Implementing TQM Principles in a Construction Company in the U.A.E.

By

Danièle Seraphim

Supervised by – Dr. Jeff Jones

A thesis submitted in partial fulfilment of the requirements for the award of a Doctorate Degree in the School of Technology, University of Glamorgan, Wales, United Kingdom.

JUNE 2006
DECLARATION

I hereby declare that this thesis is a result of developing a significant topic within the professional work of the author. As Support and Development Manager, the author was responsible for supervising the Total Quality Management implementation of the company considered in the case studies, and is therefore in a position to describe progresses, successes and failures encountered during this process.

The author’s knowledge and experience in Data Analyses, Business Administration and Total Quality Management, as well as the extensive literature review carried out, has helped her to explore the process of TQM implementation in a construction company in the United Arab Emirates.

This original research is based on the author’s comprehensive library and fieldwork. It is also based on long experience in the construction industry of the United Arab Emirates.

It is my pleasure to declare that this thesis has not been accepted in substance for a degree and is not currently submitted in candidature for a Ph.D. degree, otherwise than in this present case.

DANIELE SERAPHIM
THE CANDIDATE
DATE ________

DR. JEFF JONES
THE SUPERVISOR
DATE ________
ABSTRACT

The thesis is concerned with the implementation of Total Quality Management principles in a construction company in the United Arab Emirates.

Three case studies regarding the progress of TQM implementation in the concerned company are highlighting successes, failures and difficulties, and are assessing results through the review of Key Performance Indicators set by the organisation. Progress in TQM implementation is externally confirmed by recognitions granted by a governmental TQM award body.

Critical Success Factors, as identified through Total Quality Management literature review, are reviewed in the light of the TQM implementation experience of the company considered, and recommendations and guidelines for similar organisations are drawn from this experience.
ACKNOWLEDGEMENT

I am indebted to Dr. Jeff Jones, the supervisor of this research, for his extensive help and guidance, as well as to his wonderful wife, Kathleen, for making me feel at home in Wales, far away from home.

My gratitude also goes to Mr. Rashed Darwish, owner of Gulf Precast, who demonstrated commitment to TQM implementation, and supported my initiatives in this sense.

Total Quality Management is a team work if there was any, and the success of Gulf Precast in this regard is that of my colleagues and friends for their hard work and eagerness to make it work. This thesis reports their success.

Gulf Precast based its improvement process on the recommendations and guidance of the Sheikh Khalifa Industry Award. Thus, the award body team, led by Dr. Owen Bryn, has been a key factor in the success of the company, and as such deserve all my gratitude.

My gratitude goes also to Professor Hadi Eltigani and the Sheikh Khalifa Excellence Award team for the multiple training opportunities provided on the EFQM Model.

I would also like to show gratefulness to my mother, Marcelline Pfeffer, who took over some of my family commitments during my stays in Wales, and to my children, Marie, Carine, Melissa and Mathieu, who had to deal with a limited motherly presence for some time. Thanks also to Jess and Jo for their support.

Last, but certainly not least, I could not have completed this work without the encouragements and help of my husband, Elias Seraphim, who was always there for me, and has been my biggest fan throughout my life.

DANIELE SERAPHIM
TABLE OF CONTENTS

INTRODUCTION ......................................................................................................................... 1

1. RESEARCH OBJECTIVES ........................................................................................................ 2

2. LITERATURE REVIEW ............................................................................................................. 4

2.1. Definitions of TQM .................................................................................................................. 4

2.2. Definition of CSF .................................................................................................................... 7

2.3. Recognised CSFs for successful TQM implementation ............................................................ 8

2.3.1. Managerial Commitment and Leadership ............................................................................. 8

2.3.1.1. Top Management commitment .......................................................................................... 8

2.3.1.2. Clearly defined Mission, Vision and Values ....................................................................... 9

2.3.1.3. Changing the organisational culture ................................................................................... 10

2.3.1.4. Taking into consideration national environmental conditions ........................................... 12

2.3.1.5. Gradual TQM implementations over time ......................................................................... 15

2.3.1.6. Strategic Planning ............................................................................................................. 16

2.3.2. Quality measurement and benchmarking for continual improvement .................................... 18

2.3.2.1. Measuring the costs of Quality .......................................................................................... 19

2.3.2.2. Measuring Performance ..................................................................................................... 20

2.3.2.3. Benchmarking .................................................................................................................. 22

2.3.2.4. Balanced Scorecards .......................................................................................................... 23

2.3.2.5. Measuring TQM implementations through Awards ............................................................ 25

2.3.3. Employee Management ....................................................................................................... 28

2.3.3.1. Training and education ..................................................................................................... 29

2.3.3.2. Communication systems ................................................................................................... 30

2.3.3.3. Employee participation, involvement and empowerment .................................................. 31

2.3.3.4. Team working ................................................................................................................... 33

2.3.3.5. Working environment ....................................................................................................... 35

2.3.4. Process management ......................................................................................................... 36

2.3.4.1. Quality Engineering ....................................................................................................... 36

2.3.4.2. Six Sigma ......................................................................................................................... 37

2.3.4.3. Process mapping .............................................................................................................. 38

2.3.4.4. Business Process Reengineering .................................................................................... 39

2.3.4.5. Formal documented quality management system ............................................................. 42

2.3.5. Supplier Management .......................................................................................................... 44

2.3.6. Awareness and concern for the needs of the society ............................................................. 47

2.3.7. Customer and market focus ................................................................................................. 47

2.4. Specific issues in the Construction industry ........................................................................... 50

2.4.1. The specificity of construction projects renders some of the TQM tools difficult to implement in the construction industry ................................................................. 50

2.4.2. Working conditions: the critical importance of Safety .......................................................... 51

2.4.3. Construction Process performance: Waste reduction ............................................................ 52

2.4.4. Primary importance of Product Design ................................................................................ 53

2.4.5. Project Partnering ............................................................................................................... 54

2.4.6. Clients as the driving force towards Quality ........................................................................ 56

2.5. Specific issues in the precast manufacturing industry .............................................................. 56

2.5.1. Possible higher quality of Concrete Products ......................................................................... 57

2.5.2. Possible material, time and manpower savings, compared with in-situ construction .............. 58

2.5.3. Precast manufacturing provides a safer working environment ................................................. 59

3. COMPANY'S OBJECTIVES AND RESEARCH HYPOTHESES ............................................. 60
3.1. Company's Objectives .......................................................................................... 60
3.2. Research Hypotheses ....................................................................................... 62

4. RESEARCH METHODOLOGY ............................................................................. 64

4.1. Determine a list of Acknowledged Critical Success Factors for successful Total Quality Management implementation ........................................... 64
   4.1.1. Defining TQM and CSF ........................................................................... 64
   4.1.2. Recognised CSFs for successful TQM implementation ...................... 64
   4.1.3. Specific issues in the Construction industry ........................................... 64
   4.1.4. Specific issues in the Precast Manufacturing industry ......................... 65

4.2. Company's objectives and Research Hypotheses ........................................... 65

4.3. Critically evaluate data from an existing company's developmental work on implementing TQM, and its evolution: The cases studies .................................................. 65

4.4. Evaluations of TQM implementations ................................................................ 67
   4.4.1. The company's viewpoint of its progresses ........................................... 67
   4.4.2. Internal perception of change ................................................................. 67
   4.4.3. External assessment of the company progresses ....................................... 67
   4.4.4. Comparison between the internal views and the external one ..................... 68

4.5. Review Critical Success Factors identified during Literature Review .................. 68

4.6. Discussion and analysis of overall findings ....................................................... 69
   4.6.1. Critical appraise the evolution of TQM in the company ......................... 69
   4.6.2. Evaluation of the advantages/disadvantages in applying TQM in the UAE construction sector 69
   4.6.3. Original findings of the research ............................................................. 69

4.7. Dissertation Structure ..................................................................................... 69

5. INTRODUCTION TO THE CASE STUDIES ..................................................... 71

5.1. The company until 2000 .................................................................................. 71
   5.1.1. Characteristics of the company ............................................................... 71
           5.1.1.1. A construction company ............................................................... 71
           5.1.1.2. Located in Abu Dhabi, United Arab Emirates ............................. 71
           5.1.1.3. A fluctuating Market ................................................................. 72
           5.1.1.4. A multicultural / multilingual environment ................................. 73
           5.1.1.5. A labour intensive workforce .................................................... 76
           5.1.1.6. A workforce chosen for its skills and technical competencies ... 76
           5.1.1.7. An autocratic management style ................................................. 78
           5.1.1.8. A fast growing company ............................................................ 80
           5.1.1.9. From 1991 to 1999, a profitable company ................................. 81
           5.1.1.10. Financial results of 2000: A Record year for the volume produced; a year of financial loss. 81
   5.1.2. Before 2000: ISO & TQM, a commercial and marketing move .............. 82
           5.1.2.1. ISO certification ......................................................................... 82
           5.1.2.2. Just-in-time purchase management ............................................ 87
           5.1.2.3. Participation in TQM Award .................................................... 87
           5.1.2.4. First Action Plans ................................................................. 88
   5.1.3. End 2000 - The turning point: TQM implementation decision ............ 89
           5.1.3.1. The financial crisis of 2000 ....................................................... 89
           5.1.3.2. A Senior Management consensus on the necessity of improving ... 96
           5.1.3.3. Crisis as motivation for change .................................................. 97
           5.1.3.4. Available guideline and measuring tools ..................................... 98
6.4. Review of priorities initially set .............................................................. 180
6.4.1. Cultural change .................................................................................. 180
6.4.1.1. Communication system ................................................................. 180
6.4.1.2. Employee participation, involvement and empowerment .......... 181
6.4.1.3. Team working ............................................................................... 182
6.4.1.4. Working environment and conditions ........................................ 182
6.4.1.5. Awareness and concern for the needs of the society ............... 182
6.4.1.6. Overall review of initiatives for cultural change ..................... 183
6.4.2. Strategy ............................................................................................... 183
6.5. Reflection on company's objectives................................................................. 184

7. CASE STUDY 2 : 2002 - QUALITY INTEGRATION........................................ 187

7.1. Initial Priorities................................................................................................ 187

7.2. Detailed description of TQM implementations........................................... 187

7.2.1. Defining key performance indicators....................................................... 187

7.2.1.1. Methodology used.................................................................................. 188

7.2.1.2. Performance Questionnaire................................................................. 188

7.2.1.3. Benefits of the work on key performance indicators......................... 189

7.2.2. A second Gold Award in the Sheikh Khalifa Industry award................. 190

7.2.3. An effective Quality System................................................................. 191

7.2.3.1. Review of Quality Policy................................................................. 192

7.2.3.2. Quality Documentation reflecting the actual situation of the Company 192

7.2.3.3. Updates on the Quality System using feedback on audits................ 192

7.2.3.4. Non-Conformances are openly discussed as well as actions to prevent recurrence 193

7.2.4. Improving the Marketing................................................................. 194

7.2.4.1. Creation of a WEB Site....................................................................... 194

7.2.4.2. Reviewing the Tender Documents...................................................... 195

7.2.4.3. Participation in construction exhibition.............................................. 195

7.2.4.4. Creating Brochures and flyers for specific Products......................... 196

7.2.4.5. Creating a promotional 3D film of a virtual visit to a villa................ 196

7.2.4.6. Creating a presentation film of the Company...................................... 196

7.2.4.7. Increased Market Knowledge by systematic storing marketing information in a Database 196

7.2.5. Training.................................................................................................. 197

7.2.5.1. Coaching............................................................................................. 197

7.2.5.2. In-house Training.................................................................................. 197

7.2.5.3. On-the-job training............................................................................. 198

7.2.5.4. Training by Suppliers.......................................................................... 198

7.2.6. Improve performance measures of main Processes................................ 198

7.2.6.1. Objectives for improving Data collection and analyses..................... 199

7.2.6.2. Manpower factory productivity analyses.......................................... 200

7.2.6.3. Cost of repair analyses...................................................................... 204

7.2.6.4. Basing equipment replacement decisions on performance data......... 206

7.2.6.5. Housekeeping evaluation................................................................. 206

7.2.6.6. Detailed Feasibility studies............................................................... 209

7.2.6.7. Recruitment tests.............................................................................. 210

7.2.6.8. Improvements in Planning Activities.............................................. 210

7.2.6.9. IT Integration..................................................................................... 211

7.2.7. 360 degrees leadership evaluation....................................................... 212

7.2.8. Employee satisfaction and Welfare....................................................... 215

7.2.8.1. Salaries paid on time......................................................................... 215

7.2.8.2. Appraisal and bonus sharing............................................................ 215

7.2.8.3. Measuring Job Satisfaction............................................................... 216

7.2.8.4. Measuring labour camps satisfaction............................................... 218

7.2.8.5. Awards for Employees of the year................................................... 219

7.2.8.6. Immediate recognition of exceptional work....................................... 219

7.2.8.7. Medical clinic in the labour camps.................................................... 220

7.2.8.8. Providing social activities for the labourers....................................... 220

7.2.8.9. Suggestion Competition................................................................. 220

7.2.8.10. Safety Training for site management............................................... 222

7.2.8.11. Hiring policy giving priority to Employees' family............................ 222

7.2.8.12. Procedure set in place for solidarity among employees.................. 223

7.2.9. Improved communication....................................................................... 224

7.2.9.1. Door boards in the camps................................................................. 224

7.2.9.2. Open Door......................................................................................... 224

7.2.9.3. Inter-departmental Communication.................................................. 225

7.2.10. Improved relations with Suppliers....................................................... 225
7.2.11. Involvement in community........................................................................................................ 226
7.2.11.1. Student Summer Training....................................................................................................... 226
7.2.11.2. Cooperation with United Nation training institutes........................................................... 227
7.2.11.3. Employee involvement in cause-related initiatives............................................................ 227
7.2.11.4. Initiate Research and Development in partnership with the University............................... 228
7.2.12. Customer Satisfactions.................................................................................................................. 229
7.2.12.1. NCR statistics......................................................................................................................... 229
7.2.12.2. Customer Satisfaction Survey............................................................................................... 231
7.2.12.3. Hollowcore Quality Improvement.......................................................................................... 235
7.2.12.4. Clarification of Contractual Specification.............................................................................. 237
7.2.13. From Quality Control to Prevention............................................................................................ 238

7.3. Analysis of findings .......................................................................................................................... 239
7.3.1. The internal perspective ................................................................................................................ 239
7.3.1.1. Customer Results.................................................................................................................... 239
7.3.1.2. Business Environment results............................................................................................... 242
7.3.1.3. People results.......................................................................................................................... 246
7.3.1.4. Key performance results......................................................................................................... 249
7.3.1.5. Improvements of the period, classified according to the EFQM Model............................... 251
7.3.2. The external audit perspective .................................................................................................... 253
7.3.2.1. SKIA evaluation of the company............................................................................................. 253
7.3.2.2. Business Results category..................................................................................................... 253
7.3.2.3. Action Planning category........................................................................................................ 254

7.4. Review of priorities initially set ....................................................................................................... 255
7.4.1. Cultural change ............................................................................................................................ 255
7.4.1.1. Communication system.......................................................................................................... 255
7.4.1.2. Employee participation, involvement and empowerment..................................................... 255
7.4.1.3. Team working......................................................................................................................... 256
7.4.1.4. Working environment and conditions .................................................................................... 256
7.4.1.5. Awareness and concern for the needs of the society............................................................. 257
7.4.1.6. Overall review of initiatives for cultural change................................................................. 257
7.4.2. Improvements in the measuring system ..................................................................................... 258
7.4.3. An effective ISO Quality System ............................................................................................... 258
7.4.4. Improved customer's image ........................................................................................................ 259

7.5. Reflection on company’s objectives .............................................................................................. 260

8. CASE STUDY 3: 2003 ONWARDS - REFINEMENTS IN THE QUALITY SYSTEM.............................. 262

8.1. Initial Priorities.................................................................................................................................. 262

8.2. Detailed description of TQM implementations .................................................................................. 263
8.2.1. TQM Gap Analysis based on TQM literature review.............................................................. 263
8.2.2. Additional data available ............................................................................................................ 263
8.2.2.1. A full order book...................................................................................................................... 263
8.2.2.2. Detailed accounting provisions for the year.......................................................................... 264
8.2.2.3. Employee survey.................................................................................................................... 266
8.2.3. Improving the company’s Strategy ............................................................................................ 267
8.2.3.1. Defined processes for Strategic Plan Review, deployment and follow up.............................. 267
8.2.3.2. The inputs to the Strategic Plan.............................................................................................. 273
8.2.3.3. The Strategic Plan deployment and progress review............................................................ 279
8.2.4. Reviewing the processes for improvement using flow-charting.............................................. 281
8.2.4.1. Rationale of the process flow-charting review...................................................................... 281
8.2.4.2. Process identification .............................................................................................................. 284
8.2.4.3. Defining and flow-charting process steps.............................................................................. 285
8.2.4.4. Detailing each step.................................................................................................................... 287
8.2.4.5. List of inputs, resources, controls and outputs......................................................................... 288
8.2.4.6. Rating the satisfaction with inputs, resources and controls................................................... 289
8.2.4.7. Study of possible satisfaction improvements......................................................... 291
8.2.4.8. Table of interactions between processes................................................................. 291
8.2.5. Departments process control and measurement.......................................................... 291
8.2.5.1. Departmental statistical evaluations....................................................................... 291
8.2.5.2. Increased utilisation of contract work................................................................. 292
8.2.5.3. Measuring the performance of the processes......................................................... 293
8.2.5.4. Sustainability of performance measurement system............................................... 294
8.2.6. Aligning Human Resources with the company's Quality System............................ 294
8.2.6.1. Measuring adherence to core values................................................................. 294
8.2.6.2. Annual review of the organisation chart.......................................................... 295
8.2.6.3. Annual review of Job Descriptions...................................................................... 295
8.2.6.4. HR Gap analysis and HR recruitment Plan......................................................... 297
8.2.6.5. Generalisation of Recruitment test....................................................................... 299
8.2.6.6. Increased multi-departmental team working....................................................... 299
8.2.6.7. Sustaining the improvements.............................................................................. 301
8.2.7. Aligning Equipment and Infrastructure with the company's Quality System............. 301
8.2.7.1. Increased research on state-of-the art facilities.................................................. 301
8.2.7.2. Increasingly basing investments on feasibility studies......................................... 302
8.2.7.3. Analysis of cost of Equipment breakdown.......................................................... 303
8.2.7.4. Depreciation system based on whole life costing............................................. 304
8.2.7.5. Infrastructure Ergonomic review ....................................................................... 305
8.2.8. Continual improvement objectives........................................................................... 306
8.2.8.1. Aims of continual improvement objectives............................................................ 306
8.2.8.2. Deployment......................................................................................................... 307
8.2.8.3. Alignment within the Quality System.................................................................. 310
8.2.8.4. Follow up and review.......................................................................................... 310
8.2.8.5. Defining Action plans.......................................................................................... 311
8.2.8.6. Sustained improvement....................................................................................... 312
8.2.9. A managerial tool to grasp the Company's overall performance: Balanced Scorecard... 312
8.2.9.1. Rationale of the approach..................................................................................... 312
8.2.9.2. Objective of the approach.................................................................................... 314
8.2.9.3. The four perspectives.......................................................................................... 314
8.2.9.4. Alignment within the Quality System................................................................ 315
8.2.9.5. Review process................................................................................................... 318
8.2.9.6. Example of Balanced Scorecard......................................................................... 321
8.2.9.7. BSC implementation: success and advantages.................................................... 322
8.2.10. Customer Satisfaction Survey.................................................................................. 325
8.2.10.1. First measured indicators of customer satisfaction.............................................. 325
8.2.10.2. First analysis of measured indicators............................................................... 326
8.2.10.3. Improvement in the collection process............................................................... 330
8.2.10.4. Improved analyses of satisfaction and benchmarking information.................. 331
8.2.10.5. Alignment with the Quality System.................................................................. 333
8.2.11. Improved measurement of the cost of quality non-conformance................................ 333
8.2.11.1. Improved assessment of Failure cost.................................................................. 333
8.2.11.2. Cost of quality prevention and appraisal......................................................... 334
8.2.12. Follow-up committees are set in place................................................................. 335
8.2.12.1. Characteristics of the committees..................................................................... 335
8.2.12.2. Examples of committees.................................................................................... 337
8.2.12.3. Follow up on committee work........................................................................... 341
8.2.13. Training..................................................................................................................... 342
8.2.13.1. Evaluation of Training Effectiveness................................................................. 342
8.2.13.2. Inviting main suppliers and clients to training courses.................................... 343
8.2.13.3. Magazine circulation.......................................................................................... 344
8.2.13.4. Continuous Learning scheme............................................................................ 344
8.2.13.5. Intensive Continuous Learning scheme.......................................................... 345
8.2.14. Partnerships............................................................................................................. 346
8.2.14.1. Partnership as a Strategic Process....................................................................... 346
8.2.14.2. Mutually beneficial relations for added value in both organisations.................. 347
8.2.14.3. Partnership and feasibility studies..................................................................... 349
8.2.14.4. Partnership and process improvement............................................................... 350
8.2.14.5. Examples of partnership ................................................................. 351
8.2.14.6. Respected payment agreements with Suppliers .......................... 354
8.2.15. Emergence of Value Engineering and Partnering ......................... 354
8.2.15.1. Value Engineering ........................................................................ 354
8.2.15.2. Partnering ..................................................................................... 356
8.2.16. Benchmarking ................................................................................. 357
8.2.16.1. Internal benchmarking ................................................................. 358
8.2.16.2. Using the Award ......................................................................... 358
8.2.16.3. Using results of Customer Satisfaction Survey .......................... 361
8.2.16.4. Using Partnership with Suppliers ................................................ 363
8.2.16.5. Using Partnership with Competitors .......................................... 363
8.2.17. Improving the Marketing ................................................................. 363
8.2.17.1. Creation of a Company Brochure ................................................ 364
8.2.17.2. Creation of a promotional film on the company, integrating the following techniques:
  Film, 2D and 3D incrustations ................................................................. 364
8.2.17.3. Three dimensional computer generated mock-up of proposed final products 365
8.2.17.4. Analysis of Market Trends using the Market Research Database 366
8.2.17.5. Participation in exhibitions ........................................................... 372
8.2.18. Complete IT Integration ................................................................. 372
8.2.18.1. Outsourcing the IT System .......................................................... 372
8.2.18.2. Physical integration .................................................................... 373
8.2.18.3. Logical integration ...................................................................... 373
8.2.18.4. Data protection system ............................................................... 375
8.2.18.5. Data consultation system ............................................................ 376
8.2.18.6. Contingency plan for hardware or software failure ...................... 377
8.2.19. Process reengineering ................................................................. 378
8.2.19.1. Initial belief that process reengineering may be valueless to the company 378
8.2.19.2. First successful BPR implementation .......................................... 379
8.2.19.3. Process performance studies ....................................................... 381
8.2.19.4. Example: Study of the Mussafah Precast casting process ........... 383
8.2.20. Utilisation of quality engineering tools .......................................... 391
8.2.20.1. Rational of introducing of quality engineering tools .................... 391
8.2.20.2. Initial training on Statistical Process Control ............................. 392
8.2.20.3. Importance of a successful pilot study .......................................... 392
8.2.20.4. SPC utilisation for Mix Design cost savings ............................... 393
8.2.21. HSE improvements ......................................................................... 397
8.2.21.1. Fire evacuation .......................................................................... 397
8.2.21.2. Minimising risks relative to dangerous materials ....................... 398
8.2.21.3. Risk Analysis ............................................................................ 398
8.2.21.4. Safety Manual ........................................................................... 400
8.2.21.5. Road management system ......................................................... 401
8.2.21.6. Crane operators evaluation ........................................................ 402
8.2.21.7. Regular Camp visit by HR Manager .......................................... 403
8.2.21.8. Sustaining the improvements ....................................................... 404
8.2.22. ISO 9001:2000 certification ............................................................ 405
8.2.22.1. Approach used to prepare the certification ................................. 405
8.2.22.2. Similarities between ISO 9001:2000 and TQM .......................... 407
8.2.22.3. Quality system documentation utilisation to sustain improvements ........................................................................ 408
8.2.23. The Sheikh Khalifa Industry Award .............................................. 409
8.2.23.1. New Process of the SKIA ........................................................... 409
8.2.23.2. The Silver Level ....................................................................... 409
8.2.23.3. The Gold Level ........................................................................ 411
8.2.23.4. Obtained scores ........................................................................ 412
8.2.23.5. The diamond award ................................................................. 414
8.2.24. TQM improvement process: A endless process ......................... 414
8.2.25. The 'Quality refinement' phase as TQM maturity ........................... 415

8.3. Analysis of findings .......................................................................... 415
8.3.1. The internal perspective ................................................................. 415
8.3.1.1. Customer Results ......................................................................... 415
<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.4.1.</td>
<td>Cultural change</td>
<td>432</td>
</tr>
<tr>
<td>8.4.1.1</td>
<td>Team working</td>
<td>432</td>
</tr>
<tr>
<td>8.4.1.2</td>
<td>Communication system</td>
<td>432</td>
</tr>
<tr>
<td>8.4.1.3</td>
<td>Employee participation, involvement and empowerment</td>
<td>433</td>
</tr>
<tr>
<td>8.4.1.4</td>
<td>Working environment and conditions</td>
<td>433</td>
</tr>
<tr>
<td>8.4.1.5</td>
<td>Awareness and concern for the needs of the society</td>
<td>433</td>
</tr>
<tr>
<td>8.4.1.6</td>
<td>Overall review of initiatives for cultural change</td>
<td>434</td>
</tr>
<tr>
<td>8.4.2.</td>
<td>TQM literature review</td>
<td>435</td>
</tr>
<tr>
<td>8.4.3.</td>
<td>Process management improvements</td>
<td>437</td>
</tr>
<tr>
<td>8.4.4.</td>
<td>Relationships with key partners</td>
<td>437</td>
</tr>
<tr>
<td>8.4.5.</td>
<td>Fine tuning and alignment of the Quality System</td>
<td>438</td>
</tr>
<tr>
<td>8.5.</td>
<td>Reflection on company's objectives</td>
<td>438</td>
</tr>
<tr>
<td>8.5.1.</td>
<td>TQM implementation and organisation’s performance</td>
<td>438</td>
</tr>
<tr>
<td>8.5.2.</td>
<td>TQM implementation and stakeholders’ satisfaction</td>
<td>439</td>
</tr>
<tr>
<td>8.5.3.</td>
<td>TQM implementation and TQM award body</td>
<td>439</td>
</tr>
<tr>
<td>8.5.4.</td>
<td>TQM implementation and cultural specificity</td>
<td>440</td>
</tr>
<tr>
<td>9.</td>
<td>EVALUATION OF TQM IMPLEMENTATIONS</td>
<td>442</td>
</tr>
<tr>
<td>9.1.</td>
<td>The company's viewpoint of its progress</td>
<td>442</td>
</tr>
<tr>
<td>9.1.1.</td>
<td>Financial and commercial perspective</td>
<td>442</td>
</tr>
<tr>
<td>9.1.2.</td>
<td>Process excellence perspective</td>
<td>443</td>
</tr>
<tr>
<td>9.1.3.</td>
<td>Customer and community perspective</td>
<td>443</td>
</tr>
<tr>
<td>9.1.3.1</td>
<td>External customer satisfaction</td>
<td>443</td>
</tr>
<tr>
<td>9.1.3.2</td>
<td>Community satisfaction</td>
<td>444</td>
</tr>
<tr>
<td>9.1.3.3</td>
<td>Internal customer satisfaction</td>
<td>444</td>
</tr>
<tr>
<td>9.1.4.</td>
<td>Innovation and Learning perspective</td>
<td>445</td>
</tr>
<tr>
<td>9.1.5.</td>
<td>Correlation between the company's successes and its policy of TQM principles implementation</td>
<td>446</td>
</tr>
<tr>
<td>9.2.</td>
<td>Internal perception of change</td>
<td>447</td>
</tr>
<tr>
<td>9.2.1.</td>
<td>Rise of TQM knowledge in the organisation</td>
<td>448</td>
</tr>
<tr>
<td>9.2.2.</td>
<td>Employees' perception of “Power Distance” in the organisation</td>
<td>450</td>
</tr>
<tr>
<td>9.2.3.</td>
<td>Employees' perception of “Masculinity” in the organisation</td>
<td>453</td>
</tr>
<tr>
<td>9.2.4.</td>
<td>Internal perception of TQM initiatives</td>
<td>459</td>
</tr>
<tr>
<td>9.3.</td>
<td>External assessment of the company progresses</td>
<td>466</td>
</tr>
<tr>
<td>9.3.1.</td>
<td>Presentation of the Sheikh Khalifa Industry Award</td>
<td>466</td>
</tr>
<tr>
<td>9.3.1.1</td>
<td>What is the Sheikh Khalifa Industry Award?</td>
<td>466</td>
</tr>
<tr>
<td>9.3.1.2</td>
<td>Its mission and vision</td>
<td>467</td>
</tr>
<tr>
<td>9.3.1.3</td>
<td>The assessment model</td>
<td>467</td>
</tr>
<tr>
<td>9.3.1.4</td>
<td>Comparison with other TQM awards</td>
<td>475</td>
</tr>
<tr>
<td>9.3.1.5</td>
<td>Benefits of participation in the SKIA</td>
<td>477</td>
</tr>
<tr>
<td>9.3.2.</td>
<td>Scores obtained by the company from 1999 to 2003</td>
<td>480</td>
</tr>
<tr>
<td>9.4.</td>
<td>Comparison between the internal views and the external one</td>
<td>482</td>
</tr>
</tbody>
</table>
10. REVIEW OF CRITICAL SUCCESS FACTORS IDENTIFIED DURING LITERATURE REVIEW ................................................................. 483

10.1. Recognised CSFs for successful TQM implementation ................................................................. 483
10.1.1. Managerial Commitment and Leadership .................................................................................. 483
10.1.1.1. Top Management commitment ............................................................................................. 483
10.1.1.2. Clearly defined Mission, Vision and Values ........................................................................ 485
10.1.1.3. Changing the organisational culture .................................................................................... 487
10.1.1.4. Taking into consideration national environmental conditions ............................................. 490
10.1.1.5. Gradual TQM implementations over time ........................................................................... 494
10.1.1.6. Strategic Planning ................................................................................................................ 496
10.1.2. Quality measurement and benchmarking for continual improvement ........................................ 500
10.1.2.1. Measuring the costs of Quality ............................................................................................ 501
10.1.2.2. Measuring Performance ...................................................................................................... 503
10.1.2.3. Benchmarking ..................................................................................................................... 506
10.1.2.4. Balanced Scorecards .......................................................................................................... 508
10.1.2.5. Measuring TQM implementations through Awards ............................................................. 511
10.1.3. Employee Management ........................................................................................................... 513
10.1.3.1. Training and education ...................................................................................................... 514
10.1.3.2. Communication systems .................................................................................................... 517
10.1.3.3. Employee participation, involvement and empowerment ...................................................... 519
10.1.3.4. Team working ..................................................................................................................... 522
10.1.3.5. Working environment .......................................................................................................... 524
10.1.4. Process management ................................................................................................................ 525
10.1.4.1. Quality Engineering .......................................................................................................... 525
10.1.4.2. Six Sigma .......................................................................................................................... 526
10.1.4.3. Process mapping ................................................................................................................ 528
10.1.4.4. Business Process Reengineering ....................................................................................... 530
10.1.4.5. Formal documented quality management system ................................................................. 533
10.1.5. Supplier Management .............................................................................................................. 535
10.1.6. Awareness and concern for the needs of the society ............................................................... 538
10.1.7. Customer and market focus ..................................................................................................... 539

10.2. Specific issues in the Construction industry .................................................................................. 541
10.2.1. The specificity of construction projects renders some of the TQM tools difficult to implement in the construction industry .................................................................................. 541
10.2.2. Working conditions; the critical importance of Safety .......................................................... 543
10.2.3. Construction Process performance: Waste reduction ............................................................. 545
10.2.4. Primary importance of Product Design ................................................................................... 547
10.2.5. Project Partnering ................................................................................................................. 548
10.2.6. Clients as the driving force towards Quality ............................................................................ 550

10.3. Specific issues in the Precast Manufacturing industry ............................................................... 551
10.3.1. Possible higher quality of Concrete Products ........................................................................ 551
10.3.2. Possible material, time and manpower savings, compared with in-situ construction ............ 553
10.3.3. Precast manufacturing provides a safer working environment ............................................. 555

11. DISCUSSION AND ANALYSIS OF OVERALL FINDINGS ...................................................... 556

11.1. Limitation of research .................................................................................................................. 556

11.2. Critical appraisal of the evolution of TQM in the company ........................................................ 557
11.2.1. Overall recommendations for TQM implementation based on the company’s experience ....... 557
11.2.1.1. Securing guidance on TQM implementation ...................................................................... 557
11.2.1.2. Securing management commitment for a TQM cultural change ....................................... 558
11.2.1.3. Taking into consideration the organisation’s culture ............................................................ 562
11.2.1.4. Placing employees at the centre of the change process ....................................................... 564
11.2.1.5. Defining a strategy and aligning the organisation to this strategy ....................................... 566
11.2.1.6. Introducing both soft and hard components of TQM ......................................................... 572
LIST OF TABLES, DIAGRAMS AND FIGURES

4. RESEARCH METHODOLOGY ........................................................................................... 64

Figure 1 – Structure of the PhD dissertation .................................................................... 69

5. INTRODUCTION TO THE CASE STUDIES ..................................................................... 71

Table 1 Educational level of the staff in May 2001............................................................ 77
Table 2 TQM knowledge among the staff in May 2001.................................................... 78
Figure 2 Evolution of the Workforce in number of employees from 1996 to 2003........... 80
Figure 3 Volume of production from 1997 to 2002.......................................................... 80
Figure 4 Financial results from 1991 to 2001................................................................ 81
Figure 5 Volume of Precast Production from 1997 to 2002............................................. 82
Figure 6 Evolution of Staff employment from January 1999 to December 2000............. 91
Table 3 Scores obtained through participation in the SKIA in 1999 ................................. 98
Figure 7 Relative importance of criteria for selection of TQM tools over time ............... 101
Table 4 Comparison between the Power Distance characteristics in the workplace, according to Hofstede, and the company’s characteristics ......................................................... 109
Table 5 Comparison between the Masculine characteristics in the workplace, according to Hofstede, and the company’s characteristics ......................................................... 110

6. CASE STUDY 1: 2000-2001- START UP TO BREAK OUT ............................................ 113

Figure 8 Hierarchical levels of employees who submitted suggestions in the 2000 suggestion competition ............................................................................................................. 116
Figure 9 Hierarchical levels of employees who received prices for their suggestions in the 2000 suggestion competition ............................................................................................................. 117
Figure 10 Graphical representations of the trainings performed in 2001............................... 122
Figure 11 Results of the company in the Sheikh Khalifa Industry Award – 2000 participation round........... 122
Table 6 Survey used to assess the impact of the “Employee of the month” scheme .......... 130
Figure 12 Graphical representations of the trainings performed in 2001............................... 132
Table 7 Performance Indicators presented to the SKIA in March 2001............................. 134
Table 8 Safety performance results from 2000 to 2002..................................................... 137
Table 9 Results of the 2001 Job Satisfaction survey .......................................................... 140
Figure 13 Results of the 2001 Job Satisfaction survey ..................................................... 140
Figure 14 Organisation Chart as established by the end of 2001 ........................................ 144
Table 10 List of Action Plans prepared by the end of 2001 ................................................ 148
Table 11 Example of Action Plan prepared by the end of 2001 .......................................... 149
Table 12 Percentage of success in the implantation of the Action Plans prepared by the end of 2001 ......................................................... 150
Table 13 Appraisal Form ................................................................................................... 156
Figure 15 Competitor pricing policy Analyses available by November 2001 .................. 158
Figure 16 Market Size analyses available by November 2001 ........................................ 159
Figure 17 Market Size analyses by products available by November 2001 ..................... 160
Figure 18 Market Share analysis available by November 2001 ......................................... 160
Table 14 “Press Coverage” indicator from 1999 to 2001 .................................................. 163
Table 15 “Success when quoting” indicator from 1999 to 2001 ........................................ 164
Table 16 “Repeat Orders” indicator from 1999 to 2001 .................................................... 164
Table 17 “Customer complaint” indicator from 1999 to 2001 ............................................ 165
Table 18 “Penalties” indicator from 1999 to 2001 ............................................................. 165
Table 19 “Customer Loyalty” indicator from 1997 to 2001 ............................................... 166
Figure 19 Graphical Representation of Customer Loyalty from 1997 to 2001 .................. 166
Table 20 “Expenses on rubbish removal” indicator from 1999 to 2001 ............................ 167
Table 21 “Investment in new technology” indicator from 1999 to 2001 ......................... 168
Table 22 “Safety training” indicator from 2000 to 2001 ..................................................... 168
Table 23 “Expenditures on Sport Support” indicator from 2000 to 2001 ......................... 168
Table 24 “Appreciation letters” indicator from 2000 to 2001 ........................................... 169
Table 25 “Employee stability” indicators from 1999 to 2001..............................169
Table 26 “Safety level” indicators from 2000 to 2001 ..............................................170
Table 27 “Employee Training” indicators from 2000 to 2001................................170
Table 28 “Expenses in prayer facilities” indicator from 1999 to 2001......................171
Figure 21 Precast manpower productivity from September 2000 to November 2001........171
Figure 20 GRC manpower productivity from October 2000 to December 2001.................171
Figure 22 Hollowcore manpower productivity from February 2001 to December 2001........172
Figure 23 Sales value evolution from 1995 to 2001..........................................................172
Table 29 Evolution of Volume produced from 1999 to 2001..................................................173
Figure 24 Evolution of Net Profit/Debt from 1995 to 2001.......................................................173
Figure 25 Graphical representation of the Volume produced from 1999 to 2001.....................173
Figure 26 Improvements introduced during the first period, classified according to the EFQM Model................................................174
Table 30 Comparison between the scores obtained by the company in the 2000 and 2001-2002 SKIA participation rounds.................................................................176
Figure 27 Customer & Market Focus – Satisfaction Indicators – Percentage of Progress in 2001184
Figure 28 Human Resources – Satisfaction Indicators – Percentage of Progress in 2001..............185
Figure 29 Business Environment – Satisfaction Indicators – Percentage of Progress in 2001..............185

7. CASE STUDY 2 : 2002 - QUALITY INTEGRATION........................................................................187

Table 31 Example of Performance Questionnaires submitted to the SKIA in 2002......................189
Figure 30 Scores obtained for the 2001-2002 participation in the SKIA..............................191
Figure 31 Number of product non-conformances reported from 2002 to 2003..............................193
Figure 32 Direct cost of non-conformances from the last quarter of 2002 to the third quarter of 2003..............194
Figure 33 Example of graphical representation of productivity analysis by product......................200
Figure 34 Examples of graphical representations of productivity analysis by product and by section.............201
Figure 35 Example of comparison between the productivity of three different products.....................202
Figure 36 Example of graphical representation of the evolution of the production in volume, provided on a monthly basis to the management........................................................203
Figure 37 Example of graphical representation of productivity by projects, provided every three months to the management..............................................................204
Table 32 Example of productivity by project, provided every three months to the management...............204
Table 33 Example of repair Analyses available from February 2002 onwards..........................204
Table 34 Example of repair data by project..................................................................................205
Figure 38 Example of graphical representations of repair analyses.............................................205
Figure 39 Example of graphical representation of repair data by project......................................206
Table 35 Example of Housekeeping evaluation form (one form per section)..............................207
Table 36 Example of Housekeeping evaluation results – Comparisons between sections..................208
Table 37 Housekeeping evaluation form for Sites........................................................................208
Figure 40 Example of graphical representation of a 360 degree leadership evaluation......................213
Table 38 Questionnaire – 360 degree leadership evaluation..........................................................213
Figure 41 Job Satisfaction results for 2002, by seniority..................................................................217
Table 39 Employee wishes that would lead to satisfaction increase.............................................218
Table 40 First results of Camp Satisfaction survey.......................................................................219
Table 41 Items placed in the “Problem solving” category of the 2002 Suggestion Competition.........221
Document 1 First Mission and Vision statements elaborated by the Company..............................126
Table 42 Example of employee participation in a cause-related initiative.....................................228
Table 43 Number of non-conformances by responsibility, from December 2001 to August 2002........230
Table 44 Number of non-conformances by product, from December 2001 to August 2002..............230
Document 2 The Customer Satisfaction survey form, validated in 2002........................................234
Figure 42 Hollowcore production in volume from 2002 to 2003..................................................236
Figure 43 Number of non-conformances per volume produced, from 2002 to 2003......................236
Table 45 “Market share” indicator from 2000 to 2002.................................................................236
Table 46 “Success rate when quoting” indicator from 1999 to 2002.............................................239
Table 47 “Expenditure in Quality Control, Assurance and TQM” indicator from 2000 to 2002..............240
Table 48 “Safety level” indicators from 2000 to 2002.................................................................241
Figure 45 Graphical representation of “Expenditure in Quality Control, Assurance and TQM” indicator from 2000 to 2002.................................................................242
Figure 46 Accident frequency rate from 2000 to 2002.................................................................242
8. CASE STUDY 3: 2003 ONWARDS - REFINEMENTS IN THE QUALITY SYSTEM ........... 262

Document 3 Employee survey ................................................................. 267
Figure 47 Cost of Rubbish Removal per volume produced, from 1999 to 2002 .......... 243
Table 49 “Investments in state-of-the-art facilities” indicator, from 1999 to 2002 .......... 244
Table 50 “Amount of donation” indicator, from 2000 to 2002 ......................... 244
Table 51 “Training” indicators from 2000 to 2002 ........................................ 246
Table 52 “Employee turnover” and “Employee stability” indicators from 2000 to 2002 247
Figure 48 Graphical representation of expenditure on development, from 2000 to 2002 249
Table 53 “Expenditure on development” and “Investment based on feasibility studies” indicators from 2000 to 2002 ................................................................. 249
Table 54 “Volume produced” indicator from 1999 to 2002 ........................... 250
Table 55 Key Performance Indicators from 1999 to 2002 .............................. 250
Figure 49 Graphical representation of “Volume produced” indicator from 1999 to 2002 250
Figure 50 Improvements introduced during the second period, classified according to the EFQM Model .. 251
Table 56 Comparison between SKIA scores in the Business Results and Action Planning categories, from 2000 to 2002 ............................................. 253
Figure 51 Some Performance Indicators – Percentage of Progress from 2000 to 2002 .......... 254
Figure 52 Business Environment and Human Resources Indicators – Percentage of Progress from 2000 to 2002 .............................................. 258
Figure 53 Customer & Market Focus Indicators – Percentage of Progress from 2000 to 2002 .......... 260

8. CASE STUDY 3: 2003 ONWARDS - REFINEMENTS IN THE QUALITY SYSTEM ........... 262
INTRODUCTION

The Total Quality Management theory, which has been developed in industrialised countries to raise the performance of mass-production industries and increase the satisfaction of all stakeholders, has in recent years tentatively expanded its domain of application in two directions. Firstly, non mass-producing organisations have tried to adopt and adapt the theory. This is the case for the construction industry for example, but also the services and even government bodies. Secondly, developing countries are trying to implement the concepts, in view of generating the increase of performance which should result from their implementation, as claimed by the theory and as backed up by practical experiences in industrialised countries.

In such a context, studying the efforts of TQM implementation carried out by a construction company in the United Arab Emirates may certainly be useful. Although such a specific evaluation does not constitute a proof of whether the TQM theory is valid for all non mass-producing organisations in developing countries, it can still provide guidelines that have a more general application.

If the efforts of TQM implementation of such a company can be qualified as “successful”, has it resulted in performance improvement and a raise in its stakeholders’ satisfaction, as claimed by the theory? This corroboration implies firstly a verification of the successfulness of the TQM implementation, which is carried out both through internal assessment and external validation by a TQM governmental award body, and secondly a comparison of performance indicators levels prior to, and after TQM introduction.

Another interest of such study is to highlight and analyse difficulties and successes faced by the organisation during its TQM implementation process, which may be used, along with the study of other such experiments, as the basis for specific recommendations for successful TQM implementation in developing countries and non-mass producing industries.

Finally, it is of interest to examine how the specific environment of a UAE based construction company influenced the TQM implementation project, how the organisation had to adapt to the region’s particular culture, and thus to provide an original insight on how to take into consideration cultural specificity during TQM implementation.
1. RESEARCH OBJECTIVES

This thesis looks at the implementation of TQM principles in a construction company in the UAE. It reflects on the experiences of a particular company in the UAE, which attempted to use the TQM approach to improve its initially precarious financial and operational situation.

The investigation used the case study approach to provide data on the three stages of implementation of TQM that the company employed.

Due to the initially precarious situation of the company, and the lack of published information on employing TQM principles in the particular environment found in the UAE, the implementation was to a great extend determined by the company’s immediate perceived priorities and the need to gain approval for the researcher’s initiatives by company executives, prior to implementation.

The above constraints meant that a conservative ‘staged’ approach had to be employed and that tangible successes at each stage had to be demonstrated, prior to progressing to the next stage.

In the thesis, there are sections dealing with each stage of TQM implementation, at the end of which the data collected is evaluated and findings presented. Subsequent stages build on the findings of the previous stages.

The overall analysis and conclusions of the work provide:

1. The identification of specific factors and combination of factors found in the UAE that directly impact on the implementation of TQM in this environment.

2. A prioritisation of the factors found in order to identify ‘key’ success factors which have a major effect in successful implementation of TQM in this environment.

3. An evaluation of the advantages/disadvantages in applying TQM in the construction in the UAE.

In order to provide an objective independent overview of the company’s progress towards successful TQM implementation, the evaluation of the company through external auditing by the Sheikh Khalifa Industry Award committee was used to verify the company’s
progress, and contributed to identifying priorities for improvement, at the successive stages of implementation.

A further evaluation of meeting TQM objectives was gained through examining internal measures on key performance indicators, as well as the change in culture in the organisation between the initial and final stages of implementation.

Critical Success Factors for TQM implementation recommended in literature are reviewed in the light of the company’s experience. Both convergence and divergence between CSF identified in the TQM literature and the company’s practical experience during its TQM implementation process, are highlighted and commented upon.

The primary contribution to knowledge of this work is to provide practical guidance on applying TQM principles to the construction industry in the UAE, an environment characterised by:

1. A multi-ethnic workforce with significant intercommunication problems.
2. A strongly authoritarian management culture.
3. A very limited number of female employees.
4. A high degree of inequality between higher and lower hierarchical levels.
5. A patriarchal society where the role of women is notably different from western culture.
2. LITERATURE REVIEW

Through an extensive survey aiming towards finding out the relationship between TQM and performance of Singapore companies, Brah et al. (2002) demonstrate that TQM implementation correlates with quality performance.

Researches performed by Chapman and Al-Khawaldeh (2002) are demonstrating that mean labour productivity measurements for high-TQM Jordanian industrial companies are significantly higher than for low-TQM companies.

A study by Radovilski et al. (1996) of 235 companies that had implemented TQM reveals increases in profit, market share and productivity with reductions in defects and costs of achieving quality.

Rao et al. (2004) report that TQM companies enjoy cost-efficiency, flexibility and responsiveness. They believe that TQM can not only help save a company, but also make it profitable in a short few years.

For Agus and Sagir (2001) “TQM is not only a management tool for producing quality products and services, but also a process that leads to increased productivity and a more favourable competitive position.”

Prior to identifying what are currently the acknowledged Critical Success Factors (CSF) for a successful Total Quality Management (TQM) implementation, both TQM and CSF terms need to be defined. As the definition of Total Quality Management has evolved through time, a brief historic review of definitions according to the main “Gurus” is included, as well as the definition adopted by the author in order to assess the TQM development of a company over time.

2.1. Definitions of TQM

Possible definitions of Quality have been discussed from the earliest time. Plato, in an effort to define Quality through the example of a flute, identified that it must be the player who defines the required qualities, in agreement with the current concept of Customer focus.
The first quality theories were published by Walter A. Shewhart, who worked for Bell Telephone Laboratories in the 1920s (Shewhart, 1931), but his ideas did not spread in the West until the late 1960s.

In 1970 Juran defined Quality as fitness for purpose (Juran and Gryna, 1970), and Crosby (1980) as conformance to requirements.

However, it was not in the West but in Japan that the Quality concepts modified the performance of a whole sector: In the 1950s, the Japanese manufacturing sector, driven by several American experts in the field of quality control, managed to noticeably improve the quality of its production. Deming was a major instrument of this Japanese Quality revolution (Deming, 1986). He defined Quality as uniformity about a correct target.

Feigenbaum (1961) was the first to propose the total approach to quality issues referred to as total quality control (TQC).

For Kaoru Ishikawa (Ishikawa, 1986), quality is the quality of product, service, management, the company itself and the human being.

Oakland (1995) defines TQM as an approach to improving the competitiveness, effectiveness, and flexibility of a whole organisation. It is essentially a way of planning, organising and understanding each activity, and depends on each individual at each level.

Bryn (1995) states that “Total Quality is an acceptance that for quality to be achieved it has to be recognised that the pursuit of quality is an integral part of the whole business. Quality has to be incorporated into all departments, it has to be considered in all decisions, the pursuit of quality has to become the way of life of the business.”

For Evans and Lindsay (1999), Total Quality Management is a total, company-wide effort, through full involvement of the entire workforce and a focus on continuous improvement, which companies use to achieve customer satisfaction.

Brah et al. (2002) define TQM as a set of guiding principles and practices, as well as a philosophy, which address not only the management of quality but also the quality of management.
There are three types of definition on total quality management, as put forward by the British Quality Association: in the first, TQM can be seen focusing on the ‘soft’ qualitative characters, leading to open management styles, delegated responsibility and increased staff autonomy. The second type of definition places emphasis on the production aspects such as systematic measurement and control of work, setting standards of performance and using statistical procedures. The third type of definition is a mixture of these “hard” and “soft” features: key ingredients are “an obsession with quality, the need for scientific approach, and the view that all employees are part of the one team” (Wilkinson et al., 1992).

For Rahman (2004) the soft elements of TQM are behavioural aspects of management, such as leadership, human resource management, employee empowerment etc, and hard elements are, among others, process management tools and methods, benchmarking and JIT practices.

It may be noted that the definition of Total Quality Management is influenced by the sector in which it is applied. For example, the principle of ‘cost saving’ is rarely specified in most of the TQM definitions, but is often explicit when defining TQM in the context of the Construction Industry. The two following examples reflect this nuance:

The European Construction Institute gave in 1996 the following definition of Total Quality: “It is continuously meeting customer requirements at lowest cost, by releasing the potential of all employees – that means:

- the customer sets the standards
- reducing costs by persistently eliminating errors
- continuously improving the performance of all activity
- utilising the creativity and skills of every employee
- only doing what is required to meet customer needs, and adds value, not cost”

In their article on benchmarking for total quality construction, Sommerville and Robertson (2000) define TQM as “customer satisfaction at the lowest cost to the organisation through realising the potential of all employees within the organisation”.

The definitions of TQM may be varied but its basic principles are: customer orientation, total participation, conducive work culture, strategic focus, process management (defect prevention) and continuous improvement.
If Total Quality Management principles and tools were first applied in large goods manufacturing companies, implementations have widened to smaller manufacturing companies, construction companies, services and even the public sector, and while guiding principles stayed the same, tools had often to be adapted.

The spreading of TQM was not only in the type of corporation willing to implement its recommendations, but also geographical: from the Japan and the United States, to Europe and the rest of the world, including developing countries.

In the present study, we will adopt the following definition of TQM “a total, company-wide effort – through full involvement of the entire workforce and a focus on continuous improvement – that companies use to achieve the satisfaction of all stakeholders”.

2.2. Definition of CSF

Digman (1990) defines CSFs as the areas which must function effectively for the business to flourish.

Oakland (1995) defines them as what the organisation must accomplish to achieve the mission by examination and categorisation of the impacts. He adds that they are the minimum key factors or sub-goals that the organisation must have or need, and which together will achieve the mission.

Dahlgaard and Dahlgaard (2002) state that to achieve the TQM vision there is no quick fix. The company’s management have year by year to set up business and image goals, which when achieved will give a satisfactory balance between customer satisfaction and the various stakeholders’ satisfaction. The business and image goals are sometimes called Critical Success Factors.

Kanji and Tambi (1999) state that CSFs are the key items things that must go well to ensure success for a manager and/or organisation. They represent those managerial areas that must be given special and continual attention to facilitate a high level of performance.

This latter definition is the one that will be used in the present study.
2.3. Recognised CSFs for successful TQM implementation

Several authors have developed lists of CSFs to achieve competitive advantage through quality management. Crosby’s 14 steps (1980), Deming’s 14 prescriptive points (1982) and Juran’s trilogy (Juran and Gryna, 1970) provided the fundamental principles on which total quality is based.

Current thinking has used and developed the critical success factors proposed by the “Gurus”, and the following list represents some of the main CSFs currently quoted.

In chapter 10, these acknowledged critical success factors will be reviewed in the light of the company’s experience, highlighting whether they have been implemented by the organisation, and, if such is the case, whether they have been judged critical according to the company’s view.

2.3.1. Managerial Commitment and Leadership

The degree of visibility and support that management takes in implementing a total quality environment is critical to the success of TQM implementation (Deming, 1982; Juran and Gryna, 1970).

2.3.1.1. Top Management commitment

There is a general agreement, in the literature, that top management commitment is critical to successful TQM implementations. However, some authors warn that such commitment should go deeper than mere talks, and should be sustained over time.

In a survey carried out among quality awards winning companies, Warwood and Roberts (2004) identify “Effective leadership” as the most important success factor, with a weight of 78, against a weight of 45 for the second CSF.

Scarnati and Scarnati (2002) state that quality “must be nurtured from the top down. It is a synergetic teamwork philosophy, a group empowerment process, and a ‘can-do’ attitude that must be embraced by the entire organisation. Leadership’s responsibility is to ensure the philosophy is firmly embedded in the organisation culture. Commitment from the top is an essential ingredient for success. So important is commitment that Dr W. Edwards would not talk about quality concepts with a company unless he first had firm assurance from the highest person in the organisation.”
In their study about the possible sources for productivity programme failures, Hoffman and Mehra (1999) classify "Luke warm commitment and involvement by top management" as the first ranking major factor for failures.

Oakland (1995) maintains that the commitment of management must be a constant purpose and embrace all departments, as well as customers, suppliers and subcontractors.

Rao et al. (2004) report that management commitment to the TQM philosophy is the major contributor to the success of any quality initiative.

Nwabueze (2001), however, claims that the dominant belief that TQM must be championed from the top has misled executives to think that what is required to kick-start TQM is just mere "talk" and executive posturing, rather than focus on what is critically important to the customer. He believes that this results in the industrial landscape being littered with many mediocre attempts at TQM.

2.3.1.2. Clearly defined Mission, Vision and Values

Defining clearly mission, vision and corporate values, are thought by most of TQM researchers to be the starting point of any attempt to implement TQM principles. Managerial team work on defining Mission, Vision and Values is sometimes viewed as critical. Some authors point out that the whole organisation should be aligned with its Vision.

According to Chinowsky (2001), establishing vision, mission and goals is the starting point for all organisation endeavours; it provides each member with a direction to follow in all business practices.

Dolan and Garcia (2002) claim that both management by instructions and management by objectives give notoriously inadequate results. They state that management by values, on the other hand, is emerging as a strategic leadership tool of tremendous potential. The essential shared values become critical success elements which revolve around the structuring of objectives as instrumental intermediates. They argue that management by value is directly oriented towards the redesign of corporate cultures and thus helps leaders to guide strategic change in the company.
Daniele Seraphim – Ph.D.

Oakland et al. (2002) profess that leadership is developing and facilitating the achievement of the vision and mission, developing the values required for long term success and implementing these through their actions and behaviours.

Crotts et al. (2005) point out the importance of aligning the organisation with its mission. They define alignment as “the idea of developing and making consistent the various practices, actions, policies, and procedures that managers use to communicate to employees what is important and what is not, what has value to the organization and what does not, and what they should do and what they should not.” They claim that mission alignment is critical to organizational performance. They suggest that organisations should conduct mission alignment audits in order to identify gaps in their organisational practices, policies and procedures.

For Jaafari (2000), leadership seeks to lay the foundation for transformation, particularly in relation to the creation of a culture for continuous improvement and customer/market focus.

Ireland and Hitt (2005) point out that the “strategic leadership theory holds that companies are reflections of their top managers”, and that “one of the CEOs primary tasks is to choose a vision for the firm and create the conditions to achieve that vision”. However, according Ireland and Hitt (2005), current environmental conditions prevent single individuals from having all the insight necessary to perform this task effectively. “Insightful top managers recognize that it is impossible for them to have all the answers, are willing to learn along with others, and understand that the uncertainty created by the global economy affects people at the top as well as those lower down in the organization”.

2.3.1.3. Changing the organisational culture

There is a general agreement that a successful attempt of TQM implementation requires an organisational cultural change. Some authors point out that dissatisfaction with the present conditions helps the change process. Others highlight that a change of culture takes time, that it will undergo different phases, and that it should be strongly linked to the company’s strategy. The importance of communication is often highlighted. Some authors believe that the current culture is of importance when seeking cultural change, while others point out that a reward system linked to the sought culture might accelerate the change process.
Deming (1991) suggests that members of an organisation must experience dissatisfaction with the current situation before they will be willing to change. Recognising a need and opportunity for change is also the first step in Lewin’s (1951) classic organisational change model of unfreezing, change, and refreezing.

Bansal et al. (2001) state that to attract and retain customers to ensure a sustainable competitive advantage, organisations must focus their efforts on developing and sustaining an organisational culture that emphasises internal customer well-being as a means to attract and retain external customer patronage.

Jeffries et al. (1996) define the culture of the organisation as “all the interactions which take place between people, their relationship and the feeling engendered by their behaviour”.

Kekale et al. (2004) point out that TQM is a culture change programme that needs to “take into account the existence of subcultures with their values and beliefs”. They also highlight that the change programme faces less resistance when there is a collective feeling that the change is required in order to save the organisation.

Kerr and Slocum (2005) believe that “a corporation’s culture simultaneously determines and reflects the values, beliefs, and attitudes of its members. The values and beliefs foster norms that influence employees’ behaviour.” They believe that “the reward system represents a particularly powerful means for influencing an organisation’s culture.”

The process of change can be divided into eight steps, according to Kotter (1996): (1) establishing a sense of urgency; (2) creating the guiding coalition; (3) developing a vision and strategy; (4) communicating the new vision; (5) empowering broad-based action; (6) generating short-term gains; (7) consolidating gains and producing more change; and (8) anchoring new approaches in the company culture.

Kotter (1996) also points out that by communicating to employees the need for change and how it can be achieved is critical to the successful management of change.

Kekale and Kekale (1995) are of the opinion that the change strategy should take into consideration the present culture of the organisation, and that the “least-resistance” route should be selected, in order to increase the chances of success.
Eckermann et al. (2003) believe that whether an organisation is or is not in a conservative industry, it must foster a culture for innovation. They regard the development of a culture supportive of innovation as important as technical attributes, such as products, processes and technologies, and are in favour of an integrated approach to organisational and technical change, which should link people and technical factors.

Nwabueze (2001) claims that in an attempt to implement TQM, executives base their approach on generic prescriptions, which heavily rely on mere activities, with limited attention paid to the strategic thinking process, to the conceptualisation of an action plan, and, fundamentally, to the realignment of organisational structures, systems and processes. They do not take into consideration past history, current problems as they relate to strategic issues, market opportunities, and future scenarios when identifying the important features of the extensive culture change that must take place for TQM to succeed. He believes that there lies the cause of many TQM failures.

Using an extensive literature review, Bourne et al. (2003), established that much of the prescriptive management literature for introducing change focuses on creating dissatisfaction with today and developing a vision of the future, whilst reducing the resistance to change.

2.3.1.4. Taking into consideration national environmental conditions

While some authors believe that national environmental conditions have little relevance to successful TQM implementations, many of them, particularly when studying TQM attempts in developing countries, believe that it should be taken into consideration. However, a very limited number of studies are proposing TQM implementation models or advices, based on the national environment.

In their study about a proposed model of TQM implementation in the Palestinian context, Baidoun and Zairi (2003) report that there are few empirical studies in the literature that have attempted to identify the essentials of TQM implementation, and that all but four are studies done in developed countries. They propose practical guidelines based on both up-to-date existing knowledge of implementation in the developed countries and quality factors that are critical for effective TQM implementation in Palestinian organisations. Clearly, for these authors, the cultural environment must be at the centre of a successful TQM implementation.
Through a survey among 54 SMEs, Temtime (2003) concludes that TQM implementation should be unique to each company, and that there is no “one-size-fits-all” approach in TQM. Certain quality activities may be more appropriate for some organisations than for others. He advises organisations to take a “holistic” approach, since TQM is neither a canned programme nor a simple sum of quality tools, techniques and practices.

Hill and Collins (2000) highlight that both the internal and external environments can influence organisational change strategies and activities.

National cultures have been measured along a number of dimensions, including individualism-collectivism, power distance, masculinity-feminity and uncertainty avoidance (Hofstede, 1980).

Hofstede and Hofstede (2005) classifies Arab countries (among which the UAE) as having a large power distance (he classifies these countries in the twelfth position when comparing 74 countries or regions). According to his study, large power distance countries are characterised by employees often afraid of disagreeing with their bosses and bosses who are autocratic or paternalistic. He reports that in the workplace, the following elements can be associated with a large power distance:

- “Hierarchy in organizations reflects existential inequality between higher and lower levels.
- Centralisation is popular.
- There are more supervisory personnel.
- There is a wide salary range between the top and bottom of the organization.
- Managers rely on superiors and on formal rules.
- Subordinates expect to be told what to do.
- The ideal boss is a benevolent autocrat, or “good father”.
- Subordinate-superior relations are emotional.
- Privileges and status symbols are normal and popular.
- White-collar jobs are valued more than blue-collar jobs.”

Although less strongly, Hofstede (Hofstede and Hofstede, 2005) also classifies the culture found in the Arab countries as more masculine than feminine (thirty-first place in masculinity classification upon 74 countries or regions). He also states that independently of their countries of origin, “the range of Masculinity Index scores for men is about 50
percent wider than the range for women”. He proposes the following as masculine characteristics in the workplace:

- Management as manege: decisive and aggressive.
- Resolution of conflicts by letting the strongest win.
- Rewards are based on equity.
- Preference for larger organizations.
- People live in order to work.
- More money is preferred over more leisure time.
- Careers are compulsory for men, optional for women.
- There is a lower share of working women in professional jobs.
- Humanization of work by job content enrichment.
- Competitive manufacturing and bulk chemistry.”

Prasad and Tata (2003) believe that international conditions (e.g. socio-cultural, political-legal, economic, and educational factors) have a major influence on how quality management techniques should be adopted. They highlight that these issues have been largely unexamined in the literature. They state that for example, the UAE employs many semi-literate workers from South Asia, thus making the use of SPC and quality circles difficult.

Lagrosen (2002) highlights that no real effort has been made to study whether quality is, or should be, managed differently in different cultures. In his study about UK, Germany, France and Italy, he proposes different approaches depending on the prevailing national culture.

In their study about the Arab oil producing countries, and Qatar in particular, Al-Khalifa and Aspinwall (2000) note that from their own experience, and from the limited research available, the region is a long way from maturity in terms of total quality practices and organisational culture and climate that are needed to implement TQM. They doubt that TQM can work in an environment in which the systems/practices are hostile to its teaching.

In 2001, Al-Khalifa and Aspinwall (2001) conducted a survey of the culture of Qatar industries using the competing values framework model. It appeared that many organisations tended to be biased towards a mix of hierarchical (which implies that the
leaders tend to be co-ordinators, organisers and administrators) and rational characteristics (characterised as being results-oriented with an emphasis on productivity, performance and achievement), while the ideal cultural profile that supports TQM implementation should have group (where the leaders are considered to be mentors, sages or facilitators who actively participate) and developmental characteristics (dynamic, entrepreneurial and creative place to work where people ‘stick their necks out’ and take risks).

Thomas (2002) notes that in developing countries, labour productivity strategies cannot be easily improved by applying mechanization or equipment. He adds that the low cost of labour means that as much work as possible is labour-intensive. He views a better utilisation of workers as the key to improving productivity.

However, Whitney and Pavett (1998) are of the opinion that there is a universal set of practices that, if implemented, will lead to high performance.

2.3.1.5. Gradual TQM implementations over time

There is a general agreement in the literature, that TQM is not a quick fix. The diversity of principles and tools proposed by the literature, which creates the difficulty of how to start and where to start is often highlighted. Some authors are proposing phases of implementations. Many steps of the proposed last phases are supposed to be sustained and gradually improved over time.

Oakland (2000) and Kanji (1990) note a total quality paralysis, where organisations attempting to implement TQM are confused about where to start. This is because they are overwhelmed by so many concepts, principles, models and prescriptions.

Jeffries et al. (1996) claim that TQM implementation requires investment of time and money, whilst recognising that implementation may be difficult or confusing and take time to be understood and recommending that changes in employee attitude and culture occur at the beginning of the implementation process.

Goetsch and Davis (2003) identify three phases and twenty steps for TQM implementation. They note that some of the steps should last forever, while others are limited in time. All steps of the Preparation phase have a limited duration, while most of the steps of the Planning and Execution phases have unlimited durations.
Hradesky (1995) proposes steps for successful TQM implementation: establish critical success factors in terms of customer satisfaction, growth, competitiveness and profitability; work to change the culture of the organisation through the implementation of values and beliefs for quality; establish internal customer satisfaction agreements; match human resource capabilities with the functional needs of the organisation; design training and awareness programmes for TQM; apply appropriate tools such as ISO 9000, SPC and QFD.

Harrington (2004) believes that there is no universal best practice combination that is applicable to all organisations. While he reports the limited impact of cultural differences between countries, he highlights the importance of taking into consideration the current performance level of the organisations. He analyses which TQM practices will be effective for medium, low and high performing companies, and warns that some practices may be detrimental if introduced at the wrong time of the organisation’s evolution.

2.3.1.6. Strategic Planning

Strategic planning remains one of the most used and most important TQM tool, according to the literature review. The necessity of aligning organisational operations with the strategic objectives is often emphasised. Some authors believe that unless strategic planning is flexible enough, it may be a barrier the company’s ability to react to a fast changing environment. Finally, some authors prefer strategic thinking to strategic planning, in order to achieve maximum organisational agility.

Using a survey performed in 2002 on 708 companies on five continents, Rigby (2003) reports that “Strategic Planning” is the first tool used by organisations nowadays (89%), and that it provided the second highest satisfaction, just after “Corporate Code of Ethics”.

As there is no universally accepted definition of strategy, the following ones, although differing in content and complexity, can be used to form an understanding on the subject.

De Wit and Meyer (1998) state that “strategy can be broadly conceived as a course of action for achieving an organisation’s purpose”.

Quinn (1980) defines strategy as “the pattern or plan that integrates an organisation’s major goals, policies and action sequences into a cohesive whole”.

Page 16 of 618
Finally, Johnson and Scholes (2002) define strategy as "the direction and scope of an organisation over the long term, which achieves advantage for the organisation through its configuration of resources within a changing environment, to meet the needs of markets and to fulfil stakeholders’ expectations."

Price and Newson (2003) state that strategy implementation is accelerated by ensuring that the whole organisation is aligned with the drivers critical to strategic success. They also specify that effective strategic planning processes must have an in-built flexibility that monitors current and emerging situations with a view to updating the strategic direction of an organisation.

Munive-Hernandez et al. (2004) point out that "in order to adopt any of the competitive strategies, the various functional strategies, such as manufacturing, design, marketing, finance and human resources, must all be aligned with the competitive strategy and a competitive strategy cannot be adopted without knowledge of the capabilities of the various functions."

Lei and Slocum (2005), classify the industrial environments in four types: Fast Growth, driven by a new product concept or idea; Wild, Wild West, when fast growth is combined with technological ferment; Steady evolution, when the industry is mature and its structure stable; and Creative Destruction, when "highly mature industries face the onslaught of new technologies". For each of these types, they define a corresponding strategic approach.

According to Chinowsky (2001), successful strategic management and planning should be based on the following six areas: Vision, mission and goals; Core competencies; Knowledge resources; Education; Finance; Markets and Competition knowledge. He states that the first step in the process of moving to a strategic management perspective is to determine where current strengths exist, where gaps exist, and where the priorities will be set to build upon these answers.

In the view of Hambrick and Fredrickson (2005), a strategy must be integrated, and must consider the following questions: "Where will we be active?"; "How will we get there?"; "How will we win in the marketplace?"; "What will be our speed and sequence of moves?"; "How will we obtain our returns?".
However, Hamel’s (1996) condemnation of strategic management stated that “in the vast majority of organisations it is a calendar-driven ritual, not exploration of the potential for revolution. The strategy making process trends to be reductionalist, based on simple rules and heuristics. It works from today forward, not from the future back.”

Pelligrino and Carbo (2001) oppose Strategic Thinking to Strategic Planning, and discard the latter as a process during which strategic thinking gets lost due to the usage of cognitive simplification tools and simplified versions of reality which renders strategy shallow and nearsighted.

This position is refuted by Hambrick and Fredrickson (2005), who are of the opinion that a strategy “can evolve and be adjusted on an ongoing basis” and that it can “keep multiple options open and build in desirable flexibility”.

2.3.2. Quality measurement and benchmarking for continual improvement

Continual improvement is the objective of every quality system; this must be based on everyone’s commitment and on information, which helps make decisions aimed at improvement.

Boer et al. (2000) defined Continuous improvement, as the planned, organised and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance.

Juran (Juran and Goetsch, 1989) proposed several “measurable goals for control subjects”, that he categorised into the following major quality goals: Product performance; Competitive performance; Quality improvement; The cost of poor quality; The performance of macro processes.

Kaplan and Norton (1992) express this opinion by saying that “What you measure is what you get”. Therefore, defining what should be measured, and how, is an essential element of TQM, as the measuring system will not only apprehend, but also drive the performance of the company.

Curry and Kadasah (2002) highlight that sustainability over time is an indispensable factor of the success of total management programmes.
2.3.2.1. Measuring the costs of Quality

Measuring costs of quality was traditionally thought of as the method to determine the optimum level of TQM implementation. Some authors believe that optimum defect level being close to zero, costs of quality theories have a limited value. Reporting costs of failure is also used in improvement studies, to measure obtained results and validate the improvement approach. However, many studies are highlighting difficulties in measuring costs of quality, even when considering failure costs only, due to the importance of hidden costs. Some attempts have been made to measure costs of conformance and costs of non-conformance, based on process flow-charting.

Traditionally, so-called quality costs are divided into the following main groups suggested by Feigenbaum (1961): Preventive costs; Inspection/appraisal costs; Internal failure costs; External failure costs.

For Juran (Juran and Goetsch 1989), the cost of poor quality is the sum of all costs that would disappear if there were no quality problems. He suggests (Juran and Ireland, 1951) that an optimum level of quality could be calculated taking into consideration the failure costs and the costs of appraisal plus prevention.

Freiesleben (2004) believes that costs of quality models are no longer useful for determining an economical optimal quality level, as this optimum level is striving for best possible quality.

Oakland (1995) questions the division of the costs of achieving good quality into prevention and appraisal, as a clear distinction between them is difficult in practice, because “everything a well managed organisation does is directed at preventing quality problems”.

As noted by Freiesleben (2004), poor quality induces a variety of hidden costs, which are often neglected in cost calculations.

Due to the difficulty of measuring those traditional types of quality costs, and following today’s TQM culture were all activities are related to processes, BS 6143 Part 1 (BSI, 1992) proposes the following definitions: Process cost: The total costs of cost of conformance and cost of non-conformance for a particular process; Cost of conformance: The intrinsic cost of providing products or services to declared standards by a given,
specified process in a fully effective manner; Cost of non-conformance: The cost of wasted
time, materials and resources associated with a process in the receipt, production, dispatch
and correction of unsatisfactory goods and services.

This approach is often associated with the flow-charting of the processes, and is supposed
to allow an easier measurement of both Cost of conformance and Cost of non-
conformance, and their improvement (Aoieong et al., 2002).

Roden and Dale (2001), give an account of the difficulties faced while trying to measure
quality costs in a small engineering company. They report a strong resistance against
quality cost data collection, that was strongly linked to a blame culture, and that could
partly be overcome by the involvement of senior management. They believe that the
measured quality costs were underestimated, as the study was focusing primarily on
identifying failure costs.

In a study about cost of quality reporting in the Australian manufacturing industry, Oliver
and Qu (1999) reported that only 25.7% of the firms were currently measuring the cost of
quality in some form. Among those, only 50% calculated costs of prevention and appraisal,
while 84% measured both internal and external failure costs. They link these figures to the
fact that the majority of the firms (94%) adopted quality management practices in order to
reduce external failure costs.

2.3.2.2. Measuring Performance

There is a general agreement among the authors of the necessity for an organisation to use
performance indicators to measure its progress. Some authors believe that it will also help
identify opportunities. Some of them even believe that the performance measurement
system has a major influence on TQM implementation level, and can either inhibit or
facilitate it. The critical importance of indicators such as financial, labour productivity,
process performance or customer satisfaction is debated, while some authors are in favour
of using several types of indicators. Many authors highlight that the performance
measuring system and the strategy of the organisation should be aligned, and some of them
suggest that a review process of this alignment may be necessary. Some of them advise
companies to consider performance measurement as a process of its own, independent
from the traditional processes in place in the organisation. It is debated whether the reward
system should be linked or not to the performance measuring system.
Chapman and Al-Khawaldeh (2002) highlighted the strong link between the level of TQM principles implementation and the level of labour productivity. Therefore, measuring their level of labour productivity may be critical for organisations willing to assess their level of TQM implementation.

Hoffinan and Mehra (1999) define productivity enhancement as a process to achieve higher levels of output while consuming same or lesser amounts of input resources. They also believe that if the same level of output is reached in a shorter time period, it indicates improved productivity.

Skinner (1986) attacks management's definition of productivity programmes as results-oriented instead of process-oriented improvements, projecting a narrow vision of the organisation.

Shen et al. (2000) claim that the quality of a product or service is ultimately judged in terms of customer satisfaction, and that thus customer satisfaction benchmarking can help decision makers identify areas for improvement, make strategic decisions, and set targets on desired satisfaction performance. They highlight that a company should not only know the customer satisfaction level for its current product or service, but also know the customer satisfaction level of the competitors'.

Jaafari (2000) maintains that by using performance indicators, it should be possible to show to every employee and stakeholder that the organisation is making progress towards its goals.

Oakland (1995) considers performance measurement as a very important factor when comparing and identifying opportunities, and claims that it should include both financial and non-financial measures.

The introduction of total quality-based management frequently requires a change in organisational culture and management style, and performance measurement can be seen either to inhibit or facilitate this (Chang and Sinclair, 2003).

Kuwaiti (2004) suggests creating a new permanent post dedicated to the performance measuring process, independent from the financial controller, HR and IT functions. He stresses that the owner of the performance measuring process should have a wide
perspective of the organisation and should report directly to the CEO or the general manager. He proposes two roles for the owner: the design of the performance measuring system, and the monitoring and day-to-day management of the performance data.

Niven (2002) stresses the need for a performance measuring process and process owner to ensure continuous review and update of the measures, in order to remain relevance to strategy. He includes the review of the reward system as part of the performance measurement process.

Seijts and Latham (2005) suggest that depending upon the circumstances, an organisation should define either performance goals or learning goals. With performance goals the focus is on task performance, while with learning goals it is on the discovery of effective task processes. When employees are discovering how to carry out the various aspects of their job, learning goals should be preferred, while performance goals stimulate the development of task strategy when the task is straightforward.

Curry and Kadasah (2002) claim that when each department is trying to improve performance independently of others, it may lead to a TQM failure.

Najmi et al. (2005) highlight that for the Performance Measuring System to be and stay effective, a systematic review process is required. They claim that “a good PMS review seeks the correct balance between organisational benefits and the efforts required.” They identify three types of required reviews: On-going review of operational performance, Periodic review of the strategic indicators, and Overall review linked with the review of overall strategic objectives.

2.3.2.3. Benchmarking

There is a general agreement that benchmarking can be a powerful tool for comparison, highlighting improvement opportunities. It is either defined in a limited way as comparison against high performing competitors, or in a more open way as any type of comparison, either internal or external, within the same industry or regardless of the industry, among products or processes. Several authors point out that once gaps are identified, the improvement process should then be planned and implemented.

The BS7850 standard considers benchmarking as a non-numerical tool for implementing TQM, defining it as “Measuring your process against those of recognised leaders”.
Benchmarking aims to find the best practices in an industry, and is used to bring performance improvements that may not have occurred if only internal performance was monitored (Chang and Sinclair, 2002).

McCabe (1998) believes that an organisation needs to make sure it is keeping up with its competitors, ideally by comparing itself against proved performers.

Jaafari (2000) notes that by comparing with external leaders, gaps in an organisation’s performance can be found and improved via the application in a planned fashion of continuous improvement at each part of the organisation.

The links between benchmarking and TQM are clear: establishing objectives based on industry best practice should directly contribute to better meeting of the internal and external customer requirements (Oakland, 2003).

Goetsch and Davis (2000) highlight that the rationale for benchmarking is that it makes no sense to stay locked in an isolated laboratory trying to invent a new process that will improve the product, or reduce cost, when that process already exists.

Oakland (2003) lists four categories of benchmarking: Internal (the search for best practice of internal operations by comparison); Functional (seeking functional best practice outside an industry); Generic (comparison of outstanding processes irrespective of industry); and Competitive (specific competitor to competitor comparisons for a product or service).

2.3.2.4. Balanced Scorecards

In recent years, balanced scorecards have been proposed and widely used to measure organisational performance from different perspectives that help the company focus on its critical areas, and to translate its strategy into action. It is also viewed as a powerful communication tool. The importance of linking balanced scorecards with strategy is reinforced by some authors recently promoting the use of strategy map along with balanced scorecards. Some authors, however, report difficulties in successfully implementing balanced scorecards, while others point out that measures relative to some stakeholders, such as employees and suppliers, are not given sufficient importance in the BSC system.
Traditional accounting based performance measures have been characterised as being “financially based, internally focused, backward looking and more concerned with local departmental performance than with the overall health or performance of the business” (Bourne et al., 2003b).

Kaplan (Kaplan and Norton, 1992), who introduced the balanced scorecard (BSC) concept, claims that no single measure can provide a clear performance target or focus attention on the critical areas or business. He proposes the balanced scorecard concept as a way to allow managers to look at the business from four important perspectives, and provide answers to four basic questions: How do customers see us? (customer perspective); What must we excel at? (internal perspective); Can we continue to improve and create value? (innovation and learning perspective); How do we look to shareholders? (financial perspective).

Wongrassamee et al. (2003) view the purpose of the Balanced Scorecard as being a help to communicate and implement an organisation’s strategy, a framework containing a set of financial and non-financial measures chosen to aid a company in implementing its key success factors, which are defined in the company’s strategic vision.

By using the balanced scorecard measuring system, Kaplan states that the strategy – and not the control – becomes central to the system. Kaplan and Norton (1996) also introduced a framework to link the scorecard with the management of strategy, the so-called “strategic framework for action”. It consists of four specific processes as follows: 1- Clarify and translate vision and strategy; 2- Communicate and link strategic objectives and measures; 3- Plan, set targets, and align strategic initiatives; 4- Enhance strategic feedback and learning.

Robert Kaplan (De Waal, 2003) stated that there is a huge gap between the vision and strategy developed at the top and the things people down in the organisation are doing, and the balanced scorecard is the missing link between strategy and employee empowerment for continuous improvement. It translates the abstract strategy into clear strategic priorities and initiatives.

Gardner (2002) claims that the success of improvements can be judged only within the context of the total system, and that it is imperative for all improvements to be planned and measured in terms of the total system.
Kanzi and Moura (2002) highlight the compatibility between the balanced scorecard concept and total quality management initiatives under way in many companies.

Wongrassamee et al. (2003) in a study aimed towards comparing the two performance measurement tools that are the balanced scorecard and the EFQM Excellence model, reveal that despite having some significant differences, both approaches are developed from similar concepts.

Munive-Hernandez et al. (2004) however, note that suppliers and competitors are omitted from the BSC, and that the critical importance of people in an organisation’s success is not reflected enough.

Marr and Neely (2003) report that over 50 percent of large US firms have adopted the BSC by the end of 2000, and that among firms not currently using the balanced scorecard, 43 percent are planning to use one soon.

Bourne et al. (2003c) remark that many organisations have moved from multidimensional views of performance to building success maps that link these views together and that the best of them are now empirically testing the relations in the success map.

Strategy (or success) map is a logical architecture that defines a strategy by specifying the relationships between shareholders, customers, business processes and competencies. A strategy map makes sure that the balanced scorecard is linked to the organisation’s strategy. Currently, Kaplan and Norton are developing strategy map templates for different strategies (de Waal, 2003).

Bourne et al. (2003) report however that many organisations failed in their attempt to implement the balanced scorecard, and that successful implementation processes may take several years.

2.3.2.5. Measuring TQM implementations through Awards

TQM awards are widely thought as an excellent tool to help companies to measure their current level of performance, and to identify gaps, either from an independent point of view through participation or internally through self-assessment. Governments have recognised their importance, and many national awards have been developed. They evolve
along with the TQM theory and influence it. Sometimes, the time and efforts required for participation, is mentioned as a primary difficulty.

Lee (2002) reports that quality awards assist organisations to understand their present performance so that future progress can be targeted. He believes that they provide valuable external opinions in the form of feedback from the examiners offering organisations objective information about their current performance and helping them to identify areas of improvements.

As reported by Miguel (2001), in the pursuit of excellence, organisations all over the world began turning to quality award programmes for an evaluation and recognition such programme offer.

"Quality awards build a model of criteria and a review framework against which an organisation may face and measure itself, to examine any 'gaps'" (Oakland et al., 2002).

Lee (2002) believes that the growth and adoption of TQM in companies have to be facilitated increasingly by national governments. In order to do so, many countries have established national quality awards or business excellence awards to recognise deserving companies.

Various awards have been set up to encourage adoption of business excellence principles and provide a platform for measurement or self-assessment against world-class standards.

In the USA, the premier award is the Malcolm Baldrige National Quality Award (MBNQA). In Europe, it is the European Quality Award. Japan is the birthplace of the Deming Award. Many other countries have also established their own quality awards (Lee, 2002).

The Deming Prize was established by the Board of Directors of the Japanese Union of Scientists and Engineers in 1951. Its primary purpose was to spread quality by recognising performance improvements flowing from the implementation of company-wide quality control. Today, the Deming Application Prize has a check-list containing ten primary factors, involving the following categories: policies, organisation, information, standardisation, human resources, quality assurance, maintenance, improvement, effects, and future plans (Miguel, 2001).
In 1987, the Malcolm Baldrige National Quality Improvement Act established an annual quality award for the USA. It was created to promote quality awareness, identify the requirements for quality excellence, and share information about successful quality strategies and benefits. The criteria, used to assess an applicant’s performance are: leadership, strategic planning, customer and market focus, information and analysis, human resource focus, process management, and business results (Miguel, 2001).

In 1991, the European Foundation for Quality Management (EFQM) launched a European Quality Award framework, which is now widely used for the systematic review and measurement of operations (Oakland et al., 2002). The quality improvement enablers include the following categories: leadership, people management, policy and strategy, resources and process. Enablers impact the result categories, considering people satisfaction, customer satisfaction, impact on society and business results (Miguel, 2001). Lee (2002) highlights that the EFQM model attempts to portray the salient elements of the TQM concept.

Quality awards are not static. All of the awards’ criteria are updated periodically by the award administrators in order to represent the most current understanding of organisational quality practice and improvement (Miguel, 2001).

In his comparative study of 16 national quality awards, Tan (2002) highlights factors that influence the criteria framework of these National awards: The economic and social development of a country; The national culture; And the desire to be in line with international standards and practices.

Miguel (2001) notes that all awards programmes exemplify customer-driven quality through streamlined processes, leadership, human resource development and customer-focused strategic plans, integrated by an information and analysis system, all of them aiming at business results of various categories.

These national quality award programmes promote quality awareness, recognise quality achievements of companies, and provide a platform for sharing successful quality management initiatives (Lee, 2002).

Conti (2004) believes that award-like external assessments are highly beneficial to organisations, as it helps them to get an independent ‘measurement’ of the organisation’s
‘level of quality’. Once measured, the focus of the company should be on improvement, and to that end “diagnostic self-assessment” is needed.

Miguel (2001) reports that winners of these awards have reported that their implementation has not only improved quality but has led to improvements in market share, sales, profits, employ moral and competitiveness.

McCabe (2001) uses a classification of companies according to their level of adoption of quality management. The two upper levels of the six ones proposed are Award winners and World class.

Lee (2002) proposes a model for business excellence based on a quality award framework. He claims that as quality awards contain a set of quality criteria that encompass all areas of the organisation’s operation, and that such a premise requires the organisation to consider a holistic view of quality.

Conti (2004) points out that when quality levels, as assessed by TQM awards, enter the ‘outstanding’ range, positive differentiation is taking place and less traditional approaches start to appear, such as standardisation.

Among the shortcomings of quality awards, the time and effort required to prepare an application is often mentioned (Lee, 2002; Miguel, 2001).

2.3.3. Employee Management

As stated by Bou and Beltran (2005), social aspects are given a greater consideration during TQM implementation because responsiveness for quality is to be extended throughout all levels in the organisation.

From the start, it appeared clearly to the company that its people should be central to its TQM implementing process. It shares the belief of Bansal et al. (2001) who, like researchers and practitioners in the field of human resource management, emphasise the centrality of employees as a way to procure a sustainable competitive advantage.

Along with Rogovsky and Sims (2003), the company believes that the management practices should be people-centred in order for the organisation to be more successful.
It adopted the point of view of by Vora (2004), who states that “without looking after the well-being of your own people through trust and care, do not expect your employees to help your customers”.

### 2.3.3.1. Training and education

There is a general agreement in the literature, that training and education are central to the organisation’s adaptability, its agility and innovation level. It is generally admitted that they should be aligned both to the strategy of the company and to the needs expressed by the employees, and that its planning and assessment are crucial to its effectiveness. Communication, training and education are often viewed as strongly linked.

For Henderson and McAdam (2003), learning organisations strive to make learning central rather than an accidental activity which often goes unused. They state that a learning organisation is dependant on an expansive, reliable and efficient communication process to support the movement of knowledge from one part of the organisation to another and to ensure that relevant knowledge finds its way to organisational units that need it.

Galbreath (2002) claims that “just sending someone to train on the latest technology or tool is not sufficient unless it fits the employee’s broader personal goals.”

Goetsch and Davis (2003) link training and education to adaptability to rapid and continual change. They highlight that knowledge and skills that are on the cutting edge today may be obsolete tomorrow, and that it is critical that employees be updated constantly.

Bryn (1995) believes that education and training must be life-long, for the individual, employer and society.

In their research on successful and award-winning organisations, Oakland and Oakland (2001) highlight the ongoing commitment to investing in the provision of planned, relevant and appropriate training of these companies. Training is carefully planned through training needs analyses processes that link the training needs with those of the organisation, groups, departments, divisions and individuals.

Jaafari (2000) highlights that training and education are at the heart of success in any innovation that involves human factors.
Training needs assessment. Goetsch and Davis (2003) point out that assessing training needs can be done at two levels. Observation is one method used by managers who work closely enough with their team to detect possible needs for training. A more structured way to assess training needs is to ask employees to state their needs.

2.3.3.2. Communication systems

Every author agrees that TQM cannot be achieved without a communication system, and that its effectiveness is critical. Some authors are highlighting the need for transparency in communication in order to facilitate cultural change. It is generally specified that the information flow should be bidirectional (top-down and down-top). Some authors are pointing out the need for an effective communication system, both inside and outside the organisation. Knowledge management is a new terminology, covering the availability of relevant knowledge to all, using IT Technology. Some authors point out the critical difference between information and knowledge, and remark that information from which knowledge cannot be gained is of little interest. They state that technical solutions may not be enough, and that cross-cultural factors may render knowledge acquisition difficult.

Communication systems eliminate communication barriers within the firm and promote internal and external cooperation.

Henderson and McAdam (2003) state that effective communication and the achievement of transparency is likely to facilitate the culture change cited as being pivotal in delivering the desired organisational transformation. They add that managing people successfully requires communication and the quality of communication between people within an organisation is a crucial variable determining organisational success.

Dervitsiotis (2002) maintains that the need to develop and implement viable strategies for sustainable high performance requires that, in addition to materials and information flows within the system, one must explore ways to accommodate this third kind of flow of human communications within and between organisations. He defines Total organisation performance in the following way:

\[
\text{Total organisation performance} = \text{Performance achieved by organisational 'hard' processes} \times \text{Performance achieved by organisational 'soft' processes}
\]
Performance of organisational ‘hard’ processes = Doing the right things × Doing the right things right × Optimum capacity utilisation

Performance of organisation ‘soft’ processes = Communicating the right things × Communicating the right things right × Optimum capacity for communication

The study of Oakland and Oakland (2001) among award-winning organisations, places effective communication as an essential facet of people management, be it communication of the organisation’s goals, vision, strategy and business policies, or the communication of facts, information and data.

Knowledge management, which has for aim to share knowledge though the use of Information Technology, has emerged in recent times as a phenomenon with wide-ranging implications for organisational innovation and competitiveness (Chourides et al., 2003). It has its origin in a number of related areas, such as Human Resources Management, Total Quality Management and Information systems (Moffett et al., 2003).

Sandhu and Gunasekaran (2004) differentiate information from knowledge: “information describes how something gets done, and knowledge describes how something works.” They believe that information sharing might lead to knowledge creation, and point out that IT has, in some cases, made matters worse by exacerbating information overload.

Voelpel et al. (2005) point out that in recent years many companies launched knowledge management initiatives, but that most of them did not provide the benefits they had promised. They estimate that knowledge-sharing systems failed “because they were limited to technical solutions, and did not consider the organizational cross-cultural factors.”

Alazmi and Zairi (2003) define knowledge management as making knowledge available to the right people at the right time.

2.3.3.3. Employee participation, involvement and empowerment

The TQM theory is based on the commitment, participation and involvement of all employees, and on the ability of the organisation to use these to improve continually. There is an agreement in the literature, that it can only be achieved through effective communication, and that team work can play an essential part in this regard. Tools such as Quality circles or suggestion schemes are proposed by some authors. Others are
highlighting the importance of using KPIs (Key Performance Indicators) to measure the
degree of participation, involvement, empowerment and satisfaction of the workforce.

Bou and Beltran (2005) highlight that “the organizational culture should change towards a
climate where employee trust, commitment and participation effectively increase”, and
note the interactivity of Human Resources practices and TQM performance.

Ang (2002) notes that with the workforce today being better qualified and educated, more
aware of the choices open to them for work and career development, and with greater
mobility arising out of globalisation, one can expect employees today to be more
demanding and, at the same time, willing, able, and ready to take part in the workplace
improvement, problem solving and decision making.

Bryn (1995) states that “if quality is to be achieved it has to become the way of life for all.
Everyone must be committed and involved. It cannot be left to quality experts. They
cannot achieve quality, their role is to ensure that others understand and live quality”.

Pfeffer (2005), while analysing the reasons behind the success of five firms highlights the
critical importance of “working with people” and “seeing the workforce as a source of
strategic advantage, not just as a cost to be minimized or avoided.”

Evans and Lindsay (1999) argue that the concept of TQM will be effective only when all
employees are involved, thus emphasising the need for horizontal integration,
communication and co-operation using techniques such as quality circles, self-directed
teams and steering committees.

Suggestion schemes as well as Quality Circles are often quoted as an effective way of
employee participation. Rapp and Eklund (2002), in their study of the long-term operation
of a suggestion scheme in a Swedish company, propose the following characteristics for
their successful implementation: The suggestion scheme should be simple and easy to
adjust to new circumstances. It cannot interfere too much or take too much time of the
employees involved. Thirdly, managers committed to improvements are important.
Fourthly, feedback is necessary.

Scarnati and Scarnati (2002) believe that empowerment provides significant advantages
throughout the organisation. First, it makes people feel vital to the success of the
organisation. Second, empowerment builds commitment and a sense of belonging. Thirds, empowered people join in creating their own destiny.

Bou and Beltran (2005) highlight the link between employees' involvement in the achievement of continuous improvement and their job satisfaction level.

Oakland (2003) reports three initiatives used by organisations wishing the empowerment and involvement of their employees: 1- Corporate employee suggestion schemes, which provide a formalized mechanism for promoting employee empowerment and involvement; 2- Company-wide culture change programmes, in forms of workshops, ceremonies and events to raise awareness and empowerment to practice continuous improvement; 3- Measurement of KPIs such as labour turnover, accident rate, absenteeism and lost time through accidents. Those measured are used to identify areas for improvement.

2.3.3.4. Team working

There is a general agreement that team working is central to TQM, and that a team can outperform individuals. The primary importance of clearly defining the team's goal is expressed by all. Some authors highlight the importance of coaching the team and of using team development techniques. It is generally agreed that the diversity of the members brings richness to the team, and that team working enhances trust, communication and interdependency within an organisation. The alignment of team goals with strategic goals is viewed by some authors as critical to the effectiveness of team working.

Goetsch and Davis (2003) define a team as a group of people with a common, collective goal. They highlight that the collective goal aspect of teams is critical. Teams can outperform individuals, provided they are properly handled. Goetsch and Davis propose the following conditions: Agreement exists as the team's mission; Members adhere to team ground rules; Fair distribution of responsibility and authority exists; People adapt to change.

Kondo (2002) claims that one of the outstanding features of TQM activities is characterised by the involvement and participation of all employees in order to permit close teamwork among people from different positions, departments and activities. An important precondition for teamwork to occur is that all the members of the group fully understand and accept the group's common aims. In addition, it is often better for the
group’s members to have slightly different standpoints and outlooks, as difference makes it easier for good creative ideas to surface among the members.

The importance of aligning team goals and organisational goals is underlined by Box and Platts (2005): “If teams consist of individuals aligned with one another, and if they are aligned with the goals of the organisation, then their fullest potential can be deployed. Alignment allows the maximum energy and effectiveness to flow into achieving the desired outcomes.”

In his study on award winning organisations, Oakland and Oakland (2001) report that leading organisations place great emphasis on the value of people working together in teams, and Pfeffer (2005) points out that “teams work because of the peer monitoring and expectations of coworkers that are brought to bear to both coordinate and monitor work.”

Dean and Evans (1994) emphasise the reliance of TQM on the interdependence of different parts of the organisation and teams as having a major importance in effecting such interdependence. They classify teams as steering committees, problem solving teams, quality circles and cross-functional teams.

Oakland (2003) views teamwork throughout any organisation as an essential component of the implementation of TQM and process management, for it builds trust, improves communications, develops interdependence and the free exchange of ideas, knowledge, data and information.

He advises selecting team members, both inside and outside, the area relevant to the process or the problem under study, defining clear objectives and an agenda for each meeting, assigning tasks to team members, striving to create a climate for creativity and support within the group, and finally providing the team with regular feedback on progresses and implementations so far.

For Goetsch and Davis (2003), a critical success factor for effective team working is that teams should be coached and not bossed. Coaches give their teams a clearly defined charter. They make team development and building a constant activity, promote mutual respect, and make human diversity within a team a plus.
Providing a suitable working environment for the employees is not mentioned as critical by most of the TQM authors, although it is part of the new ISO 9001:2000 standard, and is part of employees' care in TQM awards. However, the 5-S (and Cando) concepts are aiming for clean and organised working environments, and the productive maintenance concept, based on preventive equipment maintenance tasks performed by the users, results in enhanced safety. Safety is often missing when TQM critical success factors are reviewed, except in the construction context.

5-S is a Japanese acronym which when translated mean organisation, neatness, cleanliness, standardisation and discipline. They have been referred to as the five keys to a total quality environment (Pheng, 2001). Pheng (2001) notes the similarities between 5-S principles and ISO requirements. He states that implementing 5-S principles not only promotes good housekeeping but also regular maintenance as well as constant review and evaluation of implemented quality management system.

Total productive maintenance is a manufacturing programme designed primarily to maximise the effectiveness of equipment throughout its entire life by the participation and motivation of the entire workforce (Nakajima, 1988). Ferrari et al. (2002) claim that total productive maintenance had a significant impact on all organisations which implemented it. They highlight the following targets of total quality maintenance: Maximum efficiency of the plant; An accurate definition of the plan for preventive maintenance; A diffusion of relevance of maintenance; Diffusion of workers' participation, at any level; Development of management participation in problems by implementation of small groups.

ISO 9001:2000 (Section 6.4) recognises the importance of providing a suitable work environment in order to achieve quality: “The organisation shall determine and manage the work environment needed to achieve conformity to product requirements”.

Rao et al. (2004) relate the critical importance of providing a safe working environment, as part of a TQM implementation programme: “By showing the employees that they could change things to improve their work environment, management was gaining trust, which laid the groundwork for employee involvement in other areas.”
2.3.4. Process management

2.3.4.1. Quality Engineering

Quality Engineering encompasses traditionally a number of tools used originally in the mass production industry, to improve product quality. One of the concepts is the critical importance of building quality into the product from the design stage onwards. It also relies on control, data collection, and continuous improvements. Among the tools used, Design of Experiment, Statistical Process Control and Quality Function Deployment are often quoted. It has recently received new attention, through the use of information technology to ease and enhance these tools usage, and through their adaptation to the service and public sectors.

TQM combines both ‘soft’ aspect of TQM such as Quality Management, and ‘hard’ aspects such as Quality Engineering. Taguchi (1986) described quality engineering as the technique used to improve performance and reduce functional variations caused by three types of noises, namely, environmental conditions (outer noise), deterioration (inner noise) and manufacturing imperfection.

Quality Engineering is characterised by the utilisation of tools, such as statistical process control (SPC), quality function deployment (QFD), and design of experiment (DoE) Taguchi methods (Hassan et al., 2000).

Hassan et al. (2000) claim that the emerging quality paradigm calls for quality to be “designed into the product” rather than “inspected on the product”.

Scarnati and Scarnati (2002) state that eliminating defects in the design stage, before they appear, is vital for quality.

Hassan et al. (2000) identify the following advances in quality engineering tools and techniques: Application of Quality Engineering tools and techniques has broadened to non-manufacturing areas; Quality tools and techniques have been enhanced and modified to suit new challenges in manufacturing and to satisfy the emerging quality paradigm; Significant interest is growing in the use of information technology to enhance the effectiveness of quality engineering tools and techniques; Integration of the tools is becoming prevalent.
2.3.4.2. Six Sigma

Six Sigma has recently received a lot of attention, following reports of major benefits by companies such as General Electric or Motorola. It is a philosophy aiming to control process and product variability through problem solving and continual improvement, in order to produce products having a quality close to perfection. It uses a number of quality engineering tools. The critical success factors proposed by the literature for a successful six sigma implementation are very close to those proposed for a successful TQM implementation. Some authors believe, however, that Six Sigma is not innovative enough.

Henderson and Evans (2000) note that the Six Sigma phenomenon has followed the TQM movement as the latest thrust for many companies seeking to improve their performance and effectiveness.

Scarnati and Scarnati (2002) define “six sigma” as an industry standard for defect free products. They say that although six sigma is a strategy and a philosophy by itself, it is not a quality process programme. However, the standards established for profitability are compatible with quality programmes because they ultimately lead to a vast improvement of products and services. The problem solving strategy incorporates detailed data-gathering and statistical analysis to identify sources of error and ways to eliminate them.

Ingle and Roe (2001) maintain that although technically Six Sigma means a product defect rate of 3.4 parts per million, the introduction of a Six Sigma quality programme means much more than just measuring failure rates. The philosophy is to continuously reduce product and process variation. It aims to find out, control and eventually eliminate all root causes of variation in the manufacturing process, by using statistical process control (SPC), computer simulation, short cycle manufacturing, part standardisation and supplier qualification, supplier statistical process control, participation management practices, design of experiments, measurement system analysis and failure mode and effect analysis.

Six Sigma is based on the assumption that the most economical quality level is very close to perfection, and that organisations should aim to a defect level smaller than 3.4 parts per million (Freiesleben, 2004).
Lucas (2002) believes that Six Sigma is a prime ingredient of TQM, and that adding Six Sigma to its current business system provides an organisation with almost all the elements of TQM.

Coronado and Antony (2002) report that six sigma projects can lead to a complete waste of effort, time and money, if any of the CSFs are missing during the implementation phase. He views the required success factors as: Management involvement and commitment; Cultural change; Communication; Organisation infrastructure; Training; Linking six sigma to strategy, customers, human resources and suppliers; Understanding tools and techniques within six sigma; Project management skills and project prioritisation and selection.

Jay Desai (Flaherty, 2004), who helped implementing Six Sigma at General Electric, declares that “Six Sigma does not create innovation” and that “Six Sigma is not a solution for new products or a breakthrough strategy”.


2.3.4.3. Process mapping

The aim of process mapping is to propose a graphical representation of processes. It is generally agreed that it helps to streamline the process, optimise its performance and identify weaknesses. Some authors believe that it may lead to process reengineering. A number of software have been proposed recently, to capture the complexity of the process, perform simulations, and ease comparisons between similar processes.

Gardner (2002) states that significant improvement comes from making enhancements to an organisation’s core value creating processes, and that this process starts by identifying, classifying and mapping the key processes used by the organisation.

Reding et al. (1998) claim that all business processes include some or all of a basic set of elements: operations performed directly on the product, transportation, delays, storage, decisions and controls. The fundamental advantage of process flowcharts over other forms of documentation is that they provide a graphic representation of how these elements interact. They report that carefully prepared flowcharts provide valuable insights about how to optimise process performance in terms of quality, cost and time.
Telford (1996) sees process flowcharting as a help to understand the complete process and show how steps relate; Streamline the process by eliminating redundant steps and non-productive loops; Clarify responsibilities; Show what the inputs and outputs of each step are; And identify bottlenecks and weaknesses in the process.

He proposes using the following methodology: Define the process; List the steps involved; Identify responsibilities and subsidiary steps; Draw the diagram; Analyse the flowchart. He advocates a further analysis of each step, highlighting responsibility, inputs and outputs, customers and suppliers, and measurements.

Sacks et al. (2004) claim that detailed information flows captured in the process model provide a view of the complexity of information processing occurring in the detailed activities. They used this technique to explore operational process differences between several precast manufacturers. They report that companies participating to this study were able to examine their practices in fine detail, in many cases leading to reengineering of their processes.

Balasubramanian and Gupta (2005) note that formal analysis of business processes is not easy, and that “among other things there is no one-way to represent processes and there are no standards on granularity of activities and the information that needs to be captured.”

Sandhu and Gunasekaran (2004) highlight that processes affect more than one part of any organisation and that synergetic efforts are required to ensure an overview of the whole process. “The basis of the process view is embodied in the principle that, for organisations to be more efficient and effective, the various functional areas need to work together towards a common goal.” They note that “processes involve cooperation, dependencies, different roles, and the various contributions of people, resources and information”.

Greenfield (2002) advocates using a process simulation software to understand complex processes and identify the optimal way to serve customers and shareholders. He defines simulation as a technology which enables the accurate analysis of business processes, through the computerised version of a flowchart design format.

2.3.4.4 Business Process Reengineering

The principle of BPR is a complete fresh start, a total restructuring of the organisation around radically redesigned processes. There are noted differences of opinion in the
literature of whether BPR is effective or not. BPR is sometimes perceived as a risk, creating organisational instability. It is sometimes criticised as too narrow, incapable of dealing with organisational change, apart from process change. It is often opposed to TQM, as radical change versus continuous improvement, but several authors are viewing those two approaches as compatible, claiming that both approaches may be used within an organisation, depending on the effects one wishes to achieve. Some authors are differentiating the original radical BPR with a second generation of BPR recommendations which are close to the TQM ones. The difficulty of reengineering, based on external best practice, is sometimes highlighted. Some authors advocate the use of Business Process software Simulation as a way of testing different process designs and reducing the risk of change.

BPR was first introduced by Hammer (1990), in his article “Reengineering work: Don’t automate, obliterate”. He observes that in the fiercely competitive environment of the 1990s, most businesses adopt measures such as rationalisation and automation to improve their organisation, or spend millions of dollars to improve or implement new information technology. He believes that these efforts do not truly improve business operations, but serves only to strengthen false working processes. For Hammer, the key issues of BPR include organisational redesign, process reorganisation, and use of information technology.

Maull et al. (2003) report that if some organisations claim successful performance improvements using the BPR approach, other studies are showing failure rates as high as 70 per cent. Valentine and Knights (1998) claim that “survey evidence has revealed a failure-rate of anything between 25 per cent and 70 per cent, with one study revealing that only 16 per cent of executives were fully satisfied with their BPR programmes”.

Selladurai (2002) reports that “TQM takes a moderate amount of risk by working with existing processes whereas BPR assumes a high risk in its efforts, including doing away with the existing methods of operation”.

Cao et al. (2001) believe that BPR requires a more holistic approach, as its current lack of success is strongly linked to its incapability of dealing with other types of organisational changes, apart from process change. They link BPR failures with an over-focus on process that ignores the behavioural change as the key to organisational success.
Hill and Collins (2000) oppose TQM, which they view as an incremental approach to change and Business Process Reengineering (BPR) as a radical innovation change strategy. They suggest that both approaches can be integrated and complementary. Through case studies, they demonstrate that both incremental and radical approaches to change can play a critical role in shaping an organisation’s capability to support its own strategy. They state that transformation requires a culture which questions conventional mindsets and fosters the ability to be self-critical, as well as the maturity and creativity to learn from, and act on, what is discovered. Much of this can emanate from a TQM foundation.

Valentine and Knights (1998) are differencing “radical BPR” as proposed by Davenport and Short (1990) and Hammer (1990) with “second-generation versions of BPR”. They state that “Radical BPR” is implemented top-down with employees being passive recipients of the changes, that it might generate organisational instability, and that “BPR axes are falling departmentally rather than across the organisation as a whole”. “Revisionist BPR”, however, looks for a closer alignment between “human” and “technological” issues and takes into consideration the cultural context of the organisation. They claim that “the language of revisionist BPR demonstrates a number of parallels with normative TQM discourses” and that from an operational point of view, differences between TQM and BPR are limited.

McCabe (1998) believes that business process re-engineering is complementary to TQM. Selladurai (2002) proposes to integrate the TQM and BPR approaches. He suggests that both TQM and BPR together rather than separately would be more beneficial to an organisation.

For Biazzo (1998), “the term BPR has proved to be an attractive banner under whose shade it has been possible to initiate and legitimize even the most disparate projects for organizational change.” He believes the reengineering concept does not take into consideration the complexities of organising, and should therefore be forgotten.

Goetsch and Davis (2003) compare benchmarking and reengineering. They state that benchmarking involves partnering with the owner of a best-in-class process so that the organisation might adopt or adapt that process without having to spend the time and energy to try to design a duplicate of the superior process, while process reengineering requires
the organisation to do the latter on its own. In their view, process reengineering should only be used when benchmarking is impossible.

Andersson et al. (2005) point out the difficulty of reengineering based on external best practices: “Borrowing a best practice from another organization cannot be done literally. We need to abstract from details in order to introduce the best practice in a new environment. Furthermore, before trying to take over somebody else’s best practice, we need to be sure that we are borrowing from the process that has the same nature as the one we want to substitute with the best practice.”

Greasley (2003) proposes the use of Business Process Simulation in order to carry out scenario analysis, upon which “realistic assessment of the need for, and results of, change” can be obtained, minimising the risk of change often associated with the BPR concept.

2.3.4.5. Formal documented quality management system

There is a high disagreement within the literature of whether documented quality management systems such as ISO 9000, result in performance improvement. If some view their use as the first step or the basis towards TQM, others are reporting possible negative effects on the change abilities of an organisation or the lack of correlation between certification and performance. It is generally agreed that the new 9001:2000 version is nearer to TQM principles than the previous one. Some authors are suggesting that a measuring system of compliance with the standard should be introduced, closing the gap between ISO standards and TQM awards.

The ISO 9000 family of standards was launched to the world community in 1987, after a process of consensus handled by ISO Technical Committee 176. ISO 9000 was widely accepted from the start, particularly in Europe, Australia and the United States. With the feedback of members of the ISO, the standards underwent a series of revisions in 1994 and another more fundamental one in 2000 (Chini and Valdez, 2003).

For Bryn (1995), standards are tools that do not achieve quality, but can provide the means to achieve quality when properly applied.

Martinez-Costa and Martinez-Lorente (2003) report the dissensions in the literature between authors who report the positive impact of ISO certification on firm performance, and those who report the lack of correlation between those two elements. Their own study
does not confirm the existence of a positive relationship between the ISO 9000 certification and the value of a company in the market.

Pheng and Fond (2002) report that previous versions of ISO 9000 were criticised by many as being too quality control oriented and behind the times in its quality management concepts. If positive impact of ISO 9000:1994 upon firms’ competitiveness were often reported, some negative effects were also highlighted, such as ‘unnecessary’ bureaucracy and paperwork, increased costs and stifling of innovation. They claim that the introduction of ISO 9001:2000 should act as a better foundation for firms to head towards TQM. They identify eight quality management principles on which the version is based: Customer focus; Leadership; Involvement of people; Process approach; System approach to management; Continual improvement; Factual approach to decision making; Mutually beneficial supplier relationship.

While positioning quality models according to their TQM content and to their purpose (standardisation or differentiation), Conti (2004) proposes the following: ISO 9001:1994 has a high standardisation and a low TQM content; ISO 9001:2000 has still a high standardisation but a higher TQM content. ISO 9004:2000 has a lower standardisation and a high TQM content; Award models can encompass either low standardisation or differentiation, and have a high TQM content.

Curry and Kadasah (2002) claim that only sustainable TQM and integration of different quality management in initiatives will convince business managers of the benefits to be accrued. They believe that a positive step in this direction has been the changes made to the ISO 9000 standards to bring it in line with TQM principles, and that there is now a stronger correlation between ISO 9000 and TQM.

In their study of Jordanian industrial companies, Chapman and Al-Khawaldeh (2002) suggest that ISO 9000 is an excellent, perhaps essential, foundation for TQM principles because it provides management and employees with the knowledge and expertise to build, improve and maintain the total quality approach. They emphasise the complete compatibility of the ISO 9000 approach and the total quality philosophy.

Scarnati and Scarnati (2002) see the ISO certification process as a precursor to quality. They state that the process requires an organisational effort to define policies and procedures that may lead to excellent products or services. ISO certification requires that
employees be empowered in the design and implementation of procedures that map practices for the delivery of products and services.

Conti (2004) suggests harmonizing the ISO 9001 certification and the awards assessment, in the sense that the standard should quantify the degree of compliance of the assessed system using a reliable scoring system. He proposes that ISO assessments should at least propose a rudimentary measuring system, in the form of four quality ranges: insufficient, sufficient, good or outstanding. He points out that precise assessment procedures and scoring standards would also be beneficial to assessors, helping them to better articulate their judgement.

### 2.3.5. Supplier Management

There is a general agreement that managing suppliers effectively is of major importance in an environment where organisations become more and more specialised, as product quality can only be achieved if all elements brought into it, including supplied ones, are of quality. The importance of moving from adversarial to cooperation/partnership relationships is often pointed out. Just-in-time supply is viewed as an important effectiveness improvement for an organisation. Some authors advocate selecting a unique partner supplier for a given material/service, while others point out that too much dependency may have its drawbacks, and some are proposing a rationalisation of the optimal number of suppliers. Segmentation is often used as a basis of rationalisation, with specific strategy adapted to each segment. The importance of aligning Quality Systems and performance goals within the supply chain is sometimes highlighted as critical.

Relationships between an organisation and its suppliers have traditionally been characterised by adversarial activities such as low-bid process, in which at least one and often both parties lose. Buyers use their leverage to force suppliers to absorb costs to win the low bid, and suppliers look for ways to minimise their losses by barely meeting the buyer’s specifications. It is therefore critical to move from these traditional relations, to supplier partnerships relations (Goetsch and Davis, 2003).

Oakland et al. (2002) claim that partnership relationship should be created with suppliers to form value adding supply chains.
Daniele Seraphim – Ph.D.

Oakland (2003) emphasises the importance of purchasing in partnership, and highlights the critical role of communication with external suppliers. He rejects the inspection-oriented quality system for brought-in parts and materials as being expensive, imprecise and impossible to apply evenly. He advocates single sourcing as the best basis for partnering.

The April 2005 issue of “Supplier selection & management report” (loma, 2005), advocates “an effective supply base rationalization process”. It recommends to analyse the current spend data, to segment them in spend categories, and to decide on a supply strategy for each category. It highlights that the “benefits of supply base rationalization are realized when the buying firm is able to work more closely with the retained suppliers, strengthening the relationship, fostering continuous improvements, and finding ways to add value throughout the supply chain.”

Reporting on the Supply strategy used by Clarke American (2001 Malcolm Baldridge Award Recipient), the May 2005 issue of “Supplier selection & management report” (loma, 2005b) notes that the company used both internal segmentation of suppliers and “Supply Preferencing” which takes segmentation to the supplier. “With supplier preferencing it’s the supplier who does the rating, considering the attractiveness of the account versus its relative value. If relative value and attractiveness are both right, the potential exists for a long-term relationship, perhaps a partnership”.

Sadler (1995), states that an important aspect of the overall change brought about by a TQM approach is a changed relationship with suppliers. He calls for ‘sustained collaborative relationship with suppliers’.

Gordon (2005) highlights the importance of aligning performance goals: Organisations pursuing continuous improvement programmes and methodologies need to have key suppliers aligned with their own organisational direction. As an example, he states that “if a company is pursuing lean and just-in-time deliveries, key suppliers need to be on the lean journey themselves, because lack of synchronization can adversely impact cost, quality and delivery”.

Poirier and Houser (1993) claim that the price-only approach to buyer-supplier negotiations should be eliminated. Product features, quality, and delivery issues should also be part of the negotiations.
The prohibitive cost of holding large stocks of components and raw materials has pushed organisations to adopt the ‘just-in-time’ concept. As this requires that suppliers make frequent, on time, deliveries of small quantities of material, parts or components, it requires an effective supplier network that can be trusted to conform to the real requirements (Oakland, 2003).

Beckford (2002) reports several drawbacks: The buying organisation may close itself off to other options, and may reduce its leverage in price negotiation with the supplier, particularly when supplier power is high. It becomes vulnerable to changes in strategy, tactics or performance by its supplier. From the supplier’s perspective, becoming the sole source of supply to an organisation may involve dedicating a significant proportion of its production to this client, which increases the vulnerability of the supplier to any change of product or strategy on the client’s part.

Bowon and Heungshik (2005) claim that a decision-making process dominated by one party in the supply chain is not sustainable, and that partners can expect better performance from their collaboration when both of their perspectives are accommodated equally.

For Favilla and Fearne (2005) there are four main requirements for a successful supply chain project: 1 – The right leadership. They claim that top executives must be actively involved in the entire project. 2 – The right business focus. They view supply chain transformation projects as business improvement projects, not IT projects. They claim that supply chain goals must be aligned with overall business objectives. 3 – The right approach. They recommend the use of a proven implementation methodology, using a phased approach. 4 – The right results. They claim that it is important not only to train users in the new software, but also to prepare them for change through involvement in the project, in order to minimise change resistance. Finally, they add that “to measure their achievements, companies should define a series of key performance indicators.”

Simatupang and Sridharan (2005) concentrate on identifying the possible deficiencies in the supply chain, claiming that “the main trigger that drives the chain members to redesign their interorganisational structures is deficiency”. Among these deficiencies they identify disintegrated measures of performance, and define it as a situation where chain members measure their performance according to “individual metrics isolated from the entire goal because each player has been managed as a single entity”. They identify several reasons...
for disintegration: “First, the chain members simply do not have performance measures of
the entire chain. Second, there is a bias towards internal measures rather than overall
measures.” They point out the flawed assumption that “the sum of local optimisation taken
by individual members is equal to the total improvement”, as a reason for supply chain
discontent.

2.3.6. Awareness and concern for the needs of the society

Although corporate social accountability is part of the criteria of TQM awards, it is rarely
mentioned in the literature as a critical successful factor for TQM implementation. When
mentioned, it is viewed either as compatible with TQM principles, or as a constitutive
element of the organisation’s quality system.

Gentili et al. (2003) believe that TQM, corporate social responsibility and strategic
performance, can be successfully interlinked, and that only then can the organisation create
economic, social and environmental value.

One of the underlying concepts of the EFQM Excellence model is Corporate Social
Responsibility. It is described as the engagement of the organisation to meet and exceed
the expectations and regulations of the local and global community, and the awareness of
the organisation’s impact on both the current and future community. The model states that
“Excellent organisations comprehensively measure and achieve outstanding results with
respect to society”.

Oakland (2003) believes that environment and corporate responsibility should be part of
the policies and strategies of a TQM organisation.

For Ahmed and Machold (2004), ethics and organisational morality should be an integral
part of quality management. They suggest that TQM must embed more deeply and firmly
the issue of virtue and social responsibility within its domain of content, as quality and
ethics are intimately related.

2.3.7. Customer and market focus

The TQM theory was built around the concept of customer focus and satisfaction. For
many authors, it remains the foundation of TQM principles. Some of them point out that
TQM organisations should not only satisfy their customers, but delight them and anticipate
their requirements through in-depth market knowledge, in order to foster loyalty.
Measuring customer satisfaction or loyalty is generally considered of major importance, and customer satisfaction surveys and direct communication are often proposed as useful tools to that effect. As some employees may not be in direct communication with external customers, and therefore may have difficulty to relate the concept of customer focus, some authors are proposing the concept of internal customer satisfaction. In recent years, particularly with the implementation of TQM in the service sector, some authors are proposing to shift the focus from customers to employees, as satisfied employees will endeavour to satisfy customers.

In his article examining success in the Relationship age, Galbreath (2002) maintains that customer satisfaction does not necessarily translate into loyal or profitable customers. Being merely “satisfied” implies that the customer is sitting at the point of indifference. Loyal customers, on the other hand, not only buy again and again, but they tend to be less price sensitive because they perceive more than just dollars-and-cents value from the relationship. He also highlights the importance of knowing the customers.

Bryn (1995) notes that customer expectations are evolutionary. “What they were pleased with yesterday, they will complain about tomorrow. To achieve quality consistently it is necessary to research and anticipate their needs.” Thus, he believes that market research needs to be part of the quality system.

Goetsch and Davis (2003) claim that continual communication with customers is essential in a competitive marketplace. Establishing effective mechanisms for facilitating communication and then making sure the mechanisms are used are critical strategies in establishing a customer focus.

Encouraging customers to express their complaints as well as effective and timely resolution of these complaints are seen by Bryn (1995) to be vital to retain customer loyalty. He states that “research indicates that among those who are not happy and don’t complain, over 90 per cent do not come back. Among those who do complain and have their complaints resolved quickly over 80 per cent return”.

Karapetrovic (2003) notes the expansion of the old meaning of quality as the ability to satisfy the customer, in two directions: The ability to deliver excellence to all interested parties. He claims that along the first direction of change, there is an extension from the ability “to satisfy” to the ability “to deliver excellence”. On the other hand, no longer is the
customer the only party to satisfy or deliver excellence to. A typical company must also satisfy the needs of the surrounding community, employees, investors, society, and a myriad of other stakeholders.

Building magazine (2002) reports that regular measure of customer satisfaction is an effective way of keeping track of what clients really value and ensuring the focus on often rapidly changing needs. The article advocates that in order to find out what the customer really thinks organisations should appoint independent people to interview the client on a one-to-one basis.

Craig and Roy (2004) believe that customer-satisfaction measurement is one of the primary means for focusing an organisation on the customer, and that those measures should be used to identify priority areas for improvement.

Allen et al. (2005) “surveyed 262 firms and found that 80% believed they delivered a ‘superior experience’ to their customers.” But when they asked customers about their own perceptions, they found that only 8% of the companies were rated as delivering a superior experience. Allen et al. (2005) also highlight the importance of targeting customers that will act as the company’s growth advocates, on top of most profitable companies.

Ishikawa (1985) defined the concept of internal customer as “the next process is your customer”.

Bryn (1995) states that in an organisation each individual should consider the relationships with those around in terms of supplier-customer links.

Vora (2004) claims that employee satisfaction is a prerequisite to achieving customer satisfaction, as “without looking after the well-being of your own people through trust and care, do not expect your employees to help your customers”.
2.4. Specific issues in the Construction industry

2.4.1. The specificity of construction projects renders some of the TQM tools difficult to implement in the construction industry.

There is a general agreement among the construction literature, that TQM principles are relevant or partially relevant to the construction industry, but that many tools developed for the mass production industry can either not be used or should be adapted to a sector in which each project is specific.

Chini and Valdez (2003), note that the construction end product is not a repetitive unit, but an endeavour that may be unique in its design and composition. By this characteristic it defers considerably from the mass production industries in which TQM principles were first implemented.

Jaafari (2000) notes that if the concept of TQM is particularly suited to manufacturing and similar operations where the production cycle is repetitive and one is able to establish feedback loop, the opportunity to apply TQM in the construction industry is limited, due to the fact that construction operations are typically short lived and diverse.

Using a survey carried out in the U.S. Construction industry, Chini and Valdez (2003) highlight that Construction companies have experienced difficulties in implementing ISO 9000, generally related to documentation requirements, which is perceived as slowing down the construction process and generating bureaucratic procedures. However, they maintain that ISO 9000 is an applicable tool for construction firms.

On the other hand, Jaafari (2000) reports that the imposition of QA standards has not necessarily improved the construction industry’s capabilities to meet the needs of its customers more cost-effectively, nor has it led to any product cycle time reduction or cost savings.

Aoieong et al. (2002) highlight that due to the complexity of construction processes, measuring quality costs is often difficult, and most of the time limited to failure costs. They report that a recent survey carried out in Hong Kong indicates that the respondents do not measure costs related to defects.
Love et al. (1999) state that a lack of available benchmark metrics in the Construction industry has made it difficult, if not impossible, for organisations to identify areas to target for process improvement.

Jaafari (2000) claims benchmarking is difficult in the construction industry, where project orders are highly diverse, the best practice is also dependent on the unique characteristics of a project under consideration, including the project environment, owner expectations, and other situational variables.

Love et al. (2000) also consider that rework costs are very rarely, if ever, measured by construction organisations.

Jaafari (2000) reports that the BPR movement has had little impact on the construction industry to date, and that many construction management writers are sceptical about BPR application to construction projects.

2.4.2. Working conditions: the critical importance of Safety

If providing a safe working environment is sometimes proposed as a factor of Total Quality Management when considering its principles regardless of the type of industry, it is central in the Construction Industry, were Safety risks are high. In the literature, Quality in Construction has to include Safety concerns.

In his study about Construction Engineering, Koeln et al. (2003) claim that quality, environmental and safety programmes not only assure a quality product but also reduce costs, and enhance productivity.

In the United Kingdom, the government initiatives towards reduction of accidents are a driving force towards a safe construction working environment, and reports such as “Zero Injury Techniques” are proving companies with studies and help in this regard.

The term ‘safety culture’ has gained international popularity over the last decade. Mohamed (2002) views safety culture as a sub-facet or organisational culture, which affects workers attitudes and behaviour in relation to an organisation’s on-going safety performance.

Jannadi and Almishari (2003) propose risk assessment as a tool towards an increased safety. They define Risk assessment as a technique that aims to identify and estimate risks.
to personnel and property impacted upon a project, and safety as the adoption of attitudes and the provision of resources within an organisation to mitigate the risks involved in any activity necessary for the achievement of organisational aims. They propose calculating the assessment using the following formulas:

\[
\text{Risk Score} = \text{Severity} \times \text{Exposure} \times \text{Probability}
\]

\[
\text{Justification Factor} = \frac{\text{Risk Score}}{\text{[Cost Factor} \times \text{Degree of Correction]}}
\]

Mohamed (2002) is proposing adopting the balanced scorecard tool to measure the safety culture in construction, arguing that it would ensure that a holistic view of safety is used for strategic reflection and implementation.

### 2.4.3. Construction Process performance: Waste reduction

There is a general agreement in the TQM literature that wastage in construction can be high and should be reduced in order to increase profitability and efficiency. The difficulty of data collection in this regard is often highlighted, due to the specificity of every construction site. Some authors concentrate on material wastage reduction or output variability control, while others believe that reducing workflow variability is more relevant to the construction industry.

Studies have shown that considerable savings could be made through waste reduction in the construction industry (Formoso et al. 2002). Ball and Maleyeff (2003) define Lean Management as “a total business approach designed to identify and eliminate forms of waste in the process of producing goods, services, or combinations of both”. Lean construction is the application of this concept to the construction industry. Waste can be defined as the loss of any kind of resources – materials, time (labour and equipment), and capital – produced by activities that generate direct or indirect costs but do not add any value to the final product from the point of view of the client (Formoso et al. 2002).

Waste can be reduced by reducing processing variability and flow variability (Santos et al., 2002).

Richard O’Connor (Pedder, 2002) proposes applying the lessons of the automotive industry to the construction industry, and to reduce waste by observing employees at work and eliminating resource bottlenecks. He proposes to balance the input against the output.
On the other hand, Thomas et al., (2003) suggests that reducing workflow variability does not necessarily lead to better performance, and that in the construction industry, better labour performance occur when the variability of workflow is matched by the requisite flexibility (variability) in labour flow. He maintains that as variability in construction output at the crew level is inevitable, even on high performing projects, changes in workflow should be matched with flexible work assignments. He suggests that multi-skilled labourers, allocation of labourers to other production tasks when required, and overtime may be used to match the variability of the sites.

Thomas et al. (2002) advocate assessing the daily amount of work available and adjusting work hours accordingly, in order to maintain low variability in labour productivity. They propose the following techniques: “Work hours can be adjusted by reducing crew sizes, shortening workdays, or making alternate work assignments.”

In his study about a multiskilled workforce, Haas et al. (2001) report that several researches have demonstrated the benefits of multiskilling, including labour cost saving, reduction in required total hires, increase in average employment duration for workers per project, improved quality, improved safety and the added flexibility in assigning tasks by field managers.

**2.4.4. Primary importance of Product Design**

TQM principles highlight the importance of bringing Quality from the design stage of the product, and that failure to do so will result in important quality costs during the manufacturing process. If the paramount importance of Quality during the Design phase of product has been well understood in the mass production industry, it has been less so in the construction industry, where each product is unique, and where spending time on a one off design is felt as both costly and time consuming. There is a general agreement in the TQM construction literature that the project design phase is of critical importance to improve efficiency and reduce wastage, and value management is sometimes proposed as a valuable tool in this regard.

Cnudde (1991) researched the origin of failure costs in the construction industry, and reported that 46% of total deviation costs were created during design, compared to 22% ascribed to construction deviations, which were due to poor execution of work.
Koskela (1992) suggests that it “sometimes seems that the waste caused by design is larger than that of the cost of the design itself”.

In their study about direct failure rework costs in Swedish Construction companies, Josephson et al. (2002), measured that design-related causes are the largest contributor to the overall rework costs, with a percentage of 26%.

The importance of the design stage has brought forward the concept of Value management in the construction industry. Barton (2000) defines Value Management as “a structured, facilitated, process in which decision-makers, stakeholders, technical specialists and others work collaboratively to bring about value-based outcomes in systems, processes, products and services”. Value Management studies are not only used to seek alternative solutions for cost saving, but are also widely applied to facilitate strategic decisions, to enhance communications and to reach a consensus among stakeholders, to define the scope for a proposed project, and to set priorities for the requirements of a project.

2.4.5. Project Partnering

Project partnering in construction has received a lot of attention lately in the construction industry, with reports of substantial savings and added customer value. It implies a preliminary agreement among all parties of a construction project, including all suppliers and customers, to shift from the traditional adversarial relationship to cooperation, through increased communication in view of selecting synergic solutions in an atmosphere of mutual trust. Project partnering is often promoted by governments as a successful means to improve the construction industry effectiveness, and is generally initiated by the client.

Although partnering is not specific to the Construction industry, it has been viewed as one of the most innovative developments in delivering a construction project efficiently and reducing construction disputes (Chan et al., 2004).

In some countries like the United Kingdom or Australia, governments try to influence the strategy of the construction industry. Reports such as “Constructing the Team” (Latham, 1994) and “Rethinking Construction” (Egan, 1998), have encouraged construction companies to perform radical changes, from a focus on productivity and quality control to a whole life value; more openness and long-term relationships through strategic partnering; public-private partnerships; and greater use of off-site fabrication. These government
initiatives have greatly influenced the strategy of the construction companies in these countries.

Total Quality Management strives to “satisfy” or “delight” the customer, as seen in the proposed definitions of TQM. This concept appears antagonist with the high number of claims that burden the construction industry. Mitropoulos and Howell (2001) have noted four main areas where actions can be taken to prevent disputes and/or minimise their costs: (1) reduce uncertainty, (2) reduce contractual problems, (3) increase ability to resolve problems, and (4) establish alternative dispute resolution mechanisms. In order to reduce contractual problems, they propose to develop the use of standard contracts, and to allocate risks to the parties that can best control it.

Cheng and Li (2002) claim that partnering converts the traditional reliance on claims in a construction project to a highly communicated network of construction parties.

Telford (1996) describes alliancing (or partnering) as the business relationship between customers, contractors and suppliers working together on a project (or several projects), sharing the risks and rewards. He adds that by replacing the usual adversarial relationships with cooperative agreements, projects costs are reduced.

Chan et al. (2004) profess that partnering lowers the risk of cost overruns and delays as a result of better time and cost control over the project. They state that it also increases the opportunity for innovation, especially in the development of value engineering changes and constructability improvement because of open communication and existence of trust among project parties.

McCabe (1998) believes that business process partnering is complementary to TQM.

Walker and Keniger (2002) report that the decision of adopting project alliancing is generally made by the client, and that the partnership is formed on this basis. The underlying philosophy of the client being that selecting a project delivery team on the basis of demonstrated professional excellence would result in a better outcome than choosing the team on the lowest cost tender.
2.4.6. Clients as the driving force towards Quality

In the construction industry, the client is sometimes shifted from its passive position of recipient of a product or service, to the driving force of the project, having specific responsibilities in the fulfilment of his requirements. In some countries, such as UK or Australia, government initiatives have emphasised and promoted the critical role of clients in bringing quality within the projects, and are proposing help to educate construction customers in this regard.

Cnuddle (1991) suggests that clients are responsible for ensuring quality and economy in their construction projects.

Shen and Liu (2003) identify the driving force for the utilisation of value management as the client.

In the “Accelerating change” report (Egan, 2002) issued by the strategic forum for construction, Client leadership is identified as a key element towards a more successful UK construction industry.

2.5. Specific issues in the precast manufacturing industry

Some Precast Manufacturing organisations are close to the mass production industry, as they manufacture in a repetitive way a limited number of construction elements in anticipation of customer demand, while the production of others is specific to each project, and produces in response to customer requirements, thus possessing most of the characteristics of the construction industry. The organisation considered in the case studies is of the latter type. The limited utilisation of precast manufacturing in the construction industry, may account for the scarce interest this sector has received among the TQM literature.

Work on management practices in the precast construction industry is sparse (Sacks et al., 2004).

In United Kingdom, the interest for precast manufacturing is attributed to a large extent to the effect of the Latham and Egan reports (Dowing, 2002). Prefabrication is viewed by contractors and many clients as a key element in achieving the Egan objectives of increasing certainty of programme and out-turn cost, and to assure consistent quality.
Sacks et al. (2004) report that although precast concrete offers significant potential advantages in quality, speed of erection, and cost, its share of the overall construction market in North America is very low (approximately 1.2%), and around 18% in average across the European Union.

Precast Manufacturing industry, although sharing many of the characteristics on the Construction industry such as projects’ specificity, benefits from a manufacturing process in a factory environment, which may allow an increased control over variability.

### 2.5.1. Possible higher quality of Concrete Products

There is a general agreement that a factory-based production of construction elements may result in better quality than on-site casting, due to increased control on process variability and on product quality prior to site erection.

Mike Dowing (2002) reports that on site, quality can be a hit-and-miss affair, while in the factory, quality control is the number one priority. Everything is under control, from the raw materials, to the mix design, formwork, finishing and curing. He sees a significant increase of the use of prefabrication in UK as a solution to overcome the severe skill shortages in this country. He adds that precast concrete products are of higher quality than most site-produced ones, and that the components offer a longer maintenance-free life.

Improved quality and accuracy of precast products are also reported by Walker (2003). He claims that precast concrete structures can simultaneously serve both an engineering and a decorative purpose, and that skilled workmanship in factory conditions results in a very high quality, accurate finish.

Christa (1999) reports that the moving of production into the factory helps to get high rationalisation.

Precast concrete also increases the certainty of quality, as the product can be inspected in the factory, before site delivery (Dowing, 2002).

Friedrich (2003) reports that “what is very difficult or impossible to create using site concrete can easily be produced using a special form of construction for prefabricated element panels”.
2.5.2. Possible material, time and manpower savings, compared with in-situ construction

The possible rationalisation of factory-based construction production processes, as well as a higher control on both processes and products is generally thought by the literature to provide opportunities for material, time and manpower savings in comparison with in-situ casting. This is reinforced by the speed of the erection process, particularly when just-in-time on site delivery is achieved.

Formoso et al. (2002) propose a strategy of reducing waste and encourage the use of pre-cut, preassembled components, instead of working with separate materials such as mortar, concrete, and steel reinforcement on site.

Mike Dowing (2002) highlights that factory manufacture is much more efficient in its use of labour. It also reduces wastage, since materials are ordered in strict quantities and are stored and processed in controlled conditions.

Friedrich (2003) reports material savings for both concrete and reinforcement, consecutive to the use of precast manufacturing instead of on-site construction, as well as significant time savings.

Walter (2003) claims that the benefits of prefabrication are well documented, and that they include greater certainty of programme and cost, enhanced buildability, less waste and fewer materials and skilled people required on site.

Friedrich (2003) notes that with coordinated planning of the construction process, precast panels can be delivered on site in accordance with the orders in which they are to be laid and are then lifted directly from the truck and placed using construction cranes. Intermediate storage and thus multiple handlings of panels are not necessary. In other words: just-in-time and just-in sequence.

Erection is carried out by a limited team on a just-in-time basis, and the resultant speed of construction is several times faster than traditional construction (Dowing, 2002).

The Homes magazine (2003) reported that while waste on site can be cut by up to 70%, build time is faster by 40 to 60%, compared with traditional construction methods.
2.5.3. Precast manufacturing provides a safer working environment

There is a general agreement that construction production in a factory environment has a positive effect on safety, due the limited duration of on-height working, and to increased safety measures that can be implemented in a permanent work location.

Mike Dowling (2002) highlights that factory manufacture offers a much safer and more acceptable working environment. He also reports that dust, noise and waste are much reduced.

Walker (2003) claims that better health and safety records and less pollution can be obtained through precast manufacturing.

The Homes magazine (2003) also reported that prefabrication is proven to be a safer means of construction.

All these aspects, some of them subject to different views, will be considered in the case studies. By incorporating these concepts in the TQM development of a U.A.E. company, it will be possible to assess their relative importance in the environment considered, and verify how successful their integration into the company’s operations was.
3. COMPANY’S OBJECTIVES AND RESEARCH HYPOTHESES

From a research point of view, the specific environment in which the company operates is of major interest, as in-depth research work is not yet available about Total Quality Management implementation in the United Arab Emirates. Thus, the following research hypotheses are drawn from the originality of the implementation of a theory elaborated by and for developed countries in an Arab developing country context.

The company’s objectives, however, are drawn from the belief that the implementation of the TQM theory will produce the positive outcomes highlighted by the literature (see paragraph 2).

3.1. Company’s Objectives

Taking into consideration the positive outcomes highlighted by the TQM literature and the SKIA, the company under study decided to launch a TQM implementation process, and set a number of objectives. It is of interest to clarify these objectives and to review them at the end of each implementation stage, and to verify, in the light of the company’s experience so far, if they have been achieved.

The first of the company’s objectives is, through implementing TQM principles, to raise the overall performance, and overcome its crisis situation.

Numerous authors (see paragraph 2), such as Brah et al. (2002), Chapman and Al-Khawaldeh (2002), Radovilski et al. (1996), Agus and Sagir (2001), Oakland (1995), are reporting or demonstrating through surveys the direct link between TQM implementation and overall performance. Some authors (Deming, 1986; Rao et al., 2004) specifically state that TQM can help save a company in difficulty. This position is also promoted by the SKIA.

These were the foundation upon which the company formulated its first objective.

The second company’s objective is to improve the satisfaction of all its stakeholders through this TQM implementation.
The literature review on TQM reveals that the traditional customer satisfaction focus (Evans and Lindsay, 1999; Sommerville and Robertson, 2000; Shen et al., 2000) (see paragraph 2.3.7) is often widened towards Employee satisfaction (Vora, 2004; Bansal et al., 2001; Rogovsky and Sims, 2003) (see paragraph 2.3.3), Supplier satisfaction (Sadler, 1995; Goetsch and Davis, 2003) (see paragraph 2.3.5) and Society satisfaction (Gentili et al., 2003; Oakland, 2003; Ahmed and Machold; 2004) (see paragraph 2.3.6). Several authors believe that increased overall stakeholders satisfaction should be the goal of TQM implementations (Dahlgaaard and Dahlgaaard, 2002; Karapetrovic, 2003).

The SKIA is also considering overall stakeholders satisfaction as criteria for measuring TQM implementation success.

Based on the above, the company formulated its second objective: Raising the satisfaction of all its stakeholders while implementing TQM principles.

The third objective is to offset the limited TQM knowledge available in the company through the application of the recommendations provided by the Sheikh Khalifa Industry Award body.

Many authors are reporting the benefits of participation in TQM awards. It helps participants to understand their present performance and to identify areas for improvements (Lee, 2002; Miguel, 2001; Oakland et al., 2002; Conti, 2004) (see paragraph 2.3.2.5).

As detailed in paragraph 5.1.3.4.1, the researcher decided, before initiating the TQM implementation program, to review the previous feedback report from the SKIA in the light of the company’s crisis, in order to corroborate the literature claim that a TQM award body can help understand present performance and initiate improvements. This review convinced the top management that the recommendations provided by the award body could be trusted, may be used as guidance for improvement, and may offset the poor TQM knowledge of company’s employees (see paragraph 5.1.1.6).

The fourth objective is to overcome or minimise implementation difficulties linked to the specific culture of the company.
While numerous authors are reporting the importance of taking into consideration the specific culture of the organisation while implementing Total Quality Management (Temtime, 2003; Hill and Collins, 2000; Prasad and Tata, 2003), the lack of studies in developing countries and in Arab countries in particular is often highlighted by those concerned with these regions (Baidoun and Zairi, 2003; Al-Khalifa and Aspinwall, 2001).

Al-Khalifa and Aspinwall (2000) doubt that Arab oil producing countries may successfully implement TQM principles as their organisational culture and climate is not compatible with the one needed for TQM implementation. Prasad and Tata (2003) note the difficulty of implementing some TQM tools in these countries.

Thus, taking into consideration the recommendations of most TQM authors (see paragraph 2.3.1.4), the company acknowledged that its specific culture was to be taken into consideration in order to overcome the foreseen difficulties. While formulating its fourth objective, specific ways of overcoming or minimising implementation difficulties were yet to be uncovered, as no literature guidance was available.

3.2. Research Hypotheses

Research hypotheses are based on the evidence that the cultural specificity of the company under study (see chapter 5) defers greatly from the conditions generally found in developed countries in which the TQM theory was elaborated.

Paragraph 5.2.2 explores the specific environment of the UAE industrial sector using the cultural classification proposed by Hofstede (Hofstede and Hofstede, 2005). This highlights that the cultural environment in which the company operates is in direct contradiction with five of the CSF examined in chapter 2, among which four of them are classified among "Employee Management" (see paragraph 2.3.3).

The importance of this cultural gap between the current environment of the industrial sector in the UAE and the ideal cultural profile that supports TQM implementation will have a major influence on the implementation process used by the company under study (see paragraphs 6.4.1, 7.4.1 and 8.4.1), and is the main reason why some TQM authors are doubting the possibility of successful TQM implementation in that cultural environment (Al-Khalifa and Aspinwall, 2000).
As implementation of Total Quality Management principles in the industry sector of the United Arab Emirates has not yet been documented in the TQM literature, and as many TQM authors (see paragraph 2.3.1.4) are highlighting the importance of cultural factors, the current research will provide valuable insight in regard to the following hypotheses:

The first research hypothesis is that it is possible to implement Total Quality Management in the industry sector of the United Arab Emirates.

Not only has this hypothesis still to be proven, but also it is strongly questioned by some TQM specialists (Al-Khalifa and Aspinwall, 2000).

The second research hypothesis is that a specific approach must be deployed in order to allow a successful implementation of TQM in an "unfavourable" cultural environment.

The case studies will reveal that difficulties in TQM implementation related to the specific cultural environment will be faced from the onset of the implementation process (see paragraphs 5.1.2.4.2, 5.1.2.4.3 or 6.2.1.1.2 for example), and that the company will have no choice but to deal with these difficulties and attempt to overcome or minimize them.

The third research hypothesis is that the implementation of TQM principles in the specific environment in which the company operates requires an adaptation of some of the tools proposed by the TQM theory.

Throughout its implementation process, the company under study has selected and implemented a high number of TQM tools. These tools have been more or less adapted to suit the company’s specificity. The successful adaptation of TQM tools to fit a company operating in the industrial sector of the United Arab Emirates will provide valuable guidance to organisations in a similar situation, and fill part of the academic gap.

Among the tools which required a major adaptation by the company, the following may be noted: Strategic Planning and Strategic Alignment; Balanced Scorecard system; Coexistence of Incremental Improvements and BPR.
4. RESEARCH METHODOLOGY

4.1. **Determine a list of Acknowledged Critical Success Factors for successful Total Quality Management implementation.**

Through literature review, the author seeks to bring to light the acknowledged Critical Success Factors for a successful Total Quality Management implementation. This can only be done once the definition of both Total Quality Management (TQM) and Critical Success Factors (CSF) are clarified.

**4.1.1. Defining TQM and CSF**

In order to clarify what is Total Quality Management, the author examines some of the definitions presented in the literature.

A definition of Total Quality Management according to the present study is then proposed, as a basis upon which the present research work is founded.

Possible definitions of Critical Success Factors are reviewed, and the one having the best correspondence with the study is retained.

**4.1.2. Recognised CSFs for successful TQM implementation.**

Some of the Critical Success Factors proposed in the literature seem to be independent of the type of company in which their integration is recommended. They are presented as being universally applicable whether in services, in manufacturing or even in the public sector.

Through literature review, the author seeks to highlight these recommendations for successful TQM implementation, which are unrelated to the sector in which organisations operate. The Critical Success Factors are grouped by categories for ease of reference.

**4.1.3. Specific issues in the Construction industry**

While most Critical Success Factors are thought to be applicable whatever the sector in which organisations operate, some are specifically recommended for a given industry. The company considered in the case studies operates in the precast manufacturing market, and shares characteristics relevant to the construction industry.
Thus, it is valuable to list specific issues proposed in the literature for this industry, which allows later verification of their usefulness.

4.1.4. **Specific issues in the Precast Manufacturing industry**

Specific issues related to Total Quality Management implementation in the precast manufacturing industry, as proposed by the TQM literature dealing with this sector, are examined eventually.

4.2. **Company's objectives and Research Hypotheses**

While embarking on its TQM implementation, the company set a number of objectives drawn from the TQM literature which claims that such implementation will be beneficial.

The research hypotheses are linked to the lack of literature guidance in regard to TQM implementation in the Oil producing Arab countries, and to the fact that the cultural environment of the UAE Industrial sector defers significantly from that of developed countries, where and for which the TQM theory was elaborated.

4.3. **Critically evaluate data from an existing company's developmental work on implementing TQM, and its evolution: The cases studies**

The developmental process towards the establishment of Total Quality Management in the company is then examined, and its different major stages highlighted and analysed.

The study starts with a brief on the main characteristics of the company which may influence TQM implementations. It then examines why the route to TQM was selected and what were the key stages in its development for the company. The progresses of the organisation over time, from inception to TQM establishment are studied, along with the historical implementation trials, examining the ones that succeeded as well as the ones that did not.

TQM development is examined as three separate but linked case studies, corresponding to the successive key stages of TQM implementation. For each implementation stage initial priorities are defined, improvements introduced in the company over the concerned period are detailed, and main progresses during the stage summarised on completion. Findings are analysed, priorities set are reviewed in the light of the experience gained, and original
hypotheses on which the company based its TQM implementation project critically reviewed.

The initial situation of the company, as well as the motivating factors present in the company that initiated its embarking in the TQM process are first examined.

Case study 1: The ‘Start up to Break out’ phase looks as the evolution of the company, from its first steps on the TQM road, to the first company-wide attempt of implementing the TQM philosophy in the company. The main characteristics of this phase are the commitment of the Senior Management to TQM implementation, the choice of an employee-centred approach, and the first efforts towards Strategic planning, performance measurement and community involvement.

Case study 2: The ‘Quality integration’ phase looks at a period during which the company gains confidence that the chosen approach is effective. The emphasis of an employee-centred approach is amplified, with a major effort towards understanding and answering employees’ needs and improving the communication. Measurements on Production processes are perfected. This phase is also characterised by an attempt to measure and answer other stakeholders’ requirements: Customers and Suppliers. The Quality System documentation is reviewed as a means to sustain the improvements introduced.

Case study 3: The ‘Quality refinement’ phase looks at the evolution of the company towards absorption of continual improvement as a core value of the company’s culture. TQM literature is researched in order to find improvement concepts and tools that may by of use to the company. Strategic Planning is reviewed for improvement, and breakthrough ameliorations are introduced in the follow up of strategic implementation. Processes performance is measured by the process owners, improvement objectives are set, and processes are enhanced. TQM implementation remains employee-centred, training is intensified and group work encouraged. Needs and requirements of other stakeholders are taken into consideration and acted upon. TQM is sustainable in the Company.

At the end of each case study, the results and measurable progresses so far are assessed using key performance indicators, in view of highlighting whether the TQM enablers introduced in the company’s management system have induced performance progresses.
Improvements of the period are summarised using a graphical presentation inspired from the EFQM model, and main achievements highlighted.

Scores obtained by the company through participation in an Award scheme promoted by a government body specialising in TQM evaluations, are reviewed throughout the case studies. Through participation in the award scheme the company gains both an independent audit and indications of possible directions for development.

A reflection is carried out upon the degree of success of the company in meeting its initial priorities set for the period, and on the primary hypotheses which originally led the company to embark on the TQM implementation project.

4.4. Evaluations of TQM implementations

4.4.1. The company’s viewpoint of its progresses.

The results in terms of performance improvement gained by the company during its process of TQM implementation are presented using Key Performance Indicators. The structure adopted to present these KPIs is inspired from the balanced scorecard presentation used by the company to report its performances. Results measured prior to introducing TQM principles are compared with results obtained once the TQM culture becomes sustained in the organisation. Based on this analysis, the progress of the company towards Total Quality Management is evaluated from the company’s perspective.

4.4.2. Internal perception of change

Through employee perception, a possible modification of the original culture of the company, induced by the TQM implementation project, will be examined and analysed.

An assessment of employees’ perception regarding the different initiatives introduced by the company in order to implement TQM principles will be reviewed and commented upon.

4.4.3. External assessment of the company progresses.

Before examining the evolution of the company from the view point of a government body specialising in TQM evaluation, it is of importance to review this government body: the reasons for its creation, its objectives, its evolution over time and a comparison between
this award body for Total Quality Management and other such bodies available in other countries.

The external validation by the Sheikh Khalifa Industry award can be considered relevant to the research only after an objective evaluation of the award has been made to verify its effectiveness in assessing accepted TQM objectives.

The perspective of the government body specialised in TQM evaluation is examined by comparing the scores obtained by the company in the different categories between starting and establishing a TQM system.

This external assessment provides an independent validation of the company’s progress, based both on enablers introduced in the organisation’s management system, and on their subsequent performance improvements.

4.4.4. Comparison between the internal views and the external one

A comparison will be made between the company’s viewpoints on its TQM progresses, based both on the evolution of performance indicators and on employees’ perceptions and the Sheikh Khalifa Industry award viewpoint, although this comparison is not easy, as the way of recording progresses are different.

4.5. Review Critical Success Factors identified during Literature Review.

From the critical success factors highlighted by the literature review, the ones which have been found relevant to the company in its quest for quality are identified.

The CSF review covers those identified as valid for all companies wishing to start on the TQM road, as well as the ones specific to the construction industry, and to the precast manufacturing industry.

For each Critical Success Factor, it is examined whether the company has successfully integrated it into its Quality System, and the reasons for success/failure are reviewed.

Finally, in the case of successful integration of the proposed CSF factors by the company, it is considered whether it was perceived as truly beneficial to the company in its progress towards TQM or not.
4.6. Discussion and analysis of overall findings

4.6.1. Critically appraise the evolution of TQM in the company.

The company's experience of developing a TQM system is critically appraised through the three cases studies. Based on this experience, recommendations and guidelines are formulated for a more effective approach of implementing the TQM philosophy.

Improvements introduced by the company are prioritised according to their potential advantage, and recommendations are drawn on the relative positive impact of introducing these improvements, depending on the implementation phase.

4.6.2. Evaluation of the advantages/disadvantages in applying TQM in the UAE construction sector

The discussion will summarise whether launching a TQM improvement programme is beneficial for a construction company operating in the UAE, based on the company’s experience.

4.6.3. Original findings of the research

Finally, the originality and the specific contribution to the TQM research field of this research work will be summarised and reviewed.

4.7. Dissertation Structure

Figure 1 – Structure of the PhD dissertation
5. INTRODUCTION TO THE CASE STUDIES

5.1. The company until 2000

5.1.1. Characteristics of the company

5.1.1.1. A construction company

The company was founded in 1984. One of the owners is a U. A. E. citizen, who holds the majority of the shares, as required by U.A.E. laws. The other is a non-local who is directly involved in the running of the company.

The purpose of the company is to produce precast concrete elements.

Over the years, the company has introduced new products on top of the traditional Precast concrete elements: GRC, which is a blend of cement and fibreglass, allowing the production of light weight panels with increased decorative potential, but which cannot support heavy load; Prestressed concrete, which is a technique by which the steel placed in the panel, tensioned prior to casting, and detensioned once the concrete is set, is allowing the produced elements to carry more load than the traditional concrete elements; Hollowcore concrete, which also uses the pretensioning Technique, and includes longitudinal voids in the panels, making them lighter and increasing their insulating properties; Stamped concrete, which is not a Precast concrete product as it is installed directly on site. It is used for the flooring of surfaces using chemicals of different colours, and matrices reproducing the shapes of natural stones.

Until recently, the company was mainly working as a subcontractor for general construction enterprises. Recently, it introduced turnkey villas in its catalogue, using subcontractors for all trades but the precast production.

5.1.1.2. Located in Abu Dhabi, United Arab Emirates

The head office of the company is located in Abu Dhabi, which is the richest emirate of the United Arab Emirates. Its main production facilities are located in Mussafah, which is the industrial zone for the Abu Dhabi area.

In 1999, the company started to set up a new production facility in Dubai, which is the second richest emirate of the United Arab Emirates. This decision was taken because it is not allowed, under the Dubai laws, to sell Abu Dhabi produced products in the Dubai
Emirate. Therefore, in order for the company to penetrate the Dubai market, a production centre in this emirate was required. The production of the Dubai factory started in January 2003.

In 2002 the company had the opportunity to purchase a Factory in Shahama, within the border of the Abu Dhabi emirate. This was seen as an opportunity to enlarge rapidly the company’s production facilities, in order to meet the rapidly increasing market demand. The production in the Shahama factory started in January 2003.

By mid 2004, the company started to set up a second Factory in the Mussafah area, and by end 2004, as a second one in Dubai. However, the Shahama production centre had to close its doors by mid 2004, as the landlord requested the land back.

5.1.1.3. A fluctuating Market

Originally the company mainly produced concrete elements for the construction of high-rise buildings. In the Abu Dhabi emirate, the land cannot be owned by non-locals. In order to help the local landowners to build on their land, a government body has been created, providing interest free loans to the owners, and repaying this loan by retaining part of the rental fees of the building for the first few years until complete reimbursement. Using the opportunity provided by this government body, the local landowners can invest in a building construction without any personal investment, getting part of the rental fees as soon as the building is commercialised and full rental fees as soon as the initial loan is repaid.

This technique has greatly encouraged the construction activities in Abu Dhabi, which is second only to the oil industry in the Emirates.

As a result, most of the building construction activity is controlled by this government body, and few landowners decide to build on their land without its help. The decision on the number of buildings which will receive the agreement of the government body for construction depends greatly on the expected oil revenues for the year. It has happened several times that due to the reduction of the oil revenues, the government body decided to freeze all constructions, greatly disturbing the construction industry, and causing the bankruptcy of many small companies and financial difficulties for bigger ones. Faisal
(2004) reports that oil revenues accounts for about 80 per cent of the total income of the GCC countries, and 60 per cent of their export.

In order to overcome this market fluctuations the company, which originally produced mainly for the construction of high-rise buildings, decided over the years to increase its range of products in order to be less reliant on the fluctuations of this market, targeting villas, hospitals, shopping malls, schools etc.

In Dubai, from 2001 onwards, private owning of land is opened to foreigners on designated areas. The property rights as limited to 99 years, but are concurrent with a residence right of the same duration. This has boosted the Dubai construction market, and allowed the development of highly ambitious projects such as 'the palm' (only man-made construction visible from the moon, apart from the Great Wall of China) and 'the world', which are thought to be some of the currently most ambitious construction projects in the world.

In the last years, the economic growth in the UAE has been significant. The figures provided by the September 2004 issue of the “Economy today” (Karima, 2004) reports a surge of real UAE GDP growth rate from 1.9 per cent in 2002, to 7.0 per cent in 2003. Dr Khalfan bin Kharbash, the Minister of State for Finance and Industry, expects UAE’s non-oil GDP to rise to $51.5 billion in 2003 and $55 billion in 2004, demonstrating the country’s success in its diversification process. UAE has achieved an average of non-oil GDP growth of 8 per cent over the last 10 years.

In its 2003 report, the PRS group specialised in assessing investments risks, examined 140 countries, including 18 Arab countries. UAE is classified among the “Very Low Risk” group of countries (Karima, 2004).

### 5.1.1.4. A multicultural / multilingual environment

The United Arab Emirates is an Arab country. However, the number of U.A.E. Nationals over the total population is far from being the majority. It is estimated that twelve percent of the population are U.A.E. nationals. The rest of the population is mostly composed of Asians such as Indians, Pakistanis, Sri Lankans etc, of Arabs from other countries such as Lebanese, Jordanians, Palestinians, Iraqis etc, of Europeans and North Americans, and a minority of Africans.
There are two official languages used in the United Arab Emirates. Governmental bodies mostly use Arabic as communication language, while English is predominant in the private sector. Therefore, any communication with government bodies shall be done in Arabic, while 95 percent of the commercial correspondence is done in English.

This multicultural and multilingual diversity is also found in the workforce of the company under study.

It is subdivided into two main categories:

- **The workers** are skilled or unskilled employees performing physical tasks, and are paid per hour, including overtime when applicable.

- **The staff** are holding the positions from foreman and above, and performing supervision or administrative tasks. They are paid per month, and are not entitled to overtime.

Among the staff a further classification is used: Senior staff, holding a managerial position in the company, and other staff.

Among the sixteen senior staff employed as on the first of January 2003, twelve of them were Arabs, three of them Asians and one European. The preferred communication language was Arabic for eight of them and English for the other eight. It may be noted that while all the Arabs could communicate in English, the Asians and the European could not communicate in Arabic. Therefore, the common language used in the company is English, which is either the second or third language of the staff, and never their mother tongue.

Among the staff (including the senior staff), 57 of them were Arabs, 53 Asians and one European. The preferred language was English for 59 of them and Arabic for 52 of them.

Among the workers, the preferred languages were Asian ones (mostly Hindi and Urdu) for 567 of them, Arabic for 30 of them, and English for 6.

If all staff communicates in English, such is not the case for the workers. In some cases the workers do not speak the same language as their supervisor. If this occurs the workers learn a few words and use gestural communication.
The problem of communication is therefore a major one in the company. This is especially true when considering the implementation of TQM which is based on a good communication within the organisation. The recommendations of the TQM literature on how best to improve communication in companies operating in developed countries are therefore difficult to implement in such environment. Even researches done in developing countries are not of great value about how to reach a high level of communication and overcome the multi-lingual barrier, as in those countries, a common language is generally available. This difficulty of communication in countries with a significant expatriate workforce has scarcely been studied. A few researches have studied the implementation of TQM in Arab countries [(Al-Khalifa and Aspinwall, 2000); (Al-Zamany et al., 2002); (Chapman and Al-Khawaldeh, 2002); (Curry and Kadasah, 2002)], and Al-Khalifa and Aspinwall (2000), mention that “it should be noted that a lot of companies in Qatar employ low class workers from Asian countries, because of their low wage demands”. However, the implication of this characteristic on TQM implementation has not yet been examined in depth.

It may also be noted that among the 714 employees as on 01 January 2003, only four of them were women, all employed as staff, and one of them as senior staff. This is due to the fact that workers are not allowed by law to bring their family into the Emirates. In order for an employee to be authorised to bring his family into the U.A.E., the law imposes that he shall hold a position of engineer or above, and earn a minimum salary of 5,000 Dirhams, which is well above a worker’s salary. Therefore, the wives of expatriates are few, and do not wish to work as labourer. The company may apply for a visa in order to employ an expatriate lady, but it would be difficult to interview or test her before hand. This solution is often discarded except for positions such as nurses, doctors, school teachers, housemaids etc.

Finally, one may remark that only one U. A. E. national was employed by the company as of the 01 January 2003. The reason behind this low U.A.E. national employment is that their expectations in terms of salary are well above the market price for an identical background education and experience. U.A.E. nationals have preferential employment in the government organisations, and defined compulsory ratios in companies in the oil industry and the banking sector. This policy is instated by the U.A.E. government in order to ensure high salary levels for its citizens, but prevents employment in the private sector.
5.1.1.5. A labour intensive workforce

As of the 01 January 2003, 85 percent of the workforce were workers and fifteen percent were staff. Over the last ten years, an average of 87 percent of the workforce have been workers.

The average salary per hour of a worker was of 4.4 Dhs. If during a month a worker works eight hours per day (the normal number of hours in the Emirates is eight per day, six days a week, Friday paid by the company), he would earn on average 1,056 Dhs (287 U.S. Dollars or 169 Sterling pounds). The maximum monthly salary of a worker calculated as above mentioned, was of 2,910 Dhs and the minimum of 600 Dhs per month, with an average deviation of 215.

The average salary per month of a staff member (excluding senior staff) was of 3,557 Dhs (967 U.S. Dollars or 569 Sterling pounds), the minimum of 1,300 Dhs, and the maximum of 9,600, with an average deviation of 1,223.

The average salary for one month of a senior was of 12,250 Dhs (3,329 U.S. Dollars or 1,960 Sterling Pounds), the minimum of 6,300 Dhs, and the maximum of 30,000 Dhs, with an average deviation of 5,082.

Thus, on average, a staff employee (excluding senior staff) earns 3.4 times more than a worker and a senior staff 3.4 times more than a staff.

It may be noted that, unlike staff, workers are paid overtime, and that over time hours are very frequent, as the main aim of workers is to earn as much as possible, in order to send the surplus of their salary to their family in their country of origin. During the year 2002, 25.5 percent of the total hours worked by the workers were overtime hours. The company provides accommodation for the workers in camps, while accommodation allowances for staff are included in their salary.

5.1.1.6. A workforce chosen for its skills and technical competencies

In order to recruit workers, the company has to present a group-visa in the labour office of the U.A.E. government. The number of requested visas must be documented and justified, in order to avoid companies bringing unwanted workers into the country.
Once the group-visa is obtained, engineers from the company, visit the country specified on the group-visa, in order to test candidates pre-selected by a local agency. The tests are based on the required skills, such as carpentry, masonry, erection skills etc. English speaking and writing skills are not considered, as they are very seldom found among the proposed candidates. The administrative papers are then filed in order to bring the selected candidates into the U.A.E. Once the workers join the company, they are not allowed by law to leave the company unless they return to their country of origin, in which case they will have to wait a minimum of six months before applying for a new work visa, if a company located in the U.A.E. is proposing them new employment.

Workers are selected for their skills, and staff are selected for their technical competency.

According to a survey carried out in May 2001 among staff holding a position from foreman and above, 93% of staff were holding a bachelor degree or above.

<table>
<thead>
<tr>
<th>What is the highest educational degree you earned?</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Post Graduate</td>
<td>5</td>
<td>7.25</td>
</tr>
<tr>
<td>2- Bachelor</td>
<td>30</td>
<td>43.48</td>
</tr>
<tr>
<td>3- Associate or 2 years college diploma</td>
<td>22</td>
<td>31.88</td>
</tr>
<tr>
<td>4- High school or equivalent</td>
<td>12</td>
<td>17.39</td>
</tr>
<tr>
<td>Grand Total</td>
<td>69</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 1 Educational level of the staff in May 2001

Most of the post graduate diplomas were technical diplomas such as construction drafting diploma, civil engineering degree, electrical engineering degree etc.

46% declared to be familiar or very familiar with the concepts of TQM, 41% to be familiar with the concept of Quality Circles, and 34% to be aware of at least another Quality Improvement tool. When asked to specify, 5 employees proposed ISO, 1 employee proposed: Zero defect; Just in time; Process Reengineering; Six sigma, and 1 employee proposed: ISO; Strategic and Actions Plans; Mission and Vision; Training Programme.

<table>
<thead>
<tr>
<th>Are you familiar with the concept Total Quality Management?</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- very well</td>
<td>1</td>
<td>1.45</td>
</tr>
<tr>
<td>2- fair</td>
<td>8</td>
<td>11.59</td>
</tr>
<tr>
<td>3- little</td>
<td>24</td>
<td>34.78</td>
</tr>
<tr>
<td>4- not at all</td>
<td>20</td>
<td>28.99</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>23.19</td>
</tr>
<tr>
<td>Grand Total</td>
<td>69</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Are you familiar with the concept Quality Control Circles?  

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- very well</td>
<td>1</td>
<td>1.45</td>
</tr>
<tr>
<td>2- fair</td>
<td>8</td>
<td>11.59</td>
</tr>
<tr>
<td>3- little</td>
<td>20</td>
<td>28.99</td>
</tr>
<tr>
<td>4- not at all</td>
<td>23</td>
<td>33.33</td>
</tr>
<tr>
<td>Grand Total</td>
<td>69</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Are you aware of any other Quality Improvement tool?  

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- yes</td>
<td>6</td>
<td>8.70</td>
</tr>
<tr>
<td>2- no</td>
<td>24</td>
<td>34.78</td>
</tr>
<tr>
<td>3- Strategic and Actions Plans; Mission and Vision; Training Programme</td>
<td>39</td>
<td>56.52</td>
</tr>
<tr>
<td>4- ISO; Zero defect; Just in time; Process Reengineering; Six sigma</td>
<td>62</td>
<td>89.86</td>
</tr>
<tr>
<td>Grand Total</td>
<td>69</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 2 TQM knowledge among the staff in May 2001

This survey proved that although 46% of the staff from Foremen and above thought that they possessed a good knowledge of Total Quality Management, its concepts were insufficiently known. This study is in line with the one of Al-Zamany et al. (2002) which highlights the poor understanding of Total Quality Management in Yemen, and with the one of Al-Khalifa and Aspinwall (2000), which shows that awareness of TQM is just starting in Qatar, and that its principals are often misunderstood, even by respondents who believed to have a good understanding of it, running the risk of becoming “blasé about the subject without really ever knowing about or overcoming their lack of knowledge (Taylor and Adair, 1993)”.

5.1.1.7. An autocratic management style.

With 87% of the employees being workers, the main objective of many of the company’s managers was to control and administer the workers.

This was particularly true because of the communication problems between Managers and Workers. Explaining the reasons for a decision, and convincing the employees that it was
the best solution, was a difficult task when written communication was not understood, and when verbal communication was often a mixture of a few words and gestures. It was more effective to show the employees what was expected from them, than to explain to them why it was expected.

Communication down-up faced the same issues as communication top-down, only increasingly so. When a Manager displayed a note in English on a display board, he hoped that a few of the workers may be able to understand it, and relay its translated meaning among his workgroup. Most of the workers did not have the ability of writing in English, and limited ability for speaking Arabic or English. The difficulty to transmit an idea, suggestion or request to the Manager often did not seem worth the effort.

This autocratic management approach was not limited to the communication with the workers, but extended its influence among staff who possessed the ability to communicate verbally and in most of the cases in writing (either in Arabic or in English), even if imperfectly. Apart from the communication between Senior Managers, the communication level in the Company was poor.

The culture of non-participation and of following orders was, deeply rooted in the Company. The first experiments asking the workforce for comments, suggestions and even to express their requirements did not foster a single answer, even from the staff. It was felt that the management could not be serious about asking the workforce their opinion on any subject. As will be studied in-depth in the following chapter, a request and its several reminders, asking the staff for their suggestion about how to improve the safety and the environment did not receive a single answer, nor a request for identification of training needs.

This is also reported by a study carried out by Al-Zamany et al. (2002) on Yemeni management style, which indicates that “Many managers and executives think their job is to control and administer and forget the role of leader. Without leading and encouragement from the managers the need for change and the need to question the status quo, people will remain silent.”
5.1.1.8. A fast growing company.

The company started with six employees in 1984, reached above 100 in 1991, and above 700 in 2002, which shows an average increase of 25 percent per year.

![Evolution of the Workforce](image)

**Figure 2 Evolution of the Workforce in number of employees from 1996 to 2003**

![Production in M3](image)

**Figure 3 Volume of production from 1997 to 2002**

Over the years, the Company increased its production capacity by renting new production land. In 1991, the Factory location was changed, and the production ground reached 17,500 square meters against 8,200 previously. In 1999, by renting additional land contiguous to the one rented from 1989 onwards, the production area reached 45,000 M2 and the production capacity 250 M3 per day.

In January 2003 the production activities started in the Dubai Factory and in the Shahama Factory, adding 40,000 additional M2 for each of those production centres, with a production capacity of 125 M3 per day for Dubai and 80 M3 per day for Shahama.

In 2005, with the operation of additional production facilities both in Mussafah and Dubai, this growth should be sustained.
5.1.1.9. From 1991 to 1999, a profitable company

The first years following the company's creation were years of financial loss, culminating in 1990 with a cumulated loss of 12 million Dirhams.

During the following years, the financial situation improved, and the 1991-1999 period was characterised by a relative financial stability and profitability. During these nine years of profitability, the management trust in its ability to generate a satisfactory level of performance increased, and the 2000 crisis came even more as a shock. Even during this period, however, the annual overall profitability was based on the average of a majority of lucrative projects, along with several ones showing financial losses.

![Financial results](chart.png)

**Figure 4 Financial results from 1991 to 2001**

5.1.1.10. Financial results of 2000: A Record year for the volume produced; a year of financial loss.

In 2000, despite a hard working year during which the production was increased by 63%, there was a net financial loss. After a year of struggle, quality problems increased because of the drive for production, salary payments were delayed, suppliers were paid late if at all and there was no bonus distribution. The managers were all in agreement: “something needed to be done”. But what? The net effect of considerable effort was failure.
Although these results may partly be explained by particular circumstances, Senior Management was of the opinion that the main reason was of a more fundamental nature. The solution, it was generally felt, should come from within the Company.

5.1.2. Before 2000: ISO & TQM, a commercial and marketing move

5.1.2.1. ISO certification

5.1.2.1.1. Review and improvement of the company’s quality system.

The Company was one of the first in the U.A.E. to obtain an ISO certification in 1996, and the second one in the construction industry.

In 1996 the main oil companies of the United Arab Emirates as well as some government bodies started asking their suppliers to be ISO certified, although they were generally not certified themselves. Anticipating that this will be increasingly the case, the top management of the company decided to study the possibility of applying for the ISO 9001 certification. It was decided to use the help of an external adviser, as the company did not have the skills/knowledge required in order to prepare for it internally.

It was estimated that the costs of hiring an external adviser for the few months of procedure preparation would be less than the cost of hiring a full time experienced quality assurance manager.

The investment in time and money required to set up the company’s quality procedures and quality assurance manual being important, the top management decided to take this opportunity to review and improve the company’s overall system.
The company benefited greatly from the standardisation, and its clear and defined quality system, not only from the commercial point of view but also from the managerial point of view. However, the organisation did not try at the time to evaluate the benefits of its new quality system. Two main reasons can be noted for the success of the initial quality system of the company.

**Reduction of variability through standardisation**

The external advisers selected to help the company prepare its quality procedures had experience of the construction industry. Their, and the top management’s, aim was to reduce variability through standardisation. An in-depth study was carried out to find out the best, easiest and safest way used by the company to carry out the different activities. The results of the study as well as the requirements of the ISO standards were the basis on which the procedures were defined. According to the definition of Santos et al. (2002), “‘processing variability’ and ‘flow variability’ are the building blocks for characterising the effects of liability within production systems.” However, the recommendation of Santos et al. that any subsequent process “noise”, should be studied, its root causes identified, a corrective action quickly implemented and standards rewritten to eliminate the problem, was not implemented once the certification had been obtained by the company. By not using the full potential of its new quality system, the company lost the opportunity for it to be the basis of further improvements in its activities, training and diagnosis.

**The quality system defined used the best practices already implemented in the company.**

The aim of the new quality system was to use whenever possible the best practices already implemented in the company, and to introduce new process procedures only when the practices of the company did not meet the requirements of the ISO standards. This allowed the company to own the new procedures more easily, and facilitated the transition period.

**5.1.2.1.2. From an improved quality system, to a static quality system.**

For a couple of years, the new quality system set in place was successfully implemented. The main reasons for the success were that the initial quality system had been well designed, and was reflecting the work practises in the company. The senior management of
the company was stable, and the efforts necessary to maintain the system in such stable situation were minimal.

It may be noted however, that even during those first years, the efforts spent on the prevention of non conformant recurrence was limited, and that the efforts on highlighting and correcting negative trends in non conformances and client complaints were next to nil.

After those first few years, the situation started to degrade for the following reasons:

- **No Quality Manager**

  The responsibility of maintaining the quality system was attributed as a secondary task to a senior manager. The choice of this senior manager as management representative for quality was not due to his quality knowledge. As the rest of the senior managers in the company, he was a technical engineer, with very little knowledge about quality management. He was chosen for his English writing skills, which should allow him to record modifications in the procedures.

  He received training as lead auditor, and did not receive any further quality training thereafter. His target, as defined by the top management, was to maintain the ISO certification of the company.

  As for the quality control responsibilities, they were assigned to the production units who were both responsible for the production and for the control of the products. Finding out and implementing actions to prevent the recurrence was also under the direct responsibility of the production units. The function of the management representative for quality was limited to the maintenance of the quality procedures and the quality assurance manual, and not the improvement of the quality system.

  The knowledge of total quality management in the company was very limited both among the middle management and the top management.

- **Disruptions in the top management of the company**

  As explained in the previous chapter, the company is owned by two partners: A U.A.E. National partner holding the majority of the company’s shares as requested by the United Arab Emirates law; A non-local partner holding a senior position in the company.
When the company was created the non-local partner held the position of general manager, and was referred to as the managing partner. It was decided later that the position of general manager would be held by a third party, independent of the two owners, and that the main business decisions will be taken by a committee made of the two owners and the general manager.

Such was the situation in 1996 when the ISO quality system was set into place.

In January 1999, the local partner decided to sell his shares to another U.A.E. national, and the general manager left the company as he did not have the trust of the new partner. The non-local Partner resumed his position as managing partner until a suitable general manager, having the trust of both partners, could be found.

A senior manager of the company was proposed for the vacant position, under the condition that he could successfully hold this position for some months. This initiative was not successful for two main reasons: The former peers of the intended general manager did not accept his authority; The position as a ‘may-be’ general manager did not give him the strength to impose his authority. A second senior manager was selected for this position, and failed for the same reasons.

During this period, the management responsibilities for quality kept on moving, and the senior manager responsible for the maintenance of the procedures could not keep on updating the system to reflect the current organisation structure and responsibilities.

- Increase of production and workload.

The volume of production started to increase. Thus, the employee in charge was more and more absorbed in his primary task, and found less and less time to deal with his secondary one: the maintenance of the quality system.

New products were introduced which were not included in the quality system, production techniques changed that were not reported, and the system became not only stagnant but also inappropriate for the organisation.

During this period of numerous changes in the processes, the quality system was not updated for one and a half years.
5.1.2.1.3. *The consequences of a static/inappropriate quality system.*

- **The cost of an ineffective quality system**

In order to keep the ISO certification, the company had to continue to maintain records which were no longer reflecting the actual processes. All employees were still requested to follow an inadequate system, and were audited internally and externally on their compliance with this system, and reprimanded when such was not the case. They were not asked for their suggestions on how to improve the system, as the system was not maintained any longer.

- **Lost of confidence in the quality system**

The quality system was perceived for what it was by the employees: a hindrance to improvements. From its initial function of providing motivation to increase the quality of the company's products and processes, it was now preventing the company's progress.

This negative effect of an inadequate quality system appears to be even more damaging than the costs of maintaining records of poor or no value. Rebuilding the confidence in the quality system takes both time and efforts. It is estimated that six months are required to build an effective quality system and the company found out the hard way that two years are required to rebuild the confidence in the effectiveness of the quality system once it had been lost.

- **Installation of a ‘cheating’ culture**

In order to obtain the recertification, the company had to retrospectively complete records before the visits of the external auditors. Client complaints being no longer recorded, some records were created just before the visits. Supplier evaluation forms were signed at the last minute etc.

This is particularly damaging for the company, as it builds a 'cheating' culture. Hiding quality problems is no longer viewed by the employees as dishonest, as the senior managers are using this technique to ensure recertification.

Removing this ‘cheating’ culture from the organisation takes even longer than to rebuild the confidence in the quality system.
Apart from the ISO 9001, another TQM recommendation was in place in the Company for several years: Just-in-time purchasing.

The volume of some material requirements needed to produce precast concrete is important, e.g. sand, cement and aggregates. The company soon found out that keeping important stocks of such material on the factory grounds was impractical. Agreements were made with the suppliers of these materials, to order them on a monthly basis in bulk in order to benefit from discounted prices, but to have phased delivery whenever required.

5.1.2.3. Participation in TQM Award

In order to encourage the Abu Dhabi industries to adopt the principles of total quality management, the government set in place through the Abu Dhabi chamber of commerce, a TQM award for the industrial sector.

The top management decided in 1999 to participate in this scheme, hoping that it would give the company a commercial edge against its competitors. The fact that the company was ISO certified, which was not the case of most of Abu Dhabi industries at that time, was thought to be a major element which might help the company to obtain recognition from the award team. It was also explained to the company that the award was not based on a competition basis, and was aimed not only to judge the degree of TQM implementation in the company, but primarily to help the industries in their TQM development.

The company was asked to perform a self assessment of its position regarding TQM implementation using a series of questions. The award team also asked for the company to prepare evidence, checked by the award assessors, concerning 31 points related to TQM implementation. The questionnaire relative to key performance results was completed and returned to the award body for review.

The award team then visited the company's premises, reviewed the evidence collected by the company of TQM implementation to the date, reviewed and commented on the self assessment, and verified the figures of the key performance results with the financial department. The assessors asked the company to prepare action plans for improvements in the areas in which they obtained low scores. During a second visit, the company presented
those action plans to the assessors, who took them into consideration while attributing the final scores for 1999.

5.1.2.4. First Action Plans

Three action plans were prepared with actionable first steps, and proposed to the award assessors for review. The company was informed that the implementation of those action plans would be reviewed during the following year’s assessment by the award team, and be part of the scores during the company’s 2000 participation.

5.1.2.4.1. Health, Safety and Environmental Issues

Out of the three proposed action plans, this was the only one which did not ask for the active participation of the staff, but only for the participation of selected employees. It was the only one which worked out as originally intended.

An external recognised safety organisation was appointed to draft a safety procedure for the company. It was added in the company’s procedures.

A survey was conducted in the factory stores to identify material hazards and control methods. 14 types of material were identified, with their corresponding hazard, and control methods.

The Factory Manager submitted a “Cost of implementation of safety procedures” study, defining 25 types of safety items, and their approximate costs.

Following this memo, a meeting was held between the Managing Partner and the Factory Manager, in which it was recommended that new safety equipment should be purchased, starting with the most critical ones according to the experience of the Factory Manager. In order for the company to absorb easily this extra cost, the purchases should be spread over time.

5.1.2.4.2. Training and Development plans to meet business needs

The second action plan was aimed towards the identification of training needs. The first step was for the factory manager to send a memo to his foremen asking them to identify the training requirements in their section.

No answers were received, neither on the original memo nor on the following reminder.
The first actionable step on this action plan was to “Issue a circular for all staff to convey their ideas concerning improvement of environment and contribution to society.” This circular was issued, but no answers were received, even after several reminders were sent.

The failure of the second and third action plans, revealed the importance of the communication problems that were faced by the company. At the same time, the financial situation of the company deteriorated greatly. 2000 was the year during which the senior managers recognised that in depth changes were required in order for the organisation to survive.

5.1.3. End 2000 – The turning point: TQM implementation decision

5.1.3.1. The financial crisis of 2000

By the end of 1999, the belief of the Financial Management and the Top Management was that as Company Overheads were at an operating minimum and independent of the volume produced, an increase of production would reduce the overhead rate per M3 produced and thus increase the profitability of the Company. This theory seemed to be validated by financial studies done on the previous year’s results.

An aggressive sales policy was therefore instigated. It was thought financially sound to accept projects with lower expected profit margin in order to increase the volume of sales, as the resultant diminution of overheads per unit produced should more than compensate the lower sale price per unit. When an export opportunity to nearby Qatar arose, the company decided to take this opportunity to increase its production furthermore, even though the experience of production exportation was limited in the company. Following this sales policy, the volume produced during 2000 had been 63% higher than the volume of production of 1999.

Several major difficulties arose from this important and poorly planned expansion.

5.1.3.1.1. Necessity to increase the Production Capacity

According to the number of contracts signed in 1999 effecting production in 2000, it was calculated that the Production capacity of the company should be increased. Therefore, the management decided by the end of 1999 to take the following steps in order to meet the production requirements: Recruit both additional workers and staff; Increase the
production area by renting new land adjacent to the Factory production ground and have a
direct access for shipment of products by sea.

5.1.3.1.2. Increase of the workforce

As studied in the earlier paragraphs, hiring workers is a time consuming process in the
Emirates. It starts by asking for a group visa and justifying the request, obtaining a
preliminary agreement, sending engineer in the agreed country to test the candidates,
obtaining the final agreement and obtaining the visas. Although the company started those
administrative tasks by the end of 1999, the additional workers started to reach the
Production ground by April 2000 only, by which date several of the projects were already
running late. Thus, the worker employment figure for 2000 shows an increase of 35.8 %
only in comparison with the 1999 figures (to be compared with the 63% of production
growth during the same period), with most of this additional workforce turning up late in
the year.

In order to increase the production furthermore, workers were asked to work overtime. The
overtime rate was of 20 % in January 2000, reached 30% in April 2000, and culminated at
31 % from June 2000 to October 2000. This had several consequences. First of all, the
workers working longer hours were more prone to mistakes, and the quality of the
Production was affected. Secondly, if in normal circumstances the workers would willingly
work increased overtime hours in order to increase their monthly salary, this was not the
case in 1999, as due to the cash flow crisis of the company, the salary payments were
delayed, resulting in a high dissatisfaction of the workers.

The number of staff for supervision and administrative purposes also needed to be
increased in order to face the production target. Unlike the employment of workers, the
process for staff employment is easier, as their visa is transferable from one company to
another, group visas are not required, and the candidate testing can take place in the U.A.E.
Therefore, the recruitment process started from the second half on 1999 onwards. Staff
salary payment, as well as workers salary payment, started to be delayed from October
2000 onwards.
5.1.3.1.3. Increase of the Production area

By the end of 1999, a new land adjacent to the Factory area was rented in order to meet the projected increase of production for 2000. In order for this new Production ground to be operational, two main elements were required: The equipment to operate it, primarily the cranes, and some installation work such as access roads, soil levelling etc.

Precast concrete elements can only be moved by cranes. Therefore, no production could take place in the new area until the appropriate equipment was in place. Due to the economic crisis in Europe, second hand cranes were available at competitive rates in European countries. However, the process of bringing those cranes in the Emirates is a lengthy one. Cranes must be pre-selected according to their characteristics. A certification company based in the corresponding country must then be selected to verify that the crane meets the requirements. The selected equipment must then be transported by cargo, and installed. The whole process takes around 5 months.

Another piece of equipment which was required in order to fully use the advantage of the new production ground was a new Batching Plant. The factory was equipped with two manual ones. The management decided to upgrade the company’s facilities in this regard, and purchase a state of the art automated Batching Plant. A number of suppliers, all located in Europe were pre-selected, and it took eight months from the time the company started its enquiries until the time the automated Batching Plant was installed.

It should be noted that all required equipment was purchased outside the United Arab Emirates. Suppliers that were used for the first time insisted on full payment before
This heavy investment was one of the reasons for the cash flow crisis that hit the Company by the second half of 2000.

In order to set up the new production ground, installation work was required such as preparing the access roads, installing the rails for the cranes, the beds for the Hollowcore Equipment etc. In order to minimise the cost, and as the required expertise was available in the company, it was decided to carry out this installation internally. However, the additional workforce started to arrive from April 2000 onwards, and a lot of pressure was applied on the factory employees to produce more in order to reduce the delays in delivery, making it impossible to achieve this installation by the planned time.

The combination of all those elements meant that the new rented land was only partly operational before the second half of 2000, and would be fully operational by the beginning of 2002 only. In the meantime, the majority of the production was done in the original factory ground running at more than full capacity, in a congested area in which each square foot was used to its maximum.

5.1.3.1.4. Delays in deliveries

In 1999, there was no department in charge of the planning of projects. The commercial department would draw a programme of work according to the specifications of the contract. This programme of work was passed to the three Heads of Department:

The Design Department in charge of producing the General Details and Shop Drawings.

The Factory in charge of the production of the precast concrete elements according to the shop drawings.

The Construction department in charge of the erection of the Precast Elements on site.

A delay in one of those three phases has repercussions in the following one(s). If such is the case, the company tries to reduce the delay by increasing the resources on the following phase(s).

The main cause of bottlenecks is traditionally the design phase. It is the shortest of the three phases, and no factory production can start before the shop drawings are ready. The duration of the design phase depends on factors external to the company such as
municipality approvals and client validation. After the signature of a new contract, the
design department’s aim is to produce the shop drawings as quickly as possible in order for
the factory production to start. Once the shop drawings are completed, the design
department will face a period of calm before the next contract is signed. In order to take
into consideration the cyclic element in the drafting work and to avoid employing more
resources than required, draftsmen are the only staff entitled to overtime payment.

Knowing that the Design phase might cause delays in the execution, the Commercial
Department negotiated with some of the main clients of the contracts to be executed in
2000 a quick design approval process, and in one case an automatic design approval.
Although this reduced the design delays, it decreased their reliability as shop drawings
were produced under pressure, without external validation and with reduced internal
verification, resulting in errors that had to be corrected and revised drawings issued.

As the factory process was also working under pressure, it was unable to absorb part of the
design delay due to increased reworks. In fact, in most of the cases, factory delays were
added to design delays. Such was also the case, in a less significant way, for erection
delays.

Another element which caused increased delays is that the design mistakes where often
discovered during the erection phase. In such cases, shop drawings had to be modified,
moulds rectified, panels re-casted and sent on site for erection. The delay was even more
significant when the site location was some distance away, such as the company’s Qatar
project.

5.1.3.1.5. A decreased in the Quality of the production

Many of the quality problems faced were the result of a poor design validation both
internally and externally. This was a consequence of attempting to reduce the bottleneck of
shop drawing validation. The strategy adopted by the company of minimising the
bottleneck in Design by reducing design validation led to an important increase of product
defects. The cost of such quality defects was very high as such defects were generated on
the first phase of the project, and sometimes detected only on the last one. The company
did not try to evaluate the cost on such non-conformance at that time.
However these were not the only defects. The factory production executed on a congested area and under pressure to reduce the delays incurred during the design phase, reduced its quality control. Products delivered to site at that time, would not have been deemed acceptable in term of quality in the previous years. The fact that the Quality Control functions were assumed by the Factory Management placed Quality requirements as a secondary issue to the volume to be produced.

By the second half of 2000, the company started to face an important cash flow crisis, and was no longer able to honour its local supplier payments. Some of those suppliers with which the company had a long term relationship and had confidence in the quality of their products, stopped their deliveries. The company had to look for new suppliers on which it had lower quality confidence. It also became increasingly difficult to reject material received on the ground of poor quality, while the company had stopped honouring the payments of the concerned suppliers. The quality of the final product was affected by the quality of the material used in the production process.

5.1.3.1.6. *An important cash flow crisis*

As seen earlier, heavy foreign investments were to be paid in advance, and new administrative/supervision staff were hired in order to meet the required production. Those costs increased the overheads of the Company, disproving the belief of the financial and top management that the overheads would remain constant whatever the volume produced.

The duration of a typical project is generally between six months to two years. Although interim payments are made during the course of the project, they generally start after the first month of erection on site. This means that apart from the advance payment, no payments are received during the design phase, mould fabrication phase, casting of the first panels and their erection on site. When the production is constant, the interim or final payments of other projects are covering this long period between the project signature and the first interim payment. However, during a period of production increase, interim payments for prior lower production cannot cover the initial costs of a higher volume of production.

Increased production means increased volumes of material required. For material purchased on the local market, payment agreements were available allowing a delayed payment, but for material purchase from foreign countries like the steel for example,
payment had often to be done in advance. Regarding the project in Qatar, all material purchase during the erection phase had to be carried out in cash, as the Company was not known in this country, and as no suppliers were ready to accept payment agreements. It also appeared that due to the poor knowledge of the company of this country's supply rates, the supply costs had been underestimated.

Due to product quality deficiencies generally, and to under-evaluated costs on the Qatar project in particular, company operating costs were higher than anticipated.

The combination of the above elements resulted in a major cash flow crisis, which hit the company by mid 2000.

5.1.3.1.7. Delays in Suppliers payments

The company started to delay its local suppliers payments and in some cases to stop them altogether. The suppliers of material incorporated in the production were paid on a priority basis, but even those payments started to be delayed. When a supplier refused to deliver any longer, the company started to look for alternative suppliers that would accept delays in payment, even when the supplied products were more expensive and sometime of a lower quality than those of the original suppliers.

The reputation of the Company as a reliable business partner started to deteriorate at the same time as its reputation for Quality production.

5.1.3.1.8. Delays in Salary Payment

It is a common practice among the companies working in the Industry Sector of the United Arab Emirates to delay the salary payment for 2 to 3 months. Such was the situation of the company before 2000. All salaries (including the staff and senior staff salaries) were paid with a 3 month delay. However, due to the cash flow crisis, the gap was increased to 4 months from October 2000 onwards, culminating to 5 months from January 2001 to February 2001. From March 2001 onward, the gap was back to 4 months. It was only from November 2002 onwards that the company reduced it to its original level of 3 months.

Employees were asked to work increased hours and their salaries were paid with 4 to 5 months delay. While at the beginning of 2000, the management tried to motivate the workforce by explaining that the increased production would mean increased profits and
therefore an increased bonus distribution, it soon became clear that for the first time in many years there would be no bonus distribution at all, as there was no profit.

Naturally, employee dissatisfaction mounted.

5.1.3.1.9. A Financial loss of 4.6 million Dirhams

At the beginning on 2001, the 2000 financial results of the company were known. The 63% increase of volume produced resulted in a financial loss of 4.6 million Dirhams over the year. After a year of intensive work in order to reach the top management goal, the following could be observed:

- Customer dissatisfaction
- Employee dissatisfaction
- Supplier dissatisfaction
- Shareholder dissatisfaction

5.1.3.2. A Senior Management consensus on the necessity of improving

By the end of 2000, it was clear for all Senior Staff that the company was facing a major crisis, and that this crisis was affecting all stakeholders, including themselves. The figures were clearly showing that the critical position of the company was not the result of deficiencies in one project, but was present in several of the projects executed during the year.

The Qatari project was the worst one, showing a loss of 4,300,000 Dhs for a contract value of 8,300,000 Dhs. This loss affected both the 2000 accounting year, and to the 2001 accounting year. Several factors were responsible for this spectacular loss:

- A pre-agreement with the Client on quick/automatic design validation, resulting in design mistakes.

- The additional cost repercussions of design mistakes due to the additional long-distance transport cost for replacement elements.

- The underestimation of the purchase costs of fixing material from Qatari supply market.
However, several projects in the traditional Abu Dhabi market of the company were also showing losses, while most of them were showing returns inferior to the originally estimated profit margin.

The senior management acknowledged that it was not a one off problem due to a poorly estimated project, and that the root causes were embedded in the company operating system, and not external.

Additionally, the Senior Management was conscious that if the trend was not reversed in the coming year, the company would not survive. Due to the investments made in 2000 in view of increasing the company’s production capacity, it no longer had the choice of reverting to its previous sales level. The only strategic option available was to capitalise on the investments, to increase further more the company production and to modify and improve the company’s operating system in order to generate profits.

If the necessity of improvement was clear for the Senior Management, the way of achieving it was all but clear. Lessons could be learnt from past mistakes about what should not be done:

- Reduced design validation should not be used as solution to design bottlenecks.
- Production growth should not be achieved at the expense of deterioration of products’ quality.
- Projects planning should integrate all projects and all tasks, and not be fragmented.
- Growths should be planned better, in order for all required elements to be available at the required time, sustaining the intended growth.

5.1.3.3. Crisis as motivation for change

Following Edwards Demings (1986) claim, it is now a common belief that change cannot be achieved without the commitment of the top and senior management. As stated by Scarnati and Scarnati (2002), “commitment from the top is an essential ingredient for success.” As reported by Anganski (1993), an aerospace executive once said “we create crises so that change will occur.”
In their survey carried out among quality award-winning companies, Warwood and Roberts (2004) identify “Economic survival” as the third most important CSF for successful TQM implementation.

The company did not need to create a crisis, as the crisis was already there. A consensus of all senior staff on the necessity to change had been fostered by this crisis. The next step was to determine what to change and how to change.

It may be noted that while crisis provides a consensus for change, it also increases the vulnerability of a company. The introduced changes must be chosen with care in order not to compromise the already unsteady equilibrium. In his study on the implementation of Total Quality Management in a company in difficulty, Nwabueze (2001) describes how the introduction of a TQM programme by a management consultant through a company-wide training, precipitated the collapse of the company. He states that “TQM demands that resources are available to sustain the organisation over the full period of implementation and beyond, or it could prove to be too demanding a regime for the corporate weak.”

5.1.3.4. Available guideline and measuring tools

5.1.3.4.1. The Sheikh Khalifa Industry Award

In the light of the recent crisis, the top management decided to check whether the assessments obtained during its participation in the SKIA could be useful in order to identify areas for improvement.

Company scores in the 1999 Sheikh Khalifa Industry Award.

**Silver Award**

<table>
<thead>
<tr>
<th>Scoring Categories</th>
<th>Obtained Scores</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self-assessment</td>
<td>Audit</td>
</tr>
<tr>
<td>Business Environment</td>
<td>51.7%</td>
<td>57.0%</td>
</tr>
<tr>
<td>Leadership</td>
<td>70.0%</td>
<td>58.0%</td>
</tr>
<tr>
<td>Human Resources</td>
<td>65.0%</td>
<td>60.0%</td>
</tr>
<tr>
<td>Customer &amp; Market Focus</td>
<td>71.7%</td>
<td>60.0%</td>
</tr>
<tr>
<td>Strategy</td>
<td>71.7%</td>
<td>69.0%</td>
</tr>
<tr>
<td>Process Management</td>
<td>78.3%</td>
<td>75.0%</td>
</tr>
<tr>
<td>Use of information</td>
<td>66.7%</td>
<td>85.0%</td>
</tr>
</tbody>
</table>

Table 3 Scores obtained through participation in the SKIA in 1999

The category with the lowest score, both according in the company’s opinion and according to the SKIA audit was the “Business Environment” one. The aim of this category was to take into consideration the major preoccupations of the Abu Dhabi
government. As stated in the award, “The government of Abu Dhabi has defined clear criteria for the development of the individual sector. These include protecting the overall environment, working with the community, employing UAE nationals, use of ‘state of the art’ technology, exporting and using local suppliers.” Two action plans had been set up by the company in order to improve the scores in this category (see paragraphs 5.1.2.4.1 and 5.1.2.4.3), and the company decided to review their implementation so far (see paragraph 6.2.1.1)

The second category in which the company obtained its lowest audit score is “Leadership”. The own assessment of the company in this regard was much higher than the SKIA. However, the self-assessment was performed by the company prior to the 2000 crisis, when the company was confident in its leadership performance, after 9 years of financial profitability. The SKIA point of view, however, marked a doubt about the ability of the company’s leadership to be the basis for sustained excellence.

In the light of the recent crisis, the Top Management had to acknowledge that the SKIA assessment was probably more accurate than the self-assessment, based on the following:

It was clear that the responsibility of the recent crisis was attributable to the leaders and not to the workers. Some of the reasons for the crisis could be identified as:

- Inability of the senior management to plan the intended growth.
- Wrong managerial decisions such as reducing design validation in order to reduce design time.
- Wrong managerial assumptions such as ‘Company Overheads are independent of the volume of production.’
- Not enough research on different production environment for the Qatari Project.

As for the ‘Human resources’ category, which obtained the third lowest score, it was clear that the company was not performing very well in this regard. The autocratic management style of the company had fostered a culture of non-participation of the workforce, and this had been highlighted by the failure of the two actions plans for which the initial steps were based on employee participation. The company had also defined an action plan in order to
improve in this category (see paragraph 5.1.2.4.2), but was not successful in its implementation so far.

The ‘Customer and Market focus’ category also obtained a third position in the 1999 SKJA audit score, while the self-assessment one was significantly higher. The top management recognised that the self-assessment had been based more on the ‘theory’ described in the ISO procedures of the company, rather than on the actual performance of the company in this regard, and that thus the audit score was certainly more reliable than the self-assessment one.

This review of the scores obtained by the company during its 1999 participation in the SKJA convinced the top management that the recommendations provided by the award body could be trusted, and that they could be used as guidance for improvement.

5.1.2.3 Use TQM as a Tool Kit

The company was determined to use recommendations and feedbacks from the Sheikh Khalifa Industry Award in order to improve and recover from its crisis. However, not all recommendations were applicable immediately. For example, it seemed impossible to foster partnership relations with the company’s suppliers, when the company was delaying their payments for several months. In addition to the impossibility of implementing some of the advices of the Award body, the company also wanted to work out its own priorities.

Based on the 1999 scores obtained, three actions plans had been set up, among which two were not successful, as they were based on a prerequisite willingness of the workforce to participate, which did not exist in the company.

Thus, the top management decided that it was important to start by raising the level of participation in the company. Other issues were not discarded, but rather left on the side for later implementation or later study.

This strategy of selecting among the various TQM elements the ones that the company wished to work on at a specific moment of its development was continued at a later stage, when the company decided to extend its TQM knowledge beyond that which was brought to its attention by the Award, and to perform an in-depth study of Total Quality advice available around the world. Total Quality is perceived as a Tool Kit in which the company can pick elements which seem to be adapted to its present situation. It may be noted that
most of the elements introduced at one time were reworked, modified and improved at a later stage, the idea being to continuously introduce new elements while improving on the ones already in place.

In order to use TQM as a Tool Kit, the company needed to define its criteria for selection.

5.1.3.4.3. The choice factors: Cost of implementation, Ease of implementation, Expected return

The company developed a set of three criteria for the selection of TQM elements to be implemented: Cost of implementation, Ease of implementation and Expected return. The relative importance of those three criteria varied over time. In 2000-2001, while the company was undergoing the crisis or starting to recover from it, the main criterion was cost. Over time, as the company recovered from its crisis, the weight of the Cost of implementation criterion was reduced. Once the company gained confidence in its ability to introduce TQM elements requiring increased changes in the company, the ‘Expected Return’ criterion was favoured.

![Relative importance of the criteria over time](image)

**Figure 7 Relative importance of criteria for selection of TQM tools over time**

Three major phases can be identified.

**Crisis to Break out**: It is the phase during which the company is unsure of its ability to recover. It is characterised by the predominance of the ‘cost of implementation’ criterion.

**Quality Integration**: It is the phase during which the company has reversed the loss trend but is not yet entirely confident in its ability to maintain and accelerate its
positive trend. The ‘cost of implementation’ stays the major criterion but its weight decreases, while the weight of ‘expected return’ increases.

Refinements in the Quality System: During this phase, the company is on a profitable and successful trend. The organisation has gained confidence about its ability of effectively introducing TQM improvements. It is ready to tackle implementations that may require sustainable efforts or that are implying modifications in the culture of the company. ‘Expected return’ is the major criterion during this phase.

The criterion that varies least with time is the ‘ease of implementation’. It is only in the last phase, ‘confidence’, that the weight of this criterion can be significantly reduced. The author is of the opinion that this criterion should not be overlooked by any company starting to implement TQM recommendation, and should stay a main criterion until the company has proven records of repeated successful improvement implementations.

5.1.3.4.4. The ‘cost of implementation’ criterion

In his study about a failed attempt of TQM implementation in a company in difficulty, Nwabueze (2001) states that the main reason for the failure was the massive investment in a company-wide training programme performed by a consultant. Such an investment is unwise at a time when the company is already facing financial difficulties.

One of the reasons the company decided to use the advice and feedback of the Sheikh Khalifa Industry Award is that they were readily available and free of charge. The use of an external consultant was discarded for two reasons:

The cost: The few consultants in TQM based in the Emirates are branches of international consulting companies, and their fees are very high.

The selection: The Company would not have had, at the time, the knowledge required in order to judge the quality of the proposed services, nor the estimated expected return.

Before selecting an improvement option, the cost of the implementation was estimated. During the crisis and recovery phases, emphasis was placed on external costs, which had to be reduced to a minimum due to the cash flow crisis faced by the Company. Internal costs were also considered but were thought easier to absorb.
For example, the Company had provided limited external training to its employee for several years. As training was a strong recommendation of the “People” category of the Sheikh Khalifa Industry Award, the senior management decided on the creation of a training programme, after a study of the cost, difficulty and return. A budget of 20,000Dhs was attributed in 2000 for external training costs (3,200 Pounds Sterling for 480 employees). This was a low budget to work on. However, the company provided more than 2,900 hours of training during that year.

This was done by: Using to a maximum ‘free training’ provided for example by the Chamber of Commerce on Total Quality Management or by Software Suppliers on their latest products; Introducing ‘coaching’ training in the Company; Providing internal ‘expert’ training; Increasing ‘on the job’ training; Providing internal ‘process explanation’ training to other departments; And critical external training such as External Certification for Crane Operator, Certified first-aid training etc.

5.1.3.4.5. The ‘ease of implementation’ criterion

Some TQM authors believe that “there is a universal set of practices that, if implemented, will lead to high performance” (Motwani, 2001). One can argue against this opinion, that if such was the case, no disagreement on TQM practices would exist. Such is not the case as even the Quality ‘Gurus’ do not always agree. Juran does not believe in the effectiveness of quality awareness campaigns, which is strongly advocated by other TQM authors, and Crosby and Juran have warned companies about the naive use of quality circles.

Several studies have demonstrated that TQM implementation should take into consideration the cultural differences of the organisation and of the country in which it operates. The differences in culture have lead to differences in TQM implementations between countries. Tan (2002) studies the differences between 16 National Awards. He notes differences in a number of factors that affect the criteria framework of those awards, the main two difference factors being: Economic and social development of a country; culture. He states that “An NQA that is established in a western country will probably not suit a Middle-East or Asian country due to the cultural differences.” If cultural differences are affecting TQM Awards, it reasonable to infer that they are a contributing factor in TQM implementation in those countries.
In his study about Quality Management in Europe, Lagrosen (2002) states that “quality management is usually seen as a uniform concept to be used in the same way regardless of the context in which the company operates. (...) Some authors even claim that successfully introducing TQM in a company requires a cultural transformation (e.g. Atkinson, 1990). If this is the case it seems reasonable that this cultural transformation might gain from being handled differently depending on the cultural context.” His study demonstrates cultural differences among European countries such as UK, Germany, France and Italy, and how those differences should be taken into consideration while implementing quality management practices. If such is the case for those neighbouring country, it is increasingly so for the United Arab Emirates where the extensive use of multi-cultural expatriate workforce decreases further the cultural homogeneity in the Company.

A study of the implication of multi-cultural expatriate workforce in Companies and its implication on TQM implementation may be valuable not only for Countries like the United Arab Emirates in which the U.A.E. nationals are a minority of the total population in the country. It may soon be a valuable knowledge for European countries in which barriers to human migration have been considerably reduced.

In his study about mismatch of cultures, Kekälä and Kekälä (1995) state that “quality work can mean a variety of approaches: many different strategies, tactics, tools and methods are used under the concepts TQM/TQC”. He strongly advocates that differences in culture should lead to differences in TQM approach, and that the “least-resistance” quality approach should be adopted.

As TQM implementation will require changes in the organisation’s culture, Johnson and Gill (1993) argue that there is some firm evidence that creating changes in organisational culture is difficult, it makes sense to start implementing practices which are the closest to the organisation culture. Following this incremental organisational culture change, new practices would now be available with a minimum a culture modification. By imposing radical cultural changes to the company, the chances of success would be reduced, as it would create conflicts. Techniques may be rapidly modified, but cultural change takes time.

What are the practical results of the ‘ease of implementation’ criterion? As an example, it means that the Company had a limited chance of suddenly implement Employee
Empowerment practices with success. As explained earlier, the multi-cultural and multi-lingual context of the employees of the company, as well as the autocratic management style create a strong barrier for communication and participation. Until the communication, participation and management style difficulties are at least partially solved, an attempt at employee empowerment will have little chance of success.

This philosophy was developed as a result of the lessons learnt by the company during its difficulties in its early TQM implementation stage. As will be seen later, one of the first attempts in employee participation was the organisation of a company-wide suggestion competition. This initiative highlighted both the company difficulties in term of communication and participation, and the necessity of minimising the resistance of the management towards such attempt. It also demonstrated that organisational culture had been modified by this initiative, and that new TQM practices became available to the company as a consequence.

Such an approach is not always successful, as it is not based on a measured knowledge, but on an estimated perception. One might estimate that the company culture is ready for the implementation of a TQM initiative, and find later that such was not the case. However, not considering the 'ease of implementation' would only increase the chances of failure.

5.1.3.4.6. The 'expected return' criterion

At first, the 'expected return' of TQM practice implementation was estimated in a qualitative way. For example, it was estimated that starting a training programme should increase the employee satisfaction, increase the employee awareness and improve their skill/knowledge thus leading to an increased productivity. As neither the employee satisfaction nor the productivity were measured, it was impossible to quantify the 'expected return', nor to verify that the intended returns had been achieved.

As the company advanced in its continual improvement objectives, more data were collected and analysed, making it possible to quantify expected implementation costs and often expected return. Action Plan forms and continual improvement forms were designed in which both costs and returns were identified. However, although quantified costs (both internal and external) were displayed on those forms, the Top Management remained reluctant to display quantified expected financial savings, on the basis that employees might ask for a share of those savings.
After several successful TQM implementations, the company started to gain confidence in its ability to introduce changes, and the ‘expected return’ criterion started progressively to gain importance over the two other criteria.

5.2. Reflection on company's objectives

5.2.1. TQM versus BPR

When reviewing the objectives set by the company, one might reflect on the reasons for the choice of TQM implementation to get the organisation out of the crisis, rather than the implementation of other managerial theories such as Business Process Reengineering. Indeed, TQM is based on the concept of incremental improvements while BPR is associated with radical innovation, which might appeal more to a company in crisis.

One of the reasons why TQM was selected rather than BPR, is that although the TQM knowledge was scarce in the company, the prior participation in the SKIA (see paragraph 5.1.2.3) had left a strong impression among the managers that the government body possessed valuable insights about what is required for a company to perform better. In addition, its guidance was readily available (see paragraph 5.1.2.3).

A second reason why the company did not consider BPR, is because its theory is based on radical change. The advice of Hammer (1990), “obliterate first”, is not a reassuring one. What if one obliterates and cannot rebuild in time or significantly improve on the original system? A failure in a TQM improvement implies a loss on implementation cost. A BPR failure might leave the company with partly destroyed processes.

Failure rates as high as 70 per cent have been reported in the literature (Maull et al., 2003), and BPR implementations are often associated with high risk (Selladurai, 2002). A lack of holistic approach and an over-focus on process that ignores the behavioural change as the key to organisation success (Cao et al., 2001), are often proposed as reasons behind the high failure rate.

Thus, TQM was seen as a holistic, low risk approach, with readily and free of charge available guidance, while BPR was perceived as a risky approach, with high probability of failure that may be reinforced by the very limited internal knowledge available and the lack of external guidance.
A third reason is that although the company faced a financial crisis and dissatisfaction was high, this crisis was rather recent as it had lasted for a year only. The previous nine years had been profitable (see paragraph 5.1.1.9). There was a strong feeling among the management that there was a need (and indeed a necessity) for improvement, but that did not go as far as wishing to obliterate a system which had proved (at least partially) efficient in the past, and to rebuild it from scratch.

Thus, the management of the company and the researcher were in favour of a TQM based improvements approach.

The organisation did not, at the time, consider the possibility of integrating TQM and BPR approaches, as the radical language of the original BPR concept prevented the management to study the possibility of implementing a second generation approach of BPR, that could complement TQM implementation, as advocated by some authors (Hill and Collins, 2000; Selladurai, 2002).

Thus, the organisation decided to embark on a TQM implementation programme, and discarded the possible use of the BPR approach.

However, when reflecting on the improvement initiatives introduced by the company over time, it appears that some of these initiatives are closer to a BPR approach than to a TQM one (see paragraph 10.1.4.4). While the organisation did not wish originally to use the BPR concept, its TQM improvement programme led it to some radical process reviews, which although not labelled as “BPR” are close to its conceptual characteristics.

**5.2.2. Cultural considerations**

At this time, no opinion could yet be formulated in regard to the first three of the company’s objectives, which are to raise the performance of a company in order to bring the company out of the crisis through TQM implementation, to increase the satisfaction of all stakeholders while doing so, and to use the recommendations provided by the SKIA body as a means to compensate a deficiency in TQM knowledge, as the implementation project had not yet started.

However, regarding the fourth of the company’s objectives which aims at overcoming or minimising implementation difficulties linked to the specific culture of the company, it is possible to claim that there was indeed a specific culture in the studied organisation, and
that some of its characteristics were indeed in conflict with the Critical Success Factors for TQM implementation, highlighted in the literature review.

Taking into consideration the characteristics of the company (see paragraph 5.1), the researcher was of the opinion that a large power distance existed in the organisation under study, which is confirmed by the statistical data provided by Hofstede and Hofstede (2005). The management of the company was mainly composed of Arabs, with a majority of Indians among the workforce. According to Hofstede, both Arab countries and India are scoring high on the power distance scale (twelfth and seventeenth places respectively, among 74 countries or regions examined).

When the characteristics in the workplace, according to Hofstede and Hofstede (2005), of a large power distance culture are examined in detail, it appears that many of them matched the company’s characteristics, as shown in the table below.

<table>
<thead>
<tr>
<th>Characteristics of a large power distance in the workplace, according to Hofstede and Hofstede (2005)</th>
<th>Characteristics of the company under study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hierarchy in organisations reflects existential inequality between higher and lower level</td>
<td>True</td>
</tr>
<tr>
<td>Centralisation in popular</td>
<td>True</td>
</tr>
<tr>
<td>There are more supervisory personnel</td>
<td>It is difficult to assess this element without comparison with a similar organisation in a small power distance culture, which is not available.</td>
</tr>
<tr>
<td>There is a wide salary range between the top and bottom of the organisation</td>
<td>True</td>
</tr>
<tr>
<td>Managers rely on superiors and on formal rules</td>
<td>True</td>
</tr>
<tr>
<td>Subordinates expect to be told what to do</td>
<td>True</td>
</tr>
<tr>
<td>The ideal boss is a benevolent autocrat, or &quot;good father&quot;</td>
<td>It is difficult to provide an assessment of what is the “ideal boss” in the organisation unless one carries out a specific survey (provided later in this work, see paragraph 9.2.2)</td>
</tr>
<tr>
<td>Subordinate-superior relations are emotional</td>
<td>This item is difficult to judge</td>
</tr>
<tr>
<td>Privileges and status symbols are normal and popular</td>
<td>True</td>
</tr>
</tbody>
</table>

For example, management staff are wearing white helmet on factory ground or on site, while workers are wearing coloured helmets. Management staff refused to wear the same type of safety shoes than the workers...
White-collar jobs are valued more than blue-collar jobs | True
For example, a driver perceives as an insult a request to give a hand to carry something on factory ground or on site. If a worker is unsure about how to perform a task, a team leader will ask another worker to demonstrate the operation, but will seldom show it himself.
See paragraph 5.1.1.4

Table 4 Comparison between the Power Distance characteristics in the workplace, according to Hofstede, and the company’s characteristics

It appears however, that a large power distance culture might be in conflict with the critical success factors for TQM implementation, as reported by literature review:

- Employee empowerment appears in direct conflict with a culture in which subordinates expect to be told what to do and are afraid of expressing a disagreement with their superiors.

- Communication might be strongly impeded by a culture of unquestioned obedience to superior’s decisions, and non-consultation of subordinates during decision making. Hofstede and Hofstede (2005) also believe that such culture implies that “contacts between superiors and subordinates are supposed to be initiated by superiors only”, which might render bottom-up communication more difficult. The high number of hierarchical layers in the organisation might also prove an obstacle to direct communication. Finally, those difficulties of communication linked to a large power distance culture, are reinforced by the multi-lingual and multi-cultural characteristics of the workforce, as well as by the low level of literacy among the workforce.

- Team working, particularly when mixing several level of hierarchy, can be perceived by the employees of higher hierarchal levels, as a threat that endangers their privileges and status.

Based on the organisation’s characteristics the researcher was also of the opinion that the prevalent culture in the company was more masculine than feminine in the sense of Hofstede and Hofstede (2005). Although Arab countries and India score lower in masculinity than in power distance (thirty first and twenty eighth ranks respectively among seventy four countries and regions), Hofstede and Hofstede (2005) are claiming that “from
the most feminine to the most masculine country, the range of Masculinity Index scores for men is about 50 percent wider than the range for women”. In a company where the vast majority of employees are men, it is expected that the masculinity score should be higher than when taking into consideration a mixed population of men and women.

This was substantiated by the study of masculinity characteristics as provided by Hofstede and Hofstede (2005):

<table>
<thead>
<tr>
<th>Masculine characteristics in the workplace, according to Hofstede and Hofstede (2005)</th>
<th>Characteristics of the company under study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management as manège: decisive and aggressive</td>
<td>True</td>
</tr>
<tr>
<td>Resolution of conflicts by letting the strongest win</td>
<td>If one considers that this element is opposed to the feminine opposite “Resolution of conflicts by compromise and negotiation”, it is certainly true. Compromise and negotiation is felt as a weakness, particularly in management.</td>
</tr>
<tr>
<td>Rewards are based on equity</td>
<td>True</td>
</tr>
<tr>
<td>Preference for large organisations</td>
<td>This item is difficult to judge</td>
</tr>
<tr>
<td>People live in order to work</td>
<td>True</td>
</tr>
<tr>
<td>More money is preferred over more leisure time</td>
<td>True</td>
</tr>
<tr>
<td>Careers are compulsory for men, optional for women</td>
<td>True</td>
</tr>
<tr>
<td>There is a lower share of working women in professional jobs</td>
<td>True</td>
</tr>
<tr>
<td>Humanisation of work by job content enrichment</td>
<td>This item is difficult to judge</td>
</tr>
<tr>
<td>Competitive manufacturing and bulk chemistry</td>
<td>The organisation is operating in competitive manufacturing</td>
</tr>
</tbody>
</table>

Table 5 Comparison between the Masculine characteristics in the workplace, according to Hofstede, and the company’s characteristics

A high level of masculinity may also be in conflict with some TQM implementation CSF. This might be the case for the following:

- Providing a high quality, safe and caring working environment for employees.
- Preoccupations for the working environment are typically feminine qualities
Daniele Seraphim - Ph.D.

according to Hofstede and Hofstede (2005). This CSF may be extend to high quality, safe and caring living environment for workers, as in the specific case of the organisation, the company is responsible for providing them living accommodations.

Awareness and concern for the needs of the society is also a typically feminine preoccupation, according to Hofstede and Hofstede (2005).

Thus, the cultural dominance in the organisation, as perceived by the researcher, might be in direct conflict with five of the critical success factors for TQM implementation identified in the literature: Communication systems; Employee participation, involvement and empowerment; Team working; Working environment and conditions; and Awareness and concern for the needs of the society. Four of these critical success factors are directly linked to Employee Management.

It might be noted that the company did not try, at the time, to confirm the “Power Distance” and the “Masculinity” cultural characteristics of the organisation through employees’ perception, for the following reasons:

- When discussing the “Power Distance” and “Masculinity” characteristics with members of the higher management, there appeared to be a consensus in favour of both a high “Power Distance” and a more “Masculine” than “Feminine” culture.

- The organisation had to react quickly to the crisis situation it faced, and launching a survey to confirm cultural characteristics which were agreed upon by the higher management and the researcher, and confirmed by the study of Hofstede (2001), was not high on the priority list.

- A confirmation through Employees’ perception might have been obtained through survey. As the company was characterised by a non-participation of its employees (see paragraphs 5.1.2.4.2 and 5.1.2.4.3), there was a strong doubt that the company would be able to collect a meaningful number of answers.

In 2005, a survey will be launched to analyse employees’ perception of the organisation’s culture, and its evolution over the past 5 years (see paragraph 9.2.1)
The experience of the company so far appeared to confirm difficulties in at least one of these CSF: A complete lack of employee participation resulted in the failure of two action plans (see paragraphs 5.1.2.4.2 and 5.1.2.4.3).

In the light of these cultural considerations, the fourth of the company’s objectives formulated by the organisation, to overcome or minimise implementation difficulties linked to the specific culture of the company, was subject to strong doubts. If five CSF are highly difficult to meet due to cultural characteristics, and if four of these are related to the same category (employee management in this specific case), is it reasonable to assume that these difficulties can be overcome or minimised?

Practical experience will reveal whether the company was right to formulate this fourth objective.
6. CASE STUDY 1: 2000-2001 - Start up to Break out

6.1. Initial Priorities

The initial priorities of the first period are dealing with two areas: Cultural change and Strategy.

Regarding cultural change, the aim is to start fostering modifications in order to better match the critical success factors which are unfavourably influenced by the company's culture. The emphasis is placed on employee management: Improve communication, participation and involvement, team working and working environment. A cultural change on the fifth CSF – awareness and concern for the needs of the society – should also be started. As cultural change is a difficult and slow process, the researcher doubted that significant improvements could be achieved over the period. However, as those elements were judged critical by the TQM experts and the change process was to be initiated.

The second priority pole of the first period is the Strategy. Defining clearly what the company wants to achieve and how it proposes to reach the defined objectives was seen by the researcher as a critical aim for the first period of the TQM implementation project. Fewer difficulties were expected than with the first aim of cultural modification, except in the matters closely related to employee management, such as: Employee participation in the elaboration of the strategy; Communication of the strategy etc.

6.2. Detailed description of TQM implementations

6.2.1. Basing improvements on action plans prepared during the 1999 SKIA participation

6.2.1.1. Suggestion Competition

6.2.1.1.1. The ‘launching’ decision

Two of the three actions plans initiated by end of 1999 in order to demonstrate improvements in the Sheikh Khalifa Industry Award failed because the first steps were presupposing an active participation of the employees through suggestions. This placed the Senior Management in front of the fact that a culture of non-participation was prevailing in the Company, even on subjects which are generally welcomed by the employees such as their training needs.
By mid 2000 the failure to foster employee participation was discussed by the senior management in management review meeting. At that time it was already clear that the company was facing quality problems as well as financial difficulties. The researcher proposed the idea of a Suggestion Competition. It was suggested not to limit the Competition to the issues of the Action Plans, but to open it to improvements in the organisation.

The expected returns were:

- Initiate a process of company-wide employee communication and participation.
- Collect improvement ideas from all employees that might help the company to overcome its crisis.

No quantitative estimation of expected return was calculated, as the Senior Management could not evaluate the value nor the number of the desired suggestions.

In order to focus the workforce on the improvements desired, the senior management decided to propose 5 categories plus a free entry one. The categories were designed as follows:

- How can the Company save money.
- How can the Company save time and reduce delays.
- How to improve our quality.
- How to improve the health and safety in our Company.
- How to improve the Company’s contribution to society and environment.
- Any other suggestions

In order to overcome the non-participation culture of the company, the prizes to be won had to be attractive. Three prizes would be awarded in each category. The direct cost of implementation of the competition was calculated to be 10,800 Dhs. In order to minimise the cost of suggestion studies, it was decided that a committee of volunteers Senior Staff would be formed and that it would meet outside working hours. It was estimated that the cost of implementation of valuable suggestions should be covered by the savings resulting from their implementation.

The ease of implementation criterion was not studied in-depth. The IT and Organisation department, headed by the researcher, was given the responsibility to launch the
Competition, to collect the answers and to form a “Suggestion committee”. Issues such as difficulties to move the workforce from a passive attitude to a participative attitude or possible management resistance were not studied. The company learnt from this first attempt that this criterion should not be overlooked.

6.2.1.1.2. Difficulty encountered and obtained results

By August 2000, which was the intended deadline for the competition, it was noticed that very few answers had been received and the reasons for this poor participation were investigated.

It appeared that in the company, because of the autocratic management style, employees were afraid to make suggestions as they thought that they may pass as criticism and that their career may suffer from it.

As suggested by the researcher, the top management published a commitment that all answers would be examined anonymously and that they may be submitted using a password if desired. It was decided to extend the deadline for participation.

The possibility of verbal suggestion was never used. It appears that the person selected to receive those verbal suggestions (the researcher) was not close enough to the workforce, in order for workers to feel at ease reporting verbal suggestions. Other inhibiting factors were that the selected employee could not speak Hindi, Urdu or Arabic, which are the languages common in the workforce, and that the reporting office was located in the head office, while many employees worked in the factory or on sites.

By September 2000, 151 suggestions had been received.

These were then translated and classified, a task that took several months.
39% of the Suggestions were emanating from Workers. As 89% of the workforce of the company is formed of workers, this figure may be considered as a low one. Several explanations may be advanced to explain this relatively low figure:

- Not all workers were aware of the scheme. The advertising campaign was carried out solely in English, and therefore was not readily understandable by all.

- Even though anonymous suggestions were accepted, workers were afraid of proposing ideas that may be perceived as criticism. It has to be noted that their fear was justified. One of the major department heads tried to find out who proposed the suggestions, by forcing the employee of his department who had participated in the competition to identify on the anonymous list their own suggestions.

- Workers have difficulties to express their ideas in writing.

61% of the Suggestions were emanating from Staff, who were only 11% of the workforce. Staff are facing less difficulties to express themselves in writing, and are more aware that innovative ideas are well thought of by the management.
As for the winners their proportion among employee categories is strongly correlated to the participation. This means that a worker participant had the same chance of winning than a staff participant. Workers ideas are as valuable as non-workers ideas. This finding was in contradiction with the belief of some managers that workers participation had little or no value.

Another interesting result analysis was carried out as soon as the suggestions were collected: Were the suggestions received from inside or outside the scope of work of the employee proposing it?

The management was expecting: Suggestions outside the scope of work emanating from any type of employee; Suggestions inside the scope of work emanating from workers.

It appeared that some of the received suggestions were inside the scope of work of the staff who proposed it. For example, the Safety Officer submitted several suggestions on how to improve the safety. This came as a surprise, and a study was carried out to uncover why those suggestions had not been acted upon immediately by the staff in charge. Two main reasons were identified:

- Innovative ideas were not reaching the top management, mostly because the staff in charge did not know how to express themselves clearly and forcefully. For example, their reports contained innovative ideas, but immersed in a sea of general and repetitive information.

- As a result, the Top Management did not have the time to extract from those reports the valuable suggestions, and no action was taken.
Another identified reason for which innovative ideas were not implemented by the staff in charge, is the belief that ideas not matching the ISO procedures, should not be considered. As the ISO quality system was becoming increasingly static, it was preventing the implementation of continual improvements.

6.2.1.1.3 Study and implementation process of the suggestions

Once the suggestions received, the Organisation team carried out an important work of preparation in order to ease the work of the steering committee.

Suggestions were translated in English when required.

Suggestions were classified according to the original categories, and within the categories Suggestions were sorted according to the type of improvement proposed.

Some Suggestions were difficult to understand because they were not expressed in easily comprehensible English. They had to be read several times, and examined in the context in which they were written, in order to find out their most probable signification. In such a case, the suggestion was re-written in proper English.

Suggestions were typed using a word processor, and all indication of the employee from which it was emanating was removed.

Eight Senior Staff volunteered to form a Steering Committee in charge of the suggestions study. The first meeting took place by the end of December 2000.

All the suggestions that were either already implemented or not applicable were eliminated. If a valuable suggestion could be directly implemented, the concerned manager was asked to take the required steps. If not, the manager was asked to carry out a study, and submit a report. When necessary, several reports were asked from several employees. This study process took nine months to complete, during which the steering committee met twelve times.

37 suggestions were implemented (some in their original form, others in an amended form), ranging from in-depth organisational modifications to small technical improvements.
Daniele Seraphim – Ph.D.

Many of the suggestions have been incorporated in the strategic plan that will be studied later in this chapter.

6.2.1.4. Lessons learnt

Several lessons had been learnt following this first attempt:

- Heads of departments should be more involved in the process in order to overcome their resistance.

- In order to foster a culture of participation, the climate of fear should be reduced in the company. An employee should feel safe to propose a suggestion, and this can only be attained if the management takes it as a positive and valuable attitude and not as a criticism.

- Suggestion Competition proved to the Company that valuable suggestions are not the exclusiveness if the senior staff or staff, but that worker participation is valuable and should be actively looked for.

- The communication of the aim and modalities of the scheme should be improved. It was highlighted that many employees were not aware that a Suggestion Competition was taking place, as they did not have the ability to read the English notices placed or the boards, or as they did not check the boards.

- The study process was too long, and the employees in charge started to lose their drive after nine months of meetings.

- Last but not least, the company learnt that cultural difficulties should not be overlooked that the ‘ease of implementation’ criteria should be part of the decision process, along with the cost of implementation and the expected return.

6.2.1.2. Training Survey

One of the Company’s action plans which failed due to the lack of employee participation was aimed towards the identification of training needs. No reply had been received in answer to the repeated memos from the factory management asking foremen to identify the training requirements in their sections.
The researcher proposed that employee participation should be fostered by a pro-active strategy. It was thought that once the employees would get used to participating, participation would become in-built in the organisational culture.

A list of training subjects was elaborated by the researcher and sent to all Senior Staff for review. It was amended to integrate the proposals from all departments. The list of training was sorted into categories and sub-categories, the last category being an open one (Others).

A nominal letter was sent to all staff, stating clearly that an answer was expected even if no training requirements were identified. The letter was subdivided in two parts, one referring to the training requirements of the employee to whom it was addressed, and one referring to the training requirements of all employees under his supervision. Using this technique, the training needs of a given staff employee could be identified by himself or by any of his supervisors. The training needs of a worker could be identified by one of his supervisors.

The decision not to send the training survey directly to the workers was taken for two main reasons. Primarily to minimise the number of letters (84 nominal letters covered the training requirements of the whole company), and secondly to avoid translations, as most of the workers cannot read English.

The use of nominal letter was ensuring that the receiving employee could not consider the document as another circular without any direct link to him. It also helped keeping track of the received answers, and eased subsequent follow up either through memos or through phone calls.

Using this technique, 116 training requirements were identified, among which 28 were related to subordinates requirements. This has to be compared with total lack of answer following the repeated general memos.

The training requirements identified during the survey were examined by the top management. When in line with the company strategy, the requirements were retained for
cost implication study, when not, they were rejected. The IT and Organisation department (headed by the researcher), which was in charge of the survey investigated the cost of all external training retained. Taking into consideration this cost, the top management reviewed the list of retained training and removed the ones for which the expected returns were the lowest in comparison with the external cost.

Out of the 116 training requirements identified during the 2000 training survey, 57 of them have been performed. On top of those, 35 training were conducted following the recommendations of the Suggestion Committee, and many additional ones were initiated by the senior management.

As the training programme started late in 2000, most of the intended training were carried out during the year 2001, and will be examined in the next chapter. In 2000, 620 hours of training were carried out, to be compared with 2,835 hours the next year. The 2000 training records are the following:
6.2.2. Basing Improvements on the audit report of the 2000 SKIA

6.2.2.1. Audit results of the Sheikh Khalifa Industry Award

In February 2001, the Sheikh Khalifa Industry Award provided the company with its obtained scores in the seven enabler categories of the Award, relative to its 2000 participation in the SKIA scheme. The business results category would be evaluated during the second visit of the assessors, along with the company’s proposed Action Plans for improvement.
since its last participation. However, the 25% increase of obtained audit score in the ‘Business Environment’ category was certainly related to the successful action plans on Health, Safety and Environment improvements, as well as on increased contribution to society. The 20% of improvement in the ‘Human Resources’ category was the result of the successful suggestion competition scheme, as well as the successful ‘Training survey’ recently introduced by the company. The 18% increase in Leadership reflected the Top Management commitment to implement TQM principles in the organisation.

The lowest score obtained during the assessment was in the Strategy category with 57% only. The second lowest one was on Customer and market focus with 71%.

The company was asked to prepare two Action Plans, a short-term one and a long-term one. It was decided to address the two lowest scores.

The short-term Action Plan was addressing the Strategy category, with the elaboration of a Strategic Plan by a multi-departmental team. At the suggestion of the researcher, and unlike the previous years, the top management reflection included the pre-requisites that would enable the successful elaboration and implementation of this action plan. This reflection included the creation of a steering committee called ‘Executive Staff’ and the definition of the company’s Mission and Vision.

The long-term Action Plan was addressing the Customer & Market focus category. Its aim was to develop a Database in which the Market knowledge of the company would be recorded, and from which data on Market size, Market share and Competitor pricing policy might be extracted and analysed.

Following the Top Management decision to promote employee participation and team working, and the suggestion from the researcher, the proposed Action Plans were submitted to the senior managers of the company for review and comment.

6.2.2.2 Defining the Company’s Strategy

A study of the “Strategy” questionnaire provided by the SKIA enabled the company to decide on the desired attributes of its first Strategic Plan, which could be summarized as follows:
"Managers from all sectors of the company should be involved in the Strategic Planning process. Mission and Vision need to be defined. A Strength, Weaknesses, Opportunity and Threat (SWOT) analysis should be performed. All available research, knowledge of stakeholders’ needs, feasibility studies and benchmarks need to be used as inputs to the plan. Core processes, as well as their long-term and short-term requirements must be identified, and accordingly, strategic objectives and targets should be defined and prioritised. Risks, critical success factors, required resources and contingency plans have to be identified."

The gap analysis with what the company intended to perform was alarming: Managers had never been involved in Strategic Decision making. Mission and Vision had never been defined, and no formal SWOT analysis had ever been made. Available researches were limited, stakeholders’ needs could be appreciated in a qualitative way only, there was only one minor feasibility study available, and little benchmarking data (mainly provided by the award body itself). No one had ever thought of formally defining what the core processes were, and no corresponding requirements, objectives or targets had ever been formally defined. As for risks, critical success factors, required resources and contingency plans, it was doubtful that anyone had ever taken the time to think about these issues, as the whole organization was focusing on solving day to day difficulties.

6.2.2.1. **First Mission and Vision**

A clear definition of the Mission and Vision of the company was through by the top management and by the researcher to be a pre-requisite to the elaboration of its Strategic Plan.

First, the company had to decide whom to involve in the definition of the company’s Mission and Vision. Should this defining activity be carried out by the Top Management, or should the Senior Management be involved too? Considering the importance of defining the intended direction and of rallying the company’s management team around this
objective, the top management, following the advice of the researcher, decided that all key employees should be involved.

A new entity was created: ‘Executive Staff’. An Executive Staff was defined as an employee holding a managerial position, and who participates actively in the elaboration of the Company’s Strategy. The Managing Partner established the initial list (18 employees). This list was reviewed every 6 months. Employees who do not demonstrate a willingness to participate actively in the Company’s Strategic orientation were removed from this list, whatever their managerial position. New employees may be added.

The second issue to be considered was the methodology that should be used in order to define the company’s Mission and Vision. The top management, along with the researcher, estimated that if a memo was sent to the Executive Staff asking them for their suggestions, the answering rate may be low for two reasons: The company’s Mission and Vision had never been defined before, and knowledge of what should be incorporated in it was probably very low; Requesting non-English natives to write several paragraphs on a new subject might be considered as too time consuming, and few employees may consent to such an effort.

Knowing that it would be easier for the Executive Staff to react to written statements rather than to be required to propose such statements, the researcher drafted a proposal of Mission and Vision. It was sent to all Executive Staff, asking for their comments and proposals. As it was imperative to obtain a high participation rate during this first step, all selected employees were asked to send back the answering form, even if they had no comments to make. The answers were reviewed by the IT and Organisation Department and the Top Management elaborated the final version which was distributed by February 2001.

This methodology of mission and vision review proved to be highly successful. It is still being used, and mission and vision statements are reviewed systematically before establishing a new strategic plan, in order for them to be aligned.
How can you lead if you do not know where you are going?

George Newman

To remain committed in developing our position on efficient and sound commercial principles whilst building up our reputation for Quality, Durability and Reliability.

To adapt, change and introduce technological and managerial Innovations pursuing Quality, Productivity and Profitability, in order to meet the needs and expectations of our Clients on time, every time.

To involve our employees in the company’s life, to share our success with them, while satisfying the expectations of our shareholders.

To promote health, safety and environmentally friendly policies, in order to serve our employees and the community.

Elias Seraphim
Managing Partner

Samir Koblawi
Executive Manager

Document 1 First Mission and Vision statements elaborated by the Company

6.2.2.2. The first Strategic Plan

Now that the company had clearly established its intended direction, there was a need to clarify the strategy required to reach the aims identified in the Mission and Vision. The same process that worked for the mission and vision definition was used.

At the beginning of 2001 the researcher and the Top Management drafted the first version of a strategic plan. The chosen structure was based upon the advice of the award body: Current position of the organisation, process by process; Strength and weaknesses of the
In order to trigger reactions from the Executive Staff, the draft strategic plan was initially very optimistic. The reaction was very strong: 9 out of the 18 Executive Staff proposed some modifications and 58 suggestions were studied.

A meeting was then held to review all proposed modifications. Those agreed upon were integrated in the strategic plan, which was no longer an optimistic one, but one that clarified the necessity of in-depth improvements. This revised document was widely distributed among the staff.

Analysing the strengths and weaknesses of the elaboration process of this first Strategic Plan, the following elements were identified:

The methodology employed to set the Strategic Plan was good, because all Departments were involved in its elaboration, which ensured a strong sense of ownership by the senior management.

It gave the senior management the feeling of being in control of the future of the company, and a reasonable confidence that if the decided strategy was applied, the company could recover from its existing crisis.

It was based mainly on two sets of important data: The production figures and the financial results. Elements such as the Market Evolution, Competitors pricing policy, Customer satisfaction, Employee Satisfaction etc were taken into consideration, but not in a quantified way. This weakness would be corrected in the following Strategic Plans.

Another weakness of the 2001 Strategic Plan was that it did not clearly identify the cost implications, provision and allocation of resources related to the objectives. This issue was improved in the later versions.

After study of the Japanese technique exposed by Barrie G. Dale (Dale, 2000), the possibility of implementing a Strategic plan deployment from top management to workers, and back from workers to management was examined by the researcher. However, it was estimated that such a technique was too ambitious, taking into consideration the
characteristic of the company. Written communication with the highest level of the hierarchy was already a difficult task. In order for it to be successful, the concerned employees were asked to react to a document rather than write one themselves, and to consult their team in doing so. Asking the second level of the hierarchy to study the part of the strategy relative to their work and to submit their own strategic proposals to reach them, would be a long and time consuming process, as most of them do not have the ability to write in English. It was decided to maintain reliance upon verbal communication from the second level of hierarchy down to workers.

The Abu Dhabi chamber of commerce organised a TQM best practice seminar, in which the company was asked to present its methodology for strategic planning.

6.2.2.2.3. Assessing the implementation success of the strategy

The responsibility of implementing the strategic objectives was assigned to the concerned departments. As the structure of the strategic plan was process based, the heads of department could easily identify the objectives under their responsibility.

In order to assess regularly the overall progress on the strategic plan, the Support and Development department (headed by the researcher) was given the responsibility to collect progresses to date from each department and produce a bi-annual report, highlighting areas in which target dates for improvements were not met.

Of the 46 milestones which were defined for 2001, 41 of them were completed by January 2002 and five of them were not. Many milestones defined for 2002 onwards were also achieved by this date.

The major reason for the strategic plan implementation success was considered to be the high involvement of employees both in the planning activities and in the actual implementation of the strategy.

By end of 2001, it was estimated that the implementation success rate (based on a 100% score attributed to achieved objectives, 50% to partially achieved ones and 0% to non-achieved ones) was of 69% for the 41 milestones defined for the period.
An analysis of the 2001 level of performance of the company according to its Key Performance Indicators, as well as a comparison with previous years’ levels can be found in paragraph 6.3.1.

6.2.2.3. Employee of the month

The introduction of an ‘employee of the month’ scheme was proposed in a suggestion received during the Suggestion Competition.

The Suggestion Committee thought this proposal to be a good starting point for improving employees’ recognition and reward in the company, for the following reasons.

Employee of the month recognition system is a widely used tool in many organisations. Part of its popularity must be linked to its effectiveness.

It is easily implemented. Once the selection process established, the monthly amount of time required in order to implement the scheme is minimal. No employee resistance was expected on such a scheme as it was not in conflict with the company’s culture.

The cost of implementation is minimal.

Several returns were expected:

It was decided to limit the winners to the workers in order to promote their importance and value in the organisation. This was thought to be part of the basis on which to build a culture of workers’ participation or empowerment.

The selection process was set in order to use the active participation of the foremen, which should promote their involvement in the company’s life.

The certificates being displayed on the boards, it was anticipated an increased interest in material displayed on these boards, and thus improved top-down communication.

Last but not least, it was expected to promote a sense of competition between the workers that should increase their productivity.

The scheme was implemented for the first time in May 2001. By October 2001, the process was reviewed for improvement. All Executive Staff, all foremen and all selected
Daniele Seraphim – Ph.D.

‘employee of the month’ so far, were asked for they suggestions on how the scheme could be improved. They were also asked to fill a short survey on the estimated value of the scheme.

The survey proposed, elaborated by the researcher, was as follows:

<table>
<thead>
<tr>
<th>Questions</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you feel that the winners appreciated this type of recognition of their work?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you feel it further improved the Quantity of work done by the winners?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you feel it further improved the Quality of work done by the winners?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you feel it further improved the participation of the winners in the Company’s Life?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you feel it improved the work of the Team in which the winner is a member?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you feel it improved the work in the Department in which the winner is a member?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall, do you feel that the introduction of this scheme had a positive impact in the Company?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6 Survey used to assess the impact of the “Employee of the month” scheme

Although the scheme was generally thought an effective one by employees who answered the survey, several modifications were proposed. There were collected and circulated for review.

A meeting was held between the Executive Manager, the Heads of Department in charge of the selection process and the researcher in order to study the proposed modifications and decide on possible improvements.

The scheme was modified as follows:

Departments having a high number of employees were allowed to propose two candidates.

The scheme was not restricted to workers any longer.

In the Factories, the Safety Officer was involved in the candidates’ pre-selection process.

The photo of the selected employee was printed on the Certificate.
The name of the Personnel Manager was added on the certificate, along with the Head of Department name and the Executive Manager name.

This scheme is still running nowadays.

6.2.2.4. Participation in Humanitarian causes

Even though the financial situation was still alarming in 2001, the Top Management decided to continue its participation to humanitarian causes. Two main strategies were elaborated:

Participate in punctual causes that strongly appeal to the interests of the workforce. As an example of such action, the company sent in February 2001 a container of medical bandages to India, following a major earthquake. As the majority of the company employees are originally from India, this action had a strong emotional impact. The company used the display boards to report it.

The Top Management also wanted to commit itself on long term relationships with Humanitarian Organisations. In July 2001, the company initiated a long-term relation with the local branch of ‘Medecins sans Frontiere’, through a monthly donation. This relation is still on-going to date.

Apart from the objective of having a positive impact on the society in which the company is operating, participation in humanitarian causes is thought by the management to have a positive impact on the sense of belonging of its employees. It is aligned with the company’s vision of positive influence towards all stakeholders.

6.2.2.5. Training Survey, Training Programme and Training Records

The training programme of 2001 was greatly influenced by three factors: The training suggestions received during the Suggestion Competition; The training survey carried out in June 2000; The training survey carried out in January 2001.

In 2001, the Management decided to include the annual training survey in the company’s ISO procedures.

By the end of 2000, it was decided that a training budget would be attributed to an annual training programme. This budget did not take into consideration any internal costs such as:
time away from the office for external and in house training, time of training preparation for in house training etc.

In total, 2,835 hours of training were granted in 2001. Half of those hours (1,461 hours) were on-the-job training hours, which was already a standard practice in the company for many years. Please find below some graphs showing the distribution of those hours. The graphs on the left are including on-the-job training, while the graphs on the right are excluding them.

Figure 12 Graphical representations of the trainings performed in 2001

It should be noted that workers had benefited from a satisfactory level of on-the-job training for a number of years. Any newly employed worker had been trained on the duties
he was expected to perform. On-the-job training had also been provided in case of modification of responsibilities, promotion or as a means for multiple competencies. Multiple competencies are encouraged and rewarded as it increases the flexibility of the workforce. Records of on-the-job training started to be maintained from 2001 onwards only, which explains that no such training was reported in 2000.

Among the 59% of the training hours relative to the Production techniques, many of those are on-the-job training, which explains why the training on Production techniques drops into the third place if on-the-job training is excluded.

Safety training hours are 36% of the total training hours if on-the-job training is excluded. This figure seems appropriate for a construction company. 31% of the training hours are on IT techniques.

The 6.5% figure of training on Language, if on-the-job training is excluded, may seem a very low percentage for a company facing high communication problems due to the diversity of native languages. However, it takes a long time to acquire communication skills in an unknown or poorly mastered language. With a limited budget, 10 hours of safety training for example may improve considerably the safety knowledge of an employee, while a 10 hours English course would have no noticeable effects.

Another low figure is the 9% training on Management tools and techniques. Among a population of employees chosen for their Technical knowledge and with low management technique knowledge, it is natural that technical training would be more valued than managerial ones, as the employees do not have a clear understanding of the possible returns of such training. In order to reverse this trend, the top management has to promote Management tools and techniques training. In the company, such strategy was implemented, and the importance of the management training increased over the following years.

From 2001 onwards, training records were kept and analysed regularly by the researcher and the top management.

6.2.2.6. A Gold Award in the 2000 SKIA

In March 2001, the assessors from the Sheikh Khalifa Industry Award (SKIA) performed their second visit in the company. There were two main objectives for this visit.
The first aim was to review the Action Plans prepared by the Company. The progresses on the short-term action plan (Improving the Company’s Strategy) were assessed. The company obtained a score of 70% for Action planning.

The second aim was to review and verify the Key Performance Indicators results prepared by the company. It should be noted that the financial figures considered were the figures of 1999, as the figures of 2000 were not yet audited by an independent third party. This element played in favour of the company, because the 1999 financial figures were encouraging, while the 2000 figures would have reflected the financial crisis. The following indicators were prepared and audited.

### SHEIKH KHALIFA INDUSTRY AWARD

**PERFORMANCE RESULTS QUESTIONNAIRE 2000**

<table>
<thead>
<tr>
<th>No</th>
<th>Performance Measure</th>
<th>Factory: Gulf Precast Concrete Co. LLC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>1997</strong> Actual</td>
<td><strong>1999</strong> Target</td>
</tr>
<tr>
<td>1</td>
<td>Gross Sales</td>
<td>29,665,000</td>
</tr>
<tr>
<td>2</td>
<td>Net profit</td>
<td>2,041,427</td>
</tr>
<tr>
<td>3</td>
<td>Value of Raw Materials Consumed</td>
<td>6,729,000</td>
</tr>
<tr>
<td>4</td>
<td>Labour Cost Incurred</td>
<td>5,495,552</td>
</tr>
<tr>
<td>5</td>
<td>Factory Overheads</td>
<td>3,816,914</td>
</tr>
<tr>
<td>6</td>
<td>Expenditure on Repairs and Maintenance</td>
<td>1,244,000</td>
</tr>
<tr>
<td>7</td>
<td>Number of hours worked</td>
<td>1,367,790</td>
</tr>
<tr>
<td>8</td>
<td>General and Administration Costs</td>
<td>3,142,055</td>
</tr>
<tr>
<td>9</td>
<td>Inventory Turnover</td>
<td>2.60%</td>
</tr>
<tr>
<td>10</td>
<td>Expenditure on market research</td>
<td>10,000</td>
</tr>
<tr>
<td>11</td>
<td>Expenditure on product research and development</td>
<td>10,000</td>
</tr>
<tr>
<td>12</td>
<td>Investment in new technology</td>
<td>321,770</td>
</tr>
<tr>
<td>13</td>
<td>Investment in information systems</td>
<td>114,227</td>
</tr>
<tr>
<td>14</td>
<td>Expenditure on training</td>
<td>2,500</td>
</tr>
<tr>
<td>15</td>
<td>Value of sales exported from UAE</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>Number of customer complaints</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>% of market share</td>
<td>25</td>
</tr>
<tr>
<td>18</td>
<td>Number of customers</td>
<td>100</td>
</tr>
<tr>
<td>19</td>
<td>Number of new customers</td>
<td>36</td>
</tr>
<tr>
<td>20</td>
<td>% of products delivered on time</td>
<td>90</td>
</tr>
<tr>
<td>21</td>
<td>Number of feasibility studies prepared</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>Number of feasibility studies accepted</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>Number of (permanent) employees</td>
<td>475</td>
</tr>
<tr>
<td>24</td>
<td>Number of new (permanent) employees</td>
<td>45</td>
</tr>
<tr>
<td>25</td>
<td>Average time each employee was being trained</td>
<td>2 weeks</td>
</tr>
<tr>
<td>26</td>
<td>Number of employees appraised</td>
<td>475</td>
</tr>
<tr>
<td>27</td>
<td>Overall factory productivity</td>
<td>1.30%</td>
</tr>
<tr>
<td>28</td>
<td>Overall factory output</td>
<td>30,081,530</td>
</tr>
<tr>
<td>29</td>
<td>% time of plant down time</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>% of capacity utilised</td>
<td>105.52</td>
</tr>
</tbody>
</table>

*Table 7 Performance Indicators presented to the SKIA in March 2001*
The score obtained in the ‘business results’ category was 57%.

By April 2001, the company was informed that it had won a Gold Award in the SKIA.

It may seem surprising that a company facing such difficulties as the one considered could win a Gold Award in a TQM competition. However, several elements played in this sense:

It was clear, at the time of the audits, that the management of the company had taken a strong commitment towards TQM principles, and that practical implementations had started. There was a clear improvement surge that could be demonstrated, with creative solutions such as the Suggestion Competition, and proof of successful implementation of the enhancements introduced. It was also apparent that the top management had made an effort to identify its weaknesses, and to start overcoming them. All these aspects played in favour of the company for the enablers criteria.

As for the ‘business results’ criterion (which accounted for 27% of the overall score), because the 2000 results were not audited yet, the company was asked to present figures from 1997 to 1999, which reflected profitability over these years. However, the SKIA demonstrated their doubt about the level of performance of the company so far (even without considering the financial crisis), by attributing a score of 57% only to this category (to be compared with the score of 92% obtained by the organisation in 2002).

6.2.2.7. Top Management stability

The year 2000 was characterised by the instability of the Top Management. The new local owner did not trust the employee in charge of the General Management of the company. Until a new General Manager, trusted by the two partners, could be found, the non-local Partner held the position of Managing Partner. Two tentative of internal promotion to this post were decided on a trial basis and failed. During this period, the Top Management responsibilities were unclear and fast changing. The company was negatively influenced by this lack of coherent direction, especially during this period of fast production increase.

Following the failure of internal promotion, several attempt of external hiring did not succeed, as the candidate did not suit either or both of the partners.
In August 2001 an external candidate was found who was trusted by both partners. Following this period of Top Management instability, the newly hired Executive Manager had to gain the recognition of the employees. His strong personality and his rapid control over the organisation was a major element of success in the company recovery. Even if some of the Executive Staff did not always agree with his management style, it was clear to everyone that he was in charge on the Top Management.

This Top Management stability was an important element which helped the Company define its goals and reach them.

A critical element in the further implementation of Total Quality Management in the company was that the Executive Manager is TQM literate and knowledgeable. He was in favour of the TQM implementation process which had been started before his joining, and decided to carry on with it. He supported most of the TQM initiatives and even initiated many of them.

6.2.2.8. Regular Safety reviews and improvements

The Suggestion Competition had highlighted a major weakness in the company safety system.

The system was heavily reliant on the Safety Officer, who was under the direct supervision of the Factory Manager. Conflicts of interest between Safety and Productivity were settled by the Factory Manager. In many instances, safety measures were applied only if they did not have any foreseen negative impact on the productivity.

As a consequence of the above, the authority and empowerment of the Safety Officer was minimal. Among the suggestions for improvement received in the Suggestion Competition, several emanated from the Safety Officer and were related to safety improvements, highlighting this lack of empowerment.

The Top Management decided to increase the empowerment of the Safety Officer, and to introduce Regular review of the Safety system.

The first step in this sense was to isolate Safety responsibilities from Production responsibilities. Although the “on the ground” Safety responsibilities remained with the
Daniele Seraphim – Ph.D.

Safety Officer, the researcher was assigned the responsibility to verify that regular safety improvements were introduced in the system.

Monthly safety meetings were held between the Safety Officer and the researcher in order to examine safety issues faced during the month, safety statistics and trends, if any, and follow up on improvement actions. Possible improvements studied and sent for review and approval to the Top Management, and if validated, all and concerned Departments were responsible for their implementations.

Among the improvements introduced in the safety system of the company, the following may be noted:

- Selection of Safety representatives in all Factory Sections and all Sites (see paragraph 6.2.2.9)
- Availability of salt tablets to be distributed to the employees during summer months.
- Improved maintenance of water coolers, and additional water coolers provided.
- Availability of safety shoes for all Factory and Site employees.
- Availability of uniforms for Factory employees.
- Regular visits of the Safety Officer on erection sites.
- Improved readability of the Safety reports.
- Certification of all cranes.
- Regular rope inspection on the cranes.
- Improved Safety training.
- Improved Safety awareness in the Factory and on Sites.
- Priority status for Safety purchase requests.
- Reviewed list of safety instructions.
- Etc…

Improvement actions were introduced, followed up and reviewed for effectiveness, and as the Top Management was directly supporting their implementation, the level of safety started to improve, as shown by the corresponding indicators.

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of accidents</td>
<td>45</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>Accidents / 10,000 M3 produced</td>
<td>22.80</td>
<td>7.99</td>
<td>5.22</td>
</tr>
<tr>
<td>Accident Frequency rate</td>
<td>48.83</td>
<td>27.22</td>
<td>21.59</td>
</tr>
</tbody>
</table>

Table 8 Safety performance results from 2000 to 2002
6.2.2.9. Safety Representatives

One of the problems faced by the Safety Officer was the impossibility for him to be continuously present in the multiple production areas. A safety trained employee should be present on the factory ground where the Precast Panels are manufactured, but also on the sites in which the panels are erected. The company worked on 15 to 20 sites at a given time.

It was decided that the Safety Officer would tour the sites, reducing his presence on the factory ground.

As the company did not have the financial means of hiring a Safety Officer for each production area, it was decided that employees would be trained and remunerated to assume safety duties on top of their production duties.

It was resolved that an employee would be selected, for this purpose, from each Factory Section. As the number of concomitant sites may vary, it was decided to train more Safety Representatives than the total number of sites at any given time, and to ask the site management to make sure that at least one Safety Representative was present on each given site at each given time.

They performed a training during which specific hazards relative to their work environment were highlighted. An evaluation form was then devised. The Safety Officer was in charge of assessing the safety involvement of the Safety Representatives on a monthly basis.

As this technique proved effective and is still used nowadays.

6.2.2.10. Staff Survey

One of the first initiatives of the newly appointed Executive Manager was to launch a Staff Survey. The decision to limit this survey to employees from Foreman and above was taken in order to receive quick data on which the Top Management may base its Strategy.

The Survey was divided in three parts: Some questions aimed towards knowledge of demography in the Company; Some questions aimed towards knowledge of employees’ Job Satisfaction; And some questions aimed towards their knowledge of TQM, and particularly Quality Circles.
Several group meetings were held between the Executive Manager and the Staff, during which the questionnaires were handed over and discussed. The employees were asked to fill the questionnaire and send it back within the coming days.

**6.2.2.10.1. Demography**

The demographic questions were the following:

- What is your age?
- What is the highest educational degree you earned?
- From where did you earn your degree?
- What part of the world are you from?
- What is your marital status?
- How long have you been working for this company?

The aim of those questions was to give the new Executive Manager a quick snapshot about the company’s staff, on which he could base his organisational review.

**6.2.2.10.2. Job Satisfaction**

The analysis of the job satisfaction results had been useful to the company in several ways.

It highlighted employees with very low satisfaction rate. As the survey was followed by direct interviews between the employee and the Executive Manager, the low satisfaction was discussed in-depth, and alternative career moves were proposed once the organisational review was completed. For example, one of the two employees scoring the lowest in the job satisfaction survey of 2001, was proposed a career move as Planning Manager, and is still holding this position successfully. The second one was proposed a career move as quantity surveyor, and was recognised a few months later as the youngest Executive Staff of the company.

It also helped the company to highlight the weakest average satisfaction elements, and to plan corrective actions accordingly.

### JOB SATISFACTION RESULTS OF 2001

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, how satisfied are you with the persons in your workgroup?</td>
<td>77.57</td>
</tr>
<tr>
<td>Overall, how satisfied are you with your supervisor?</td>
<td>80.14</td>
</tr>
<tr>
<td>Overall, how satisfied are you with your job?</td>
<td>80.88</td>
</tr>
<tr>
<td>Overall, how satisfied are you with your organisation?</td>
<td>72.43</td>
</tr>
<tr>
<td>Considering your skills and the effort you put into your works, how satisfied are you with your pay?</td>
<td>56.25</td>
</tr>
</tbody>
</table>
How satisfied are you with the progress you have made in the organisation up to now? 73.90
How satisfied are you with your chances for getting ahead in this organisation in the future? 69.12
How satisfied are you with the input that you have given to the organisation (productivity)? 83.46
How satisfied are you with the motivation practices within the organisation? 57.84
In your opinion, how satisfied is your company from your job performance? 83.98

Table 9 Results of the 2001 Job Satisfaction survey

Figure 13 Results of the 2001 Job Satisfaction survey

The lowest obtained score was on the following question: “Considering your skills and the effort you put into your work, how satisfied are you with your pay?”. The dissatisfaction was amplified by the fact that no increase of salary had been granted in 2000, due to the financial losses during that year. With the positive financial results of 2001, the company was able to re-establish its policy of yearly salary review. The review scheme was also improved.

The second lowest score was obtained on: “How satisfied are you with the motivation practices within the organisation?”. As seen earlier, the “employee of the month” scheme was reviewed for improvement in October 2001. The company also introduced immediate recognitions for outstanding performance.

All other categories obtained next to or above 70 percent of satisfaction, with a general average of 74 percent.
As the job satisfaction survey provided useful and actable data to the company, it was decided to perform it on an annual basis, and to extend it to all employees.

6.2.2.10.3 TQM and Quality Circle knowledge

The last part of the survey was related to the total quality knowledge, and particularly the quality circle knowledge, within the company. It contained the following questions:

- Are you familiar with the concept Total Quality Management?
- Are you familiar with the concept Quality Control Circles?
- Are you aware of any other Quality Improvement tools?
- Specify:
  - Do you agree that a Quality Circle Programme is? (not important; important but not essential; essential)
  - Do you feel that Quality Circles will be beneficial to your work unit?
- Are you willing to join a quality circle programme?
- Would you participate by suggestion ideas in quality circle meetings?
- Do you think that Q.C. meeting will improve communication through group activities?
- Will you be committed to the results of the Q.C. meetings?
- Do you anticipate that Quality Circles could improve your job satisfaction and work productivity?

The obtained results showed that although 47 percent of staff estimated they had a good to fair knowledge of TQM, very few of them could specify a quality improvement tool, apart from the ISO quality system. This over-estimation of their TQM knowledge may have been partly the result of a willingness to impress favourably the new Executive Manager.

It also demonstrated the willingness of the company employees to implement total quality tools such as quality circles, as 81 percent of them declared being willing to join the quality circle programme, and 72 percent of them to participate with suggestion ideas in quality circles meeting. 85 percent of them were of the opinion that quality circle meetings should improve communication through group activities and 81 percent that it should improve job satisfaction and work productivity. 72 percent of the staff declared that they would be committed to the results of quality circles meetings.

The Top Management however felt that the company was not yet ready for the introduction of quality circles for two reasons:

The knowledge of total quality management tools and possible benefits from their utilisation should first be increased in the company through appropriate training,
particularly for the senior management, in order to minimise resistance to the quality circles recommendations.

The company should first find ways to minimise the difficulties due to the multi-lingual Communication barrier, in order for the workers to be highly involved in quality circles. Choosing employees with verbal and written English skills to be members of quality circles would disqualify most of the workers from this initiative, which would be in direct contradiction with the recommendations for such activities. (Rapp and Eklund, 2002).

6.2.2.10.4. *Individual meetings*

The collection of the survey results was followed by an individual meeting between the employee and the Executive Manager. The employee was prompted to comment his answers, to clarify any difficulty he was facing in his daily work, as well as his general understanding of the company’s strengths and weaknesses. During this meeting he was also asked to hand over his curriculum vitae, and discuss his career desires.

These meetings were the opportunity for the company’s staff to meet the new Executive Manager, and for the latest to evaluate the human potential in the company. The length of those meetings were generally 20 minutes, but in some cases lasted 30 to 45 minutes.

6.2.2.11. *Monthly Executive Staff meetings*

Prior to 2001 the formal communication in the company was mostly limited to the senior management. Senior and top management used to meet weekly or bi-weekly in order to discuss the progresses and obstacles met on the current projects. These meetings were held after working hours, and often lasted until late at night. The participants to those meetings were generally the seven or eight senior managers in the company. The agenda was limited to technical problems.

Another characteristic of senior management communication was the low use of direct communication. When facing a problem of interface between processes, a Senior Manager would generally contact the top management, who in turn would contact the other Senior Manager and try to solve the problem with him. Therefore, the weekly or biweekly senior management meetings were a useful tool to discuss problems in the presence of the top management as an arbitrator.
The first initiative in order to improve the senior management’s communication was the decision of the top management to refuse to act as an intermediate between senior managers. When a senior manager tried to explain to the top management a problem relative to the interface with another process, the employee was strongly advised to contact the concerned Department Head directly and solve the problem with him. Direct communication between senior management was not only encouraged, it was set as a performance criterion of the department.

In order to foster this change, the senior management meetings were originally cancelled. Once direct communication was established, technical meetings with a limited number of managers were reintroduced, in order to discuss specific coordination problems. The length of those meetings was greatly reduced, and the agenda was limited to specific issues on specific projects, and not the complete review of all the projects.

The company required a tool to communicate its managerial policy and decisions. It was decided to set in place a monthly Executive Staff meeting, aimed towards discussing non-technical issues. The top management decided to invite to those meetings both the senior management and some junior management, and to use the newly created entity of executive staff, whose list was updated to include key Junior Staff. One week in advance, the Executive Staff were informed that an Executive Staff meeting will take place, and asked for the topics they would like to discuss during this meeting. The agenda was then sent to all participants, in order to allow anyone to carry out researches on the proposed topics. Very often new topics were proposed in reaction to the first ones and the new agenda was posted. During the meeting, technical issues or issues that could be solved by the communication between few employees were removed from the agenda for later discussion in restricted committees.

Those meetings were the occasion to pass on information about the company. This was used primarily by the top management to inform the attendants of the performance of the company, but also by other executive staff. It was also a good opportunity to solve managerial overall problems. Minutes of meeting were kept and sent to all participants within fifteen days.
6.2.2.12. Complete review of the organisation's structure

One of the first initiatives of the new Executive Manager was to review the organisation's structure. The top management elaborated a theoretical organisation chart reflecting the 'best' organisation structure for the company. It was characterised by a horizontal organisation chart in comparison with the previous vertical one. It was drawn without consideration of the available skills in the company.

This organisation chart was then reviewed against the human resources available. Whenever possible, available human resources were assigned to the drawn positions. When necessary, minor adjustments were made to the theoretical organisation chart. However, major positions were not removed, even when no internal human resources were available to fill them. The position was drawn in dotted line, indicating that the company was looking for the appropriate employee.

Due to the expansion of the company at the time of the re-organisation, very few of the employees had to be laid off, and most of the ones whose previous position was not available in the new organisation chart were proposed alternative positions. However, some employees left the company either because their performance was judged poor by the top management, or because they did not agree with the new management style.

Figure 14 Organisation Chart as established by the end of 2001
6.2.2.13. Clear definition of roles and responsibilities of key Employees

Once the new organisation chart established, and the positions filled with available or recruited human resources, the roles and responsibilities of all key employees were precisely defined.

The previous period of management instability had left many of the senior employees in doubt about the boundaries of their job responsibilities. In several cases a given responsibility was thought to be included in the job definition of several employees, while some responsibilities were not attributed at all. This caused increased conflict between the senior management, culminating in a refusal of direct communication.

The positions in the new printed organisation chart were defined in detail, and conflicts of responsibility were cleared. Although this created some tension between the top management and the senior management in the first phase, it reduced greatly the conflicts between Senior Managers, and was an important agent for communication improvements among Managers.

Refined roles and responsibilities were exhibited on the display boards, and the new Organisation Chart was widely distributed both inside and outside the company.

6.2.2.14. Team building activities

In order to improve the communication within the company, the top management decided to promote multi-disciplinary and multi-hierarchical activities.

In Europe, team building activities are widely used by many companies to reinforce the employees' integration into the organisation and to generate cooperation links both within the working teams and individuals. Services of team building professionals may be hired to organise the activities and to structure them according to the objectives defined by the company.

In the United Arab Emirates, however, team building activities are scarce and team building experts' services are not available. Therefore, the organisation of such activities relies entirely on in-house resources, which have little or no experience in this regard.

An additional difficulty was that the organisation of such activities takes time, and the Human Resources team was too time-restricted to organise it on its own. Therefore,
employees holding positions that do not generally deal with activity organisation were asked to participate in the preparation in addition to their normal duties.

When organising team building activities, the diversity of the company's employees in terms of nationality, religion and social position in the company had to be taken into consideration. The organising team gained experience of possible difficulties and the way to overcome them through experience in such activities over the years.

The “Raft Race” event had for aim the participation of employees of different hierarchical levels in an activity unrelated to work, in which hierarchical barriers could be temporarily lifted. It was the first of such activities and therefore can be viewed as a company attempt to reduce power distance rather than as an anecdotal event.

The “Bowling night” event aimed towards joining staff and their family in a cross functional occasion outside the work environment. The aims were to create the possibility for employees from different departments to meet, and for families to be involved in a company promotional scheme.

The “first appreciation day” event had for objective that the whole company, from workers to managers, would meet in a festive atmosphere, over games and food. In order to promote employee participation, it was decided to propose a number of substantial prizes. Main suppliers of the company were contacted and asked to sponsor the event by offering gifts to the winners. This initiative also reinforced the links between the company and its suppliers.

These three events were the precursors of other such initiatives, aiming towards reducing power distance, increasing inter-departmental communication and promoting the image of the company to the employees, based on outside working environment events.

### 6.2.2.15. Setting up 18 Action Plans

Following the advice of the Sheikh Khalifa Industry Award team, the company decided to set up ‘Action Plans’ for improvement.

### 6.2.2.15.1. Methodology Used

The documents submitted to the Sheikh Khalifa Industry Award were reviewed by the researcher. Each criterion in which the company obtained less than the highest score was
studied, and possible actions for improvement were listed. The list was then sent to the Top Management for review and selection. Eighteen of the proposed topics were selected. For each of those topics, the researcher drafted an Action Plan containing the following data:

- Project Title
- Sheikh Khalifa Industry Award items addressed
- Objectives
- Measures
- Resources allocated
- Estimated Cost
- Estimated Benefits
- Project Milestones including target dates and responsibilities

The drafts were reviewed by the Top Management and modified when necessary.

6.2.2.15.2 Topics selected

The topics selected were the following:

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources</td>
<td>Improve domestic facilities in the camps</td>
</tr>
<tr>
<td></td>
<td>Increase documentation available in the Company</td>
</tr>
<tr>
<td></td>
<td>Provide Factory and Site training to all employees</td>
</tr>
<tr>
<td></td>
<td>Generalise the Internal Training programme scheme.</td>
</tr>
<tr>
<td></td>
<td>Generalise Job Satisfaction survey to all employees on given periodicity.</td>
</tr>
<tr>
<td></td>
<td>Provide social activities for the employees.</td>
</tr>
<tr>
<td></td>
<td>Invite Students to perform a training in the company</td>
</tr>
<tr>
<td>Customer and Market Focus</td>
<td>Improve lines of communication with Customers and potential customers</td>
</tr>
<tr>
<td></td>
<td>Evaluate Customer Satisfaction using a satisfaction survey</td>
</tr>
<tr>
<td>Process Management</td>
<td>Measure delivery performance as part of the planning system, and analyse obtained results against targets</td>
</tr>
<tr>
<td></td>
<td>Review the Quality Assurance System and apply for ISO 9001-2000 certification</td>
</tr>
<tr>
<td></td>
<td>Improve Material Management</td>
</tr>
<tr>
<td></td>
<td>Minimise produced elements final touch up work.</td>
</tr>
<tr>
<td>Use of information</td>
<td>Further improve the presentation of Data analyses.</td>
</tr>
<tr>
<td></td>
<td>Further improve the IT System protection against viruses</td>
</tr>
<tr>
<td>Business Environment</td>
<td>Assess housekeeping through evaluation means in the Factory, the Sites and the Head Office</td>
</tr>
<tr>
<td></td>
<td>Conceive a Safety Manual</td>
</tr>
<tr>
<td></td>
<td>Nominate and follow up Safety representatives for Sites and Factory</td>
</tr>
</tbody>
</table>

Table 10 List of Action Plans prepared by the end of 2001
6.2.2.15.3, Example of Action Plan

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Gulf Precast Concrete Company LLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Title</td>
<td>Improve domestic facilities in the camps</td>
</tr>
<tr>
<td>Self - Assessment Issues Addressed:</td>
<td></td>
</tr>
<tr>
<td>Human Resources - Domestic facilities, Human resources - Employee satisfaction</td>
<td></td>
</tr>
</tbody>
</table>

**Objectives**

Improve the domestic facilities provided in the camps. In order to do so, a camp improvement survey will be elaborated and distributed every six months to the employees residing in the camps. Using the results of this survey, a review team will meet and decide on improvement actions.

**Measures**

Results of camp improvement survey.

**Resources Allocated**

**Human Resources**

Camp improvement team: Set up the decided improvement action. Estimated five days of work of a team of five employees for each improvement action.

**Other Resources**

Material etc: Estimated average budget by improvement event and by camp: 5,000 Dhs.

<table>
<thead>
<tr>
<th>Estimated Costs</th>
<th>Camp Improvement team 2,000 Dhs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per event</td>
<td>Other resources 10,000 Dhs</td>
</tr>
</tbody>
</table>

**Estimated Benefits**

Increase the satisfaction of the Employees
Increase the feeling that the management is caring for and listening to its employees.
Increase the participation of the employees to the life of the Company.

**Project Milestones**

<table>
<thead>
<tr>
<th>Project Milestones</th>
<th>Responsibility</th>
<th>Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting in order to examine the possible list of questions to be included in the camp improvement survey.</td>
<td>E. Seraphim; A. Deek; S. El-Shouni; VK George; R. Prasad</td>
<td>15/02/2002</td>
</tr>
<tr>
<td>Finalise the camp improvement survey.</td>
<td>Deek</td>
<td>28/02/2002</td>
</tr>
<tr>
<td>Distribute the camp improvement survey.</td>
<td>S. El-Shouni</td>
<td>07/03/2002</td>
</tr>
<tr>
<td>Collect and analyse the results of the camp survey</td>
<td>S. El-Shouni</td>
<td>31/03/2002</td>
</tr>
<tr>
<td>Meeting in order to examine the improvement action most needed according to the results of the survey.</td>
<td>E. Seraphim; A. Deek; S. El-Shouni VK George; R. Prasad</td>
<td>07/04/2002</td>
</tr>
<tr>
<td>Find out the financial cost of the proposed improvement.</td>
<td>Deek</td>
<td>25/04/2002</td>
</tr>
<tr>
<td>Propose a written study of the financial cost of the proposed improvement to the Executive Manager</td>
<td>A. Deek</td>
<td>30/04/2002</td>
</tr>
<tr>
<td>Examine the proposed study and ask modifications or more information if required.</td>
<td>S. Koblawi</td>
<td>10/05/2002</td>
</tr>
<tr>
<td>Carry out asked modifications and provide complementary information if required.</td>
<td>Deek</td>
<td>25/05/2002</td>
</tr>
<tr>
<td>Validates the proposed improvement</td>
<td>S. Koblawi</td>
<td>31/05/2002</td>
</tr>
<tr>
<td>Supervise the realisation of the improvement in accordance with the validated study</td>
<td>S. El-Shouni</td>
<td>June onwards</td>
</tr>
<tr>
<td>Distribute the camp improvement survey.</td>
<td>S. El-Shouni</td>
<td>07/09/2002</td>
</tr>
<tr>
<td>Tasks 3 to 11 are recurring every six months</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Project Coordinator**

Camp boss

**Approved Chief Executive**

Samir Koblawi Date 30/12/2001

Table 11 Example of Action Plan prepared by the end of 2001
6.2.2.15.4 Achieved/non-achieved Plans

Table 12 Percentage of success in the implantation of the Action Plans prepared by the end of 2001

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>TOPIC</th>
<th>IMPLEMENTATION STATUS</th>
<th>%AGE OF SUCCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources</td>
<td>Improve domestic facilities in the camps</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Increase documentation available in the Company</td>
<td>Partial implemented (magazine documentation had been increased, but the book library was not maintained)</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Provide Factory and Site training to all employees</td>
<td>Not implemented</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Generalise the Internal Training programme scheme.</td>
<td>Implementation stopped after 8 months of functioning</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Generalise Job Satisfaction survey to all employees on given periodicity.</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Provide social activities for the employees</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Invite Students to perform a training in Gulf Precast</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td>Customer and Market Focus</td>
<td>Improve lines of communication with Customers and potential customers</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Evaluate Customer Satisfaction using a satisfaction survey</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td>Process Management</td>
<td>Measure delivery performance as part of the planning system, and analyse obtained results against targets</td>
<td>Partially implemented</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Review the Quality Assurance System and apply for ISO 9001-2000 certification</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Improve Material Management</td>
<td>Implementation stopped after 2 months of functioning</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Minimise the final touch up work.</td>
<td>Not implemented</td>
<td>0</td>
</tr>
<tr>
<td>Use of information</td>
<td>Further improve the presentation of Data analyses.</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Further improve the IT System protection against viruses</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td>Business Environment</td>
<td>Assess housekeeping through evaluation means in the Factory, the Sites and the Head Office</td>
<td>Implemented</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Conceive a Safety Manual</td>
<td>Partially implemented (a Safety procedure was set instead of the intended Safety Manual)</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Nominate and follow up Safety representatives for Sites and Factory</td>
<td>Implemented</td>
<td>100</td>
</tr>
</tbody>
</table>

In average, 71% of the objectives of the 18 initial Action Plans were reached.

6.2.2.15.5 Reason for successes

One of the main reasons for success was analysed as the dedication of the Project Coordinator to the Action Plan. In some cases, the project coordinator was changed, once it was noted that the action plan was not progressing as intended, in order to improve the chances of success.
When the Action Plan was clearly within the area of responsibility of the project coordinator, the chances of success were higher.

The less coordination required between different departments, the greater the chances of success.

6.2.2.15.6. *Reason for failures*

*Provide Factory and Site training to all employees:* This Action Plan required coordination between the employee in charge of organising training, the Departments in charge of providing the training and the Department of the potential trainee. At the original time set for implementation, the volume to be produced was increasing. Consequently the training dates kept on being rescheduled until the workload was lower. This did not happen, and the objective was not met.

*Improve Material Management:* The concept of this Action Plan was that the Executive Manager would propose, on a monthly basis, a specific material, for which all concerned departments would closely monitor the consumption, with a view to find saving opportunities. After two months of implementation it was discovered that it was impossible to measure whether there was any saving achieved on the selected material, as the financial department was recording the consumption of groups of material and not specific materials.

*Minimise the final touch up work:* Final touch up work consist of any work required at the factory after demoulding and before Site delivery. At best, it consists of applying mortar and fair coat on the surface of the panels and of rubbing them with sand paper. When the panel does not conform to the required quality, some repair work may be required prior to mortar and fair coat application. Unlike in the previously described action plan, the measuring tool was available for this plan. For a year, data concerning final touch up work was closely monitored. However, no decrease of labour force per unit produced was noted during that period, as the Department in charge of the work was not able to find a way of improving its process.

*Generalise the Internal Training programme scheme:* This plan was successfully implemented for a period of eight months, and was then abandoned. The intended objective was to provide internal training to employees selected for a possible promotion.
The chosen employees were closely joined in a trainee-trainer relationship to employees already holding the intended position for a number of years. This coaching technique was successful in two departments, but then faced the resistance of other heads of department who considered it as an interference with their prerogative in deciding on promotions.

Increase the documentation available in the Company: The objective of this Action Plan was to provide the company employees, with books and magazines relative to their area of work, in order for them to increase their theoretical knowledge. A number of books were proposed and placed in a library, so that the staff could consult and return them. However, many books were not returned, and as the company did not want to hire a librarian in charge of the consultation process, the scheme was dropped. However, subscriptions were made to a number of Technical magazines, and circulated using the document circulation system already in place in the company. Therefore, the Action Plan was a partial success.

Measure delivery performance as part of the planning system, and analyse obtained results against targets: The aim of this Action Plan was to collect data on which to base the decision of purchasing Transportation facilities, or of shifting from short-term to long-term agreement with one or several transportation suppliers. Once this decision was made, the Planning department was supposed to prepare a detailed delivery plan, and to monitor its implementation. Following a feasibility study, the company decided to opt for a long-term partnership with a transport company. However, instead of preparing a detailed delivery planning, it was decided to improve the casting sequence planning, and increase communication between the factory and the sites as a means to ensure co-ordinated deliveries.

Produce a Safety Manual: The aim of this Action Plan was to write a Safety Manual covering the company’s activities and production process, and to implement it. However, the only person having sufficient knowledge to carry out this work did not have the English writing skills necessary for the task. It was decided to develop a Safety Procedure instead, in close cooperation between the employee responsible for safety and an employee with good writing skills.

6.2.2.15.7. Sustaining the benefits of successful Action Plans

In order for the company to retain the benefits of successful Action Plans, it was necessary, in most cases, to ensure that their implementation would not be discontinued.
Six of the Action Plans were later incorporated in the company’s quality procedures, thus assuring that their regular implementation would be checked during internal and external audits.

Four of the Action Plans requiring a long period of implementation were listed in the Strategic Plan of the company, thus assuring that their implementation progresses would be evaluated regularly.

Three of the Action Plans were selected as objectives for Continual Improvement by the concerned Heads of Departments, ensuring that regular progress would be made on those issues.

6.2.2.16. Complete review of the Appraisal process

Traditionally in the organisation, the unique objective of the Appraisal process was to review and possibly increase the employees’ salaries. The Appraisal process review remained mainly oriented towards that objective, but also allowed to identify training needs, and to improve the knowledge of available skills through recording the appraisal results in a database.

6.2.2.16.1. Objectives

Minimise subjectivity of the Appraisal review process

The first objective of the Appraisal review was to minimise the subjectivity of the process. Until then, salary increments were based on the Head of Department’s opinion of whether the employee was performing well or not. Accordingly, his current salary was examined and a possible increase was decided upon.

It was thought that such appraisal technique was excessively reliant on the subjective opinion of the Head of Department.

In order to reduce the subjectivity, it was decided to define clear evaluation criteria. For each criterion, a five point’s scale grading system was proposed.

The total calculated grade should correspond to a theoretical salary on a salary scales used, in the salary review.
It was decided that appraisals based on the sole discretion of the Head of Department was to cease, and that they should result from the review performed by several hierarchical levels.

The appraisal criteria should not be limited to the employee’s productivity

Until now, the productivity of the employee was the main, if not the sole, criterion of evaluation. It was decided that if the productivity should still be considered during evaluation, other criteria should be introduced.

Record and recognise multiple skill activities

The management wanted to recognise employees with multiple skills. It was thought that multiple skills allow a greater flexibility of the workforce and a better adaptation to changing conditions, and should therefore be encouraged.

6.2.2.16.2. Methodology used

Establish a list of criteria

As limiting the evaluation to the sole productivity of the employee was thought too restrictive, a list of criteria was established during a brainstorming meeting, the Heads of the main departments, the Executive Manager and the researcher. They were grouped in two categories: Work evaluation and Behaviour evaluation.

The four criteria for the work evaluation category were:

- Quality of work
- Quantity of work
- Job knowledge
- Ability to work independently

The criteria for the behaviour evaluation were:

- Safety awareness
- Initiative / innovative ideas
- Attitude / sincerity
- Discipline / conduct
- Honesty / integrity

Depending of the marks obtained in the criteria, the employees would be categorised by a two letters score, the first letter reflecting his work evaluation, and the second his
behaviour evaluation. For example, an AC employee would be an employee with an excellent work evaluation an acceptable behaviour.

It was decided that an employee could be rated for several trade skills. However, the reported sub-criteria details would concern his main trade only, and only the “work evaluation” main criterion would be reported for alternative trades. (As the “behaviour evaluation” of the employee does not depend on the skill evaluated but on the employee’s attitude in general, it was considered to be valid for all trades possessed by the employee.)

List the possible trades by department

Then, each Head of Department was requested to prepare a list of required skills in his department. The list would of course differ from one department to another, Factory skills, Site skills and Head Office skills being widely different.

The lists were submitted to the Executive Manager for review.

Establish grades of salaries

According to the list of trades and to the possible grades that may be obtained, the Heads of Department were asked to submit a grille of salary to the Executive Manager. They may propose, for example, that an AC Fabricator should be paid between 7 and 7.5 Dhs per hour.

A meeting between the Head of Departments and the Executive Manager was then scheduled in order to review and validate the salary scales.

Decide on a review process

The person having the greatest knowledge of the employee to evaluate is his direct supervisor. In the case of workers, their direct supervisor is their foreman, who should be the first to propose an appraisal. This appraisal will then be reviewed by the Head of Department, and finally by the Executive Manager.
Sample of Appraisal form

<table>
<thead>
<tr>
<th>Trade</th>
<th>A</th>
<th>B</th>
<th>C+</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helper / Coolie (Multi Purpose)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helper loading / Batching plant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scraper operator + Helper water curing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shutter carpenter / mould fitter / polystere</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel fixer / Cutter + tight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plumber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.Core cutter operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prestress operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helper electrician / Mechanic helper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRP assistant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steam curing operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRC mixer operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mason cast + Multi purpose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel fixer bend / Operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair mason / finishing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.Core extruder operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loader</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRP laminator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welder / Cutter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Painter / Putty / Gypsum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Furniture carpenter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Batching plant operator / Unloader Operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile crane op. (below 18 T) &amp; O. Head crane operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A => Excellent; B => Good; C+ => Above average; C => Average; D => Below Average

<table>
<thead>
<tr>
<th>Work Evaluation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Remark/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to Work Independently</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRADE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C => Need Training; D => Must improve

<table>
<thead>
<tr>
<th>Behavior Evaluation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Remark/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Awareness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initiative / Innovative Ideas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude / Sincerity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discipline / Conduct</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honesty / Integrity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL POINTS</td>
<td>15-14: A (good)</td>
<td>13-12: B (average)</td>
<td>10-9: C (acceptable)</td>
<td>7-8: C (acceptable)</td>
</tr>
<tr>
<td>GRADE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SUPERVISOR

Please fill this form using a blue or black Pen
Name: «Name Supervisor»
Comments:
Signature:

HEAD OF DEPT

Please correct this form using a Red Pen
Comments:
Signature:

EXECUTIVE MANAGER
Comments:
Signature:

Table 13 Appraisal Form
Include the yearly appraisal within the Quality System

The corresponding quality procedure was later be updated, specifying that the Appraisal of all employees should be carried out at least once per year. The form itself was added to the procedure. This ensured that the implementation of a yearly appraisal would be checked during internal and external audits.

Recording Appraisal records in a database

It was decided to record the Appraisal of the employees in a Database. This had two main advantages. It enabled the management to follow the progresses of the employees. It also allowed interrogating the Database during a particular skill shortage. Although the Heads of Departments have generally a good knowledge of the main skills of their employees, they might overlook a sub-skill infrequently used.

6.2.2.17. Market Research Analyses

In March 2001 the company had prepared a long-term Action Plan addressing the Customer & Market focus category of the Sheikh Khalifa Industry Award. Its aim was to develop a Database in which the Market knowledge of the company would be recorded, and from which useful data might be extracted and analysed.

The Database was developed, and an employee was assigned the task to collect all possible market data and to enter them into the database.

By November 2001 a first analysis of the data collected was carried out by the researcher.

Three types of analyses were done: Competitor pricing policies, Market size and Market share.

6.2.2.17.1. Competitor Pricing Policies Analyses

The company’s quotations submitted during tenders where compared with the ones of its competitor. Competitor prices were measured as a percentage above or below the company’s quotation. Therefore, in the obtained graphical representations, the company prices are represented by the horizontal zero value line.

The analysis was done independently of products as well as for individual products.

Competitor Analysis, independently of products
Competitor Analysis for the GRC Product

Figure 15 Competitor pricing policy Analyses available by November 2001

The analyses clearly show that the company was usually quoting higher than its competitors.

6.2.2.17.2. Market Size Analyses

The aim of the market size analyses was to highlight the current trends in the market, such as its expansion or contraction.
The analyses were based either on the number of enquiries received for a particular product, or in volume enquired.

![Number of Enquiries Received by Product](image1)

![Quantity of Product in Enquiries received](image2)

Figure 16 Market Size analyses available by November 2001

Four months data had been collected so far, therefore the results obtained were not highly representative. However, as the number of collected data increased with time, the obtained analyses will become progressively more valuable to the company.

The enquiries received were also analysed on the basis of product and location. This analysis reflects the traditional market of the company, more than the total available...
market (enquiries for which the company was not subsequently asked to quote were not included in this analysis).

![Market Size analyses by products available by November 2001](image)

**6.2.2.17.3 Market Share Analyses**

The third group of analyses provided was relative to Market Share. The aim was to measure the current position of the company in the market against the one of its competitors.

![Market Share analysis available by November 2001](image)
This analysis was showing that the company was second in its traditional market, with 27% of the market share.

A comparable analysis was prepared for the different products of the company.

6.2.2.17.4. Importance of those analyses.

Although the data collected by the end of 2001 were limited, the three groups of analyses were already providing valuable indications to the company. As the data collected increased in volume and scope, the company would increasingly rely on these analyses, and they will be an important element on which the strategy of the company will be based.

6.2.2.18. Improved communication

Due to the diversity of nationalities in the company, communication has always been an issue. In order to improve it, the management decided to increase the number of communication channels. Four of the methods employed for that effect were:

6.2.2.18.1. Suggestion Boxes

Suggestion/Complaint boxes were placed in all work areas as well as in the camps. However, the number of suggestions and complaints received through this channel has always been scarce. Written communication is impeded both by language barriers and by the poor level of literacy of the workforce. However, suggestions/complaints boxes will not be removed, as the limited communication they provide is better than none.

6.2.2.18.2. Induction Procedures

Until 2001, induction of any new employee within three months of joining the company was mandatory. However, the topics to be covered during the induction were left to the discretion of the hierarchical superior performing the induction.

From the end of 2001 onwards, topics to be covered during induction were listed. The following list was approved and later updated to cover additional items.

- Quality Policy; Quality System; Quality Improvement
- Productivity; Productivity Improvement
- Work Attitude
- Coordination between Departments
- Safety
Daniele Seraphim – Ph.D.

- Customer focus
- Mission and Vision
- Employee Participation with Innovative Ideas

The list was incorporated in the corresponding Quality Procedure at the beginning of 2002, in order to make sure that inductions were done according to the management recommendations.

6.2.2.18.3. Translation of the Safety Instructions

Safety instructions were translated in Arabic, Urdu and Hindi, and were displayed in all working areas.

6.2.2.18.4. Monthly Executive Staff Meetings

A steering committee called “Executive Staff” had been created in February 2001, as part of a short-term Action Plan submitted to the Sheikh Khalifa Industry Award auditors. It was decided that this committee would meet on a monthly basis to discuss any managerial issues.

This initiative greatly improved the communication within the upper levels of the hierarchy.

6.2.2.19. Quality Control Department independent from the production processes

Until the end of 2001, the Quality Control functions were under the responsibility of the Factory Management. This organisational structure had the advantage of limiting the number of additional employees required to perform Quality Control tasks, as in most of the cases, employees were performing both their production and their quality control duties. This had two main disadvantages. When employees were in charge of production and quality control, quality issues were often not reported, and thus actions to prevent recurrence not suitably studied and implemented. Secondly, Quality Control was limited to the factory production phase. It was not implemented in the preliminary study of the projects, nor in the erection phase of the projects.

The Top Management decided, by the end of 2001, the creation of a Quality Control Department independent of the Factory Management, which would cover the whole production process, from the project study to the erection and maintenance period.
The team comprised of both newly hired engineers with a Quality Control background, and of engineers previously working in the factory production department, in order to bring their expert factory knowledge into the team.

6.3. Analysis of findings

6.3.1. The internal perspective

Many of the Performance Indicators reviewed hereafter to analysis the progress of the company during the first period had been developed in 2002 (see paragraph 7.2.1).

6.3.1.1. Customer Results

Several internal measures and external measures were selected by the company as indicators of the level of customer satisfaction.

6.3.1.1.1. First evaluation of the "Market share" indicators

The Market share indicators were estimated as highly valuable by the management. However, no comparison over time was yet available. The obtained values for 2001 are reviewed in paragraph 6.2.2.17.3

6.3.1.1.2. Decreased press coverage

The press coverage indicator was measured using the number of press articles mentioning the company or one of its Projects.

The figure for 2000 was partly due to press coverage related to a number of prestigious International Projects performed by the company during that year. However, these projects were one of the reasons for the 2000 financial loss, and it was decided not to take such high risk projects in 2001. Thus, the 2001 figure reflects a decrease in press coverage.

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td></td>
<td>Attract press coverage by performing prestigious International Projects</td>
<td>Attract press coverage by competing in TQM Awards</td>
</tr>
<tr>
<td>Actual measure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of press articles</td>
<td></td>
<td>13</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 14 "Press Coverage" indicator from 1999 to 2001
6.3.1.3. Slight decrease of success rate when quoting

The “success rate when quoting” indicator is the number of signed contracts during the year, divided by the number of projects quoted during that year.

This indicator shows a slight decrease from 1999 to 2000, which may reflect a slight decrease of customer satisfaction (possible retarded effect corresponding to the 2000 crisis).

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>10%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Actual measure</td>
<td>47/384</td>
<td>26/236</td>
<td>32/292</td>
</tr>
</tbody>
</table>

Table 15 “Success when quoting” indicator from 1999 to 2001

6.3.1.4. Recovery in the number of Repeat Orders

The “Repeat Orders” indicator is evaluated through the number of similar projects contracted during the analysed year plus projects performed with similar clients during the year, over the total number of projects executed during the year.

The figures, which are showing a decline of repeat orders in 2000, are clearly showing a recovery in 2001.

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target or budget</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Repeat orders for/from a) Similar job</td>
<td>6/45 jobs</td>
<td>3/25 clients</td>
<td>3 + 2 out of 40 jobs</td>
</tr>
<tr>
<td>Repeat orders for/from b) Same client</td>
<td>6/36 clients</td>
<td>4/28 clients</td>
<td></td>
</tr>
</tbody>
</table>

Table 16 “Repeat Orders” indicator from 1999 to 2001

6.3.1.5. Customer complaint

This indicator shows that the 2000 customer dissatisfaction is not yet resolved by the end of 2001. After further analyses, it appeared that only major complaints had been recorded, which explains the low figures recorded. Thus, this indicator is of poor value. However, the management estimated that it might become a highly valuable one if the customer complaint process could be improved and if complaints of all types were to be routinely recorded and analysed. Therefore, analysing this indicator has led the management to identify an improvement to be introduced in the next period.
In most of its contracts, the company’s customers have a defined right to claim for 10% penalties if the company delays the project execution. Bad workmanship penalties are not contractually defined, but can be applied when the quality of the product is not satisfactory.

The “penalties for delay / bad workmanship” indicator has a zero value for 2000 and 2001. This was analysed by the company as an indication that customers were not greatly dissatisfied with the company’s products, as if such was the case, they would certainly have imposed penalties. A lower satisfaction in 2000 perceived through direct meetings with the clients, had not reached a point of dissatisfaction, which means that the company could still regain the trust of its customers.

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Actual measure</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 17 “Customer complaint” indicator from 1999 to 2001

6.3.1.1.7. Recovery in Customer Loyalty and New Customer Attraction

The Customer Loyalty indicator clearly demonstrates a long-term relationship between the company and its customers. Although this indicator has been negatively affected by the 2000 crisis, it clearly indicates a recovery in 2001, reflecting the fact that the company’s customers were willing to trust the ability of the organisation to recover, and respond to their needs.

The new customer attraction indicator was also showing a slight recovery in comparison with 2000. However the figure stays low, reflecting that the recovery of the company had been based on the trust of its loyal customers rather than on attracting new customers.
Table 19 “Customer Loyalty” indicator from 1997 to 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Nbr of Projects Done</th>
<th>New Clients Nbr</th>
<th>Same Client, 2 projects Nbr</th>
<th>Same Client, 4 projects or more Nbr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nbr</td>
<td>Percentage</td>
<td>Nbr</td>
</tr>
<tr>
<td>1997</td>
<td>50</td>
<td>25</td>
<td>50.00</td>
<td>9</td>
</tr>
<tr>
<td>1998</td>
<td>44</td>
<td>18</td>
<td>40.91</td>
<td>10</td>
</tr>
<tr>
<td>1999</td>
<td>51</td>
<td>20</td>
<td>39.22</td>
<td>5</td>
</tr>
<tr>
<td>2000</td>
<td>35</td>
<td>9</td>
<td>25.71</td>
<td>11</td>
</tr>
<tr>
<td>2001</td>
<td>37</td>
<td>10</td>
<td>27.03</td>
<td>7</td>
</tr>
</tbody>
</table>

Thus, customer satisfaction indicators are showing a decrease of satisfaction in 2000, followed by a slight recovery in 2001. It may be noted that the decrease of satisfaction is marginal, and that customers were willing to give a chance to the company to demonstrate its ability to recover and provide them with quality products and services.

6.3.1.2. Business Environment results

The company used the following internal and external measures of its involvement in the Business Environment.
The most significant of those indicators was probably the “Expenditures related to wastage removal”, which was clearly indicating that the percentage of waste was decreasing over the years.

FACTORY MUSSAFAH
EXPENSES ON RUBBISH REMOVAL (in Dhs)

<table>
<thead>
<tr>
<th>MONTH</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>5,100.00</td>
<td>800.00</td>
<td>800.00</td>
</tr>
<tr>
<td>Feb</td>
<td>6,850.00</td>
<td>600.00</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Mar</td>
<td>2,350.00</td>
<td>800.00</td>
<td>800.00</td>
</tr>
<tr>
<td>Apr</td>
<td>4,600.00</td>
<td>800.00</td>
<td>800.00</td>
</tr>
<tr>
<td>May</td>
<td>1,100.00</td>
<td>800.00</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Jun</td>
<td>1,600.00</td>
<td>800.00</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Jul</td>
<td>1,100.00</td>
<td>1,000.00</td>
<td>800.00</td>
</tr>
<tr>
<td>Aug</td>
<td>600.00</td>
<td>800.00</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Sep</td>
<td>1,100.00</td>
<td>800.00</td>
<td>800.00</td>
</tr>
<tr>
<td>Oct</td>
<td>600.00</td>
<td>1,000.00</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Nov</td>
<td>2,800.00</td>
<td>-</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Dec</td>
<td>1,100.00</td>
<td>1,600.00</td>
<td>800.00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>28,900.00</td>
<td>9,800.00</td>
<td>10,800.00</td>
</tr>
</tbody>
</table>

Average Per month

Production in M3

Rubbish disposal expenses per M3

Table 20 “Expenses on rubbish removal” indicator from 1999 to 2001

6.3.1.2.2. Investment in new technology

In 2000, the company had performed important investments in new technology in order to increase its production level. In 2001, the investments in new technology of the company were mainly directed towards production machinery. IT investments were kept to a minimum because a complete modification of the IT system was planed for 2002-2003.

INVESTMENT IN NEW TECHNOLOGY

<table>
<thead>
<tr>
<th>SI.</th>
<th>NAME OF EQUIPMENT</th>
<th>Year of Purchase</th>
<th>NAME OF SUPPLIER</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AIRLESS SPRAY MACHINE,PRESIDENT</td>
<td>1999</td>
<td>BITEC</td>
<td>10,990.00</td>
</tr>
<tr>
<td>2</td>
<td>IT EQUIPMENT</td>
<td>1999</td>
<td>VARIOUS</td>
<td>177,838.00</td>
</tr>
<tr>
<td>3</td>
<td>PRE MIXER MACHINE</td>
<td>2000</td>
<td>POWER SPRAYS</td>
<td>31,879.50</td>
</tr>
<tr>
<td>4</td>
<td>BAR BENDING MACHINE</td>
<td>2000</td>
<td>MODERN MACHINERY</td>
<td>12,000.00</td>
</tr>
<tr>
<td>5</td>
<td>WROUGHT IRON MACHINE</td>
<td>2000</td>
<td>S.A.R.L. VOLUTEK</td>
<td>3,829.00</td>
</tr>
<tr>
<td>6</td>
<td>HOLLOW CORE EQT. SET</td>
<td>2000</td>
<td>X-TEC FINLAND</td>
<td>1,632,275.00</td>
</tr>
<tr>
<td>7</td>
<td>BAR CUTTING MACHINE</td>
<td>2000</td>
<td>CMC</td>
<td>12,750.00</td>
</tr>
<tr>
<td>8</td>
<td>PLASMA CUTTING MACHINE</td>
<td>2000</td>
<td>CONTRACTORS SUPPLY</td>
<td>12,500.00</td>
</tr>
<tr>
<td>9</td>
<td>IT EQUIPMENT</td>
<td>2000</td>
<td>VARIOUS</td>
<td>100,402.00</td>
</tr>
<tr>
<td>10</td>
<td>HOLLOW CORE GREEN CUTTING SAW</td>
<td>2001</td>
<td>X-TEC FINLAND</td>
<td>22,592.00</td>
</tr>
<tr>
<td>11</td>
<td>AUTO.BATCHING PLANT LIEBHER</td>
<td>2001</td>
<td>GERMAN GULF</td>
<td>566,716.00</td>
</tr>
<tr>
<td>12</td>
<td>CHILLER YORK</td>
<td>2001</td>
<td>GEO ELECTRICALS</td>
<td>37,000.00</td>
</tr>
<tr>
<td>13</td>
<td>BAR CUTTING MACHINE</td>
<td>2001</td>
<td>CMC</td>
<td>11,000.00</td>
</tr>
<tr>
<td>14</td>
<td>BAR BENDING MACHINE</td>
<td>2001</td>
<td>CMC</td>
<td>10,000.00</td>
</tr>
</tbody>
</table>
Table 21 “Investment in new technology” indicator from 1999 to 2001

6.3.1.2.3. Increase in expenditures on safety training

The “Expenditures on safety training” indicator reflects the willingness of the company to improve the safety level of its employees and of the community at large. While expenditures on safety training were multiplied by more than 2 over a year, the number of safety training hours was multiplied by more than 5 over the same period.

Table 22 “Safety training” indicator from 2000 to 2001

6.3.1.2.4. Slight increase in expenditures on Sport Support

The financial involvement with the community stays low in 2001, as the company has not yet fully recovered from the financial crisis of 2000. However, there is a slight increase in expenditures on Sport Support.

Table 23 “Expenditures on Sport Support” indicator from 2000 to 2001

6.3.1.2.5. Appreciation Letters

The number of appreciation letters received for participation in Humanitarian Actions, reflects the involvement of the company with the community. Although reduced in 2000 and 2001 due to the financial difficulties of the company, this indicator is showing that the company is starting to get involved with the community needs in which it operates.
Table 24 “Appreciation letters” indicator from 2000 to 2001

The Business Environment result indicators are showing that the company is starting to take into consideration the community in which it operates. It is willing to limit possible negative impacts of its production on the environment by reducing its wastage and improving its safety level, to invest in new technology, and it is starting to take into consideration the community needs.

6.3.1.3. People results

Several indicators were selected to grasp the level of employee satisfaction, involvement and empowerment, as well as its progress relative to its care for its people.

6.3.1.3.1. Recovery in employee stability

The worker stability, which had dropped in 2000 because of the company’s financial difficulty and the delays in salary payments, improved in 2001, regaining a level similar to the one of 1999.

Staff stability also dropped in 2000. However, it did not improve in 2001, but rather went on decreasing. This is analysed by the management as a result of the difficulty of staff workforce to adapt to the new top management set in place in 2001.

Overall, the employee stability shows a recovery in 2001.

<table>
<thead>
<tr>
<th>Year</th>
<th>Targets or budget</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual measure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employees</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 25 “Employee stability” indicators from 1999 to 2001

6.3.1.3.2. Participation in Suggestion Scheme

180 suggestions for improvement were received in 2000 during the suggestion competition. However, as it was the first such competition, and as it was decided to launch it every two years, no comparison over time could be made on this indicator.
6.3.1.3.3. **Marked improvements in the Safety level (Number of Accidents, Frequency Rate, Incidence Rate, Lost Time Injury Rate)**

The safety focused policy implemented by the company was clearly successful, as demonstrated by the indicators provided below. Comparison over time was limited, as these indicators were first calculated in March 2000.

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From March 2000</td>
<td>From Jan 2001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accidents</td>
<td>Accidents</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dangerous</td>
<td>13</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td>Minor</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>First Aid</td>
<td>08</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Injury Freq. Rate</td>
<td>48.83</td>
<td>27.22</td>
</tr>
<tr>
<td></td>
<td>L.T.I Rate</td>
<td>15.19</td>
<td>11.80</td>
</tr>
<tr>
<td></td>
<td>Incidence Rate</td>
<td>4.28</td>
<td>2.89</td>
</tr>
</tbody>
</table>

Table 26 “Safety level” indicators from 2000 to 2001

6.3.1.3.4. **Increased training**

The training indicators are showing an increase of level of training in 2001. The training budget although increased, could not be oversized, due to the financial difficulty of the company. However, the number of training hours was next to multiplied by 18 over a year, which shows that the company privileged low cost training during this period, and used to its maximum internal and free external resources in this regard.

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Target or budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training Fees:</td>
<td>20,000.00 Dhs</td>
<td>30,000.00 Dhs</td>
</tr>
<tr>
<td></td>
<td>Actual measure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training Fees:</td>
<td>NA</td>
<td>19,100 Dhs</td>
</tr>
<tr>
<td></td>
<td>Hours:</td>
<td>NA</td>
<td>620 Hrs</td>
</tr>
</tbody>
</table>

Table 27 “Employee Training” indicators from 2000 to 2001

6.3.1.3.5. **Upgrade of the Factory mosque**

Most of the company workforce are Muslim, and it is important for them to have an easy access to a prayer area. A mosque had been constructed on the factory ground for this purpose. Each year, a budget is allocated in order to maintain this edifice. In 2001, it was decided to increase the mosque’s size, as the increase in the number of employees rendered it insufficient for easy access.

The indicator chosen to reflect this improvement was “Expenditures on maintenance and improvement of the Factory mosque”.
6.3.1.3.6 Improved productivity by product

Productivity indicators are partly reflecting the satisfaction of employees, as satisfied employees are more willing to perform their duties as best as possible, and to take initiatives in this regard.

The productivity data by product were only available for 15 months. They clearly show that 2001 had been the start of the recovery, with steady productivity increase throughout the year.

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target or budget</td>
<td>3,000 Dhs</td>
<td>3,000 Dhs</td>
<td>7,500 Dhs</td>
</tr>
<tr>
<td>Actual measure</td>
<td>2,990 Dhs</td>
<td>2,990 Dhs</td>
<td>7,532 Dhs</td>
</tr>
</tbody>
</table>

Table 28 “Expenses in prayer facilities” indicator from 1999 to 2001
6.3.1.4. Key performance results

6.3.1.4.1. Sales increase

The sales figures are steadily increasing from 1998 onwards, reflecting the company growth strategy. However, the pace of sales growth, which was important in 2000, was reduced in 2001, while the production increased more in 2001 than in 2000. This is due to the sales of the newly introduced Hollowcore product, which has a sale price per cubic meter inferior to the sale price of traditional precast concrete.

6.3.1.4.2. Profitability recovery

A comparison between the sales figures and the net profit figures clearly indicates that the 2000 growth was insufficiently planned, and that 2001 was the starting point of the company’s recovery.
An important increase of volume produced

The volume produced increased by 90% in 2001, in comparison with 2000. This reflects both an increased of the produced volume of traditional precast concrete, and an additional production of the newly introduced Hollowcore product.

Table 29 Evolution of Volume produced from 1999 to 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected</th>
<th>Realised</th>
<th>Percentage of Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>14,200.00</td>
<td>12,125.00</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>22,573.00</td>
<td>19,736.00</td>
<td>62.77</td>
</tr>
<tr>
<td>2001</td>
<td>34,274.00</td>
<td>37,540.00</td>
<td>90.21</td>
</tr>
</tbody>
</table>

Figure 25 Graphical representation of the Volume produced from 1999 to 2001

Significant increase in investments

Investments significantly increased in 2001, reaching next to 4 million Dirhams, which is a 50% increase, when compared with 2000.

Most investments were performed in order to increase the production of Hollowcore, and to prepare for the production of the Shahama and Dubai factory.
Key performance indicators are clearly showing that the financial recovery of the company was not performed at the expense of its growth strategy, but was rather due to an improved performance of its processes.

6.3.1.5. Improvements of the period, classified according to the EFQM Model

In order to present graphically the list of improvements introduced during each period, the author has chosen the representation proposed by the EFQM Model.

This recognised model for Total Quality Management has the advantage over the Sheikh Khalifa Industry Award that its main structure has not evolved much in the last years, apart from sub-criteria and relative percentages of points affected to main criteria.

Providing a graphical representation for each period should ease comparisons, highlight areas in which the company intensified its effort, and can be used to easily locate improvements relative to the 9 main criteria of the model.

Figure 26 Improvements introduced during the first period, classified according to the EFQM Model
**Improvements of the Start up to Break out Period**

<table>
<thead>
<tr>
<th>Leadership</th>
<th>People</th>
<th>Policy &amp; Strategy</th>
<th>Partnerships &amp; Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2.2.1 First Mission and Vision</td>
<td>6.2.1.1 Suggestion Competition</td>
<td>6.2.2.1 First Mission and Vision</td>
<td>6.2.2.4 Participation in Humanitarian causes</td>
</tr>
<tr>
<td>6.2.2.2 The first Strategic Plan</td>
<td>6.2.2.2 Training Survey</td>
<td>6.2.2.2 The first Strategic Plan</td>
<td>6.2.2.7 Top Management stability</td>
</tr>
<tr>
<td>6.2.2.3 Employee of the month</td>
<td>6.2.2.2.2.3 Assessing the implementation of the strategy</td>
<td></td>
<td>6.2.2.18.1 Suggestion Boxes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.18.2 Induction Procedures</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.18.3 Translation of the Safety Instructions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.18.4 Complete review of the organization’s structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.18.5 Clear definition of roles and responsibilities of key Employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.12 Complete review of the organization’s structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.13 Clear definition of roles and responsibilities of key Employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.12 Complete review of the organization’s structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.13 Clear definition of roles and responsibilities of key Employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.12 Complete review of the organization’s structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.2.2.13 Clear definition of roles and responsibilities of key Employees</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Processes</th>
<th>People Results</th>
<th>Customer Results</th>
<th>Society Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2.1.1 Suggestion Competition</td>
<td>6.3.1.3.1 Recovery in employee stability</td>
<td>6.3.1.2 Decreased press coverage</td>
<td>6.3.1.2.1 Decrease in expenditures related to wastage removal</td>
</tr>
<tr>
<td>6.2.2.15 Setting up 18 Action Plans</td>
<td>6.3.1.3.2 Participation in Suggestion Scheme</td>
<td>6.3.1.1 Decrease of success rate when quoting</td>
<td>6.3.1.2.2 Investment in new technology</td>
</tr>
<tr>
<td>6.2.2.19 Quality Control Department independent from the production processes</td>
<td>6.3.1.3.3 Marked improvements in the Safety level</td>
<td>6.3.1.4 Recovery in the number of Repeat Orders</td>
<td>6.3.1.2.3 Increase in expenditures on safety training</td>
</tr>
<tr>
<td></td>
<td>6.3.1.3.4 Increased training</td>
<td>6.3.1.5 No Penalties for Delay / Bad Workmanship</td>
<td>6.3.1.2.4 Slight increase in expenditures on Sport Support</td>
</tr>
<tr>
<td></td>
<td>6.3.1.3.5 Upgrade of the Factory mosque</td>
<td>6.3.1.7 Recovery in Customer loyalty and New customer attraction</td>
<td>6.3.1.2.5 Appreciation Letters</td>
</tr>
<tr>
<td></td>
<td>6.3.1.3.6 Improved productivity by product</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.3.2. The external audit perspective

6.3.2.1. SKIA evaluation of the company

The external perspective of the company progress during the first phase, which starts from mid-2000 and finishes at the end of 2001, can be analysed by the comparison of the scores provided by the SKIA in February 2001 (2000 participation round) and the ones provided in March 2002 (2001-2002 participation round).

It may be noted that the scores of the 2001-2002 participation round were completed by the end of 2002, when Business Results scores and Action Planning scores were added to the other categories. Therefore, these two last categories are more relevant to the improvements introduced during the second phase (2002) than to those of the first phase. Therefore, they will be commented during the analysis of findings of the second phase.

It may also be noted that the categories’ scores of 2000 were subdivided into the “company’s self-assessment” and the “SKIA audit”. Overall scores for each category were calculated by the award body taking into consideration those two grades. However, the calculation process was not provided to the participants. On the contrary, overall scores only were provided for the 2001-2002 participation round. For comparison purposes, the average of self-assessment and audit scores for 2000 will be compared with the overall score for 2001-2003. As this comparison technique may not be completely accurate, a difference of less than 5 points between 2000 and 2001-2003 will not be considered.

<table>
<thead>
<tr>
<th>Categories</th>
<th>2000</th>
<th>2001-2002</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self assessment</td>
<td>Audit</td>
<td>Average</td>
</tr>
<tr>
<td>Strategy</td>
<td>76.1</td>
<td>57.0</td>
<td>66.6</td>
</tr>
<tr>
<td>Customer &amp; Market Focus</td>
<td>73.3</td>
<td>71.0</td>
<td>72.2</td>
</tr>
<tr>
<td>Business Environment</td>
<td>69.7</td>
<td>82.0</td>
<td>75.9</td>
</tr>
<tr>
<td>Leadership</td>
<td>82.1</td>
<td>76.0</td>
<td>79.1</td>
</tr>
<tr>
<td>Human Resources</td>
<td>78.6</td>
<td>80.0</td>
<td>79.3</td>
</tr>
<tr>
<td>Process Management</td>
<td>84.9</td>
<td>80.0</td>
<td>82.5</td>
</tr>
<tr>
<td>Use of information</td>
<td>85.4</td>
<td>80.0</td>
<td>82.7</td>
</tr>
<tr>
<td>Business Results</td>
<td>57.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Planning</td>
<td>70.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Award obtained: Gold - Second place, Gold - First place

* These two figures are relative to the second period, and not the first one

Table 30 Comparison between the scores obtained by the company in the 2000 and 2001-2002 SKIA participation rounds
6.3.2.2. Overall score

The first remark is that the company progressed from a Second place in the Gold Level to a first place. However, this might be the result of the excellent progresses reported in the Business Results and Action Planning categories, which are more relevant to the second phase and than to the first one.

6.3.2.3. The Strategy category

The greatest improvement score, between the 2000 and 2001-2002 participation rounds, is in the Strategy category, with an increase of 21 points. This is consistent with the efforts carried out by the company to define clearly its strategy and follow up on the implementation of the defined objectives. The following improvements relative to strategy improvements had been introduced during the first period:

- First Mission and Vision (see paragraph 6.2.2.2.1)
- First Strategic Plan (see paragraph 6.2.2.2.2)
- Assessing the implementation success of the strategy (see paragraph 6.2.2.2.3)

Thus, the improvement in Strategy noted by the SKIA matches the internal assessment of the company in this regard.

6.3.2.4. The Business Environment category

The second highest modification score is in the Business Environment category (a decline of 14 points), in which the organisation scored significantly lower. This poor result matched the company’s perception, as several improvements had been introduced during the period:

- Participation in Humanitarian causes (see paragraph 6.2.2.4). The company had carried out a reflection on its intended objectives in regard to this issue, but the actual first implementations took in 2002.

- Cutback on wastage (see paragraph 6.3.1.2.1). It is undeniable that there had been a significant cutback on wastage during the first period. However, when looking back on the submission documents handed over by the company to the SKIA, it is interesting to note that this improvement had not been highlighted to the award body. The reason for this is that wastage performance indicators were not available
at the time of submission. The organisation attempted to measure wastage only when the SKIA requested performance data relative to Business Environment, later in 2002. Thus, paradoxically, the organisation was not aware in 2001 that it had realised a significant progress in wastage reduction, and thus did not convey that fact to the SKIA, which could not take it into consideration will scoring the Business Environment category. However, the researcher found out by later discussions with the SKIA team, that the reduction in wastage had been judged highly relevant by the SKIA when figures were provided in 2002, and that part of the excellent score of the company in the Business Results category was based on that indicator.

- Improved Safety (see paragraphs 6.2.2.8 and 6.2.2.9). This item, although related to the Business Environment category, is certainly more relevant to the Human Resources category, and had been taken into consideration in that category.

Thus, the difference of opinion of the SKIA and the company is explainable. From the company’s point of view, the organisation had started examining how improvements could be introduced, and had a feeling of progress. From the SKIA point of view, no proof of actual progress was provided by the company, and non-progress in a continuous improvement context is in fact a regression.

6.3.2.5. The Customer and Market Focus category

The SKIA noted good improvements of the company in the Customer and Market Focus category, with a progress of 10 points.

This matches the company’s view in this regard, which recorded the following improvements: Availability of Market Research data (see paragraph 6.2.2.17) that provided Competitor pricing analyses (see paragraph 6.2.2.17.1), Market size analyses (see paragraph 6.2.2.17.2) and Market share analyses (see paragraph 6.2.2.17.3); A recovery in Customer loyalty and New Customer attraction (see paragraph 6.3.1.1.7).

6.3.2.6. Process management

From the SKIA point of view, the Process Management category slightly decreased (decline of 8 points). It is true that few improvements had been introduced during the first period in that area. However, the company was preparing the ground for future
improvements: In the Strategic Plan, objectives are defined for each process (see paragraph 6.2.2.2), a complete review of the organisation’s structure had been performed (see paragraph 6.2.2.12) and roles and responsibilities of key employees had been cleared (see paragraph 6.2.2.13).

6.3.2.7. **Use of information**

In Use of Information category, the score of the company declined by 5 points. This matches the company point of view. Some new data were collected (such as market research data), but although the management knew that major improvements should be undertaken in the IT system, the financial situation was not recovered enough to undertake such costly project.

6.3.2.8. **Leadership**

No significant modifications of scores had been noted by the SKIA on this category. This also matches the company point of view. Although the organisation was entering a phase of Top Management stability (see paragraph 6.2.2.7), it was still early to judge on this by the end of 2001. It was also still early to judge on the leadership improvements which had recently been introduced.

6.3.2.9. **Human resources**

A category of disagreement between the SKIA (a decrease of 3 points) and the company’s point of views is the Human Resources one.

The company point of view was that a significant number of improvements had been introduced during the period, such as:

- Suggestion competition (see paragraph 6.2.1.1)
- Employee of the month (see paragraph 6.2.2.3)
- Training survey, programme and records (see paragraphs 6.2.1.2 and 6.2.2.5)
- Safety reviews and improvements (see paragraph 6.2.2.8)
- Safety representatives (see paragraph 6.2.2.9)
- Staff survey (6.2.2.10)
- Monthly executive staff meeting (6.2.2.11)
- Team building activities (6.2.2.14)
- Complete review of appraisal (6.2.2.16)
• Improved communication (6.2.2.18)

A partial explanation for such difference of appreciation on the Human Resources category is that several performance indicators related to these improvements had not been communicated to the SKIA assessors, but would be developed later in 2002, at the request of the award body.

A second partial explanation is that the SKIA team might have estimated that these improvements had been too recently introduced to foster any significant modifications in the organisation. If such is the case, the next periods should show significant improvements in the Human Resources category, as the organisation should benefit from the capitalisation on improvements introduced during the first period.

6.4. Review of priorities initially set

The initial priorities of the first period focused on two areas: Cultural change and Strategy. The following review of initiatives introduced during this period demonstrates that these two areas did indeed receive a lot of attention.

6.4.1. Cultural change

As examined in paragraph 5.2.2, the cultural dominance in the organisation might be in direct conflict with five of the critical success factors for TQM implementation identified in the literature: Communication systems; Employee participation, involvement and empowerment; Team working; Working environment and conditions; and Awareness and concern for the needs of the society.

Initiatives aiming at a cultural change were introduced during this period on all of these issues:

6.4.1.1. Communication system

The following initiatives had been introduced: Attempt to widely communicate the defined Strategic Plan (see paragraph 6.2.2.2.2); Monthly executive staff meeting (see paragraphs 6.2.2.11 and 6.2.2.18.4); Team building activities (see paragraph 6.2.2.14); Suggestion boxes (see paragraph 6.2.2.18.1); Induction procedures (see paragraph 6.2.2.18.2); Translation of safety instructions (see paragraph 6.2.2.18.3).
Apart from the "Suggestion boxes", all these improvements aimed at improving Top-Down communication which, according to Hofstede and Hofstede (2005) is easier to foster in a large power distance culture than Down-Top communication. It may be noted that Suggestion boxes initiative was mostly unsuccessful in collecting employees' views. The attempt at improving Top-Down communication, however, was more successful.

6.4.1.2. Employee participation, involvement and empowerment

Several initiatives were introduced during the first period in view of increasing employee participation and involvement: Suggestion competition (see paragraph 6.2.1.2); Training survey (see paragraph 6.2.1.2); Employee participation in the elaboration of the strategic plan (see paragraph 6.2.1.2); Staff survey (see paragraph 6.2.2.10).

None of these improvements, apart from the Suggestion competition, were meant to foster workers participation and involvement.

The suggestion competition faced several difficulties: A low participation due to fear, difficulties in explaining the scheme to the workforce, some managerial attempts to identify the origin of the suggestions (while the scheme was supposed to be anonymous), and difficulties of translating and understanding suggestions written down by semi-literate employees. Its overall success was mainly due to the attractive rewards proposed, but the review and analysis of the received suggestions took both time and effort, which led the company to decide not to run the scheme on an annual but bi-annual basis.

The other initiatives however were quite successful. It is of interest to check the reasons for this success while previous attempts at staff participation and involvement failed (see paragraphs 5.1.2.4.2 and 5.1.2.4.3). In order to prevent a lack of participation, the Support and Development manager and the Top Management did not only ask for participation but requested participation. Documents were sent with the name of the concerned employee and in the attachment letter it was specified that an answer was compulsory, if only to acknowledge the document. The loyalty and propensity to obey orders, in a large power distance population, was used to induce participation and involvement. Paradoxically, the company had to use "forced participation" in order for its initiatives to be successful.
6.4.1.3. Team working

Two initiatives were taken during the first period to improve team working: Creation of a “Suggestion competition” study team (see paragraph 6.2.1.1.3); Monthly Executive staff meetings (see paragraph 6.2.2.11).

Both initiatives concerned senior staff only and did not attempt to break hierarchical barriers.

Through team building activities (see paragraph 6.2.2.14), there was a first attempt at placing employees of different hierarchy levels together, outside their traditional work context.

6.4.1.4. Working environment and conditions

A few attempts were carried out during the first phase to improve the working environment and conditions: Training programmes (see paragraph 6.2.2.5); Safety reviews and improvements (see paragraph 6.2.2.8); Safety representatives (see paragraph 6.2.2.9); and Complete review of the appraisal system (see paragraph 6.2.2.16).

Although these improvements are significant, convincing the management that they were necessary was difficult. For example, it took several years for the researcher to convince the Top Management that it was of importance to provide safety shoes once per year to the workers, or to convince the Site management that although wearing a safety harness might decrease employee productivity, site engineers should impose their use when necessary from a safety point of view (this was also resisted by workers themselves as a “non-macho” attitude). The review of the appraisal system, on the other hand, was well perceived by all, which is consistent with a mainly masculine culture, as described by Hofstede and Hofstede (2005).

6.4.1.5. Awareness and concern for the needs of the society

The company carried out a reflection on participation in humanitarian causes (see paragraph 6.2.2.4), and significantly reduced its wastage (see paragraph 6.3.1.2.1).

However, if a participation in humanitarian causes is a feminine preoccupation in the sense of Hofstede, reduction of waste would be a masculine one, as it was not intended with the aim of preserving the environment, but rather of improving efficiency, which is a more masculine preoccupation.
Overall, indications are that the company was more successful in its initiatives when they were consistent with its original culture than when they diverged from it.

When facing a difficulty, the company sometimes used its prevalent cultural traits to try and initiate a culture modification, which led to paradoxes such as “forced participation”.

Most of the initiatives taken aimed at incremental culture modification and not at radical culture modification. The more radical one was the Suggestion Competition, and it faced many difficulties.

Initiatives were taken to improve top-down communication was improved, while little was done to improve down-top one. Employee participation and involvement was forced and mostly limited to the higher levels of the hierarchy. Team working was also limited to higher levels of the hierarchy and did not cross hierarchical barriers, although occasions are provided for different hierarchical levels to meet outside the work environment. There was an attempt at improving working environment and conditions, although it faced strong resistance. Finally, little was done to increase organisational concern for the needs of the society.

By the end of the first phase, it was evident that modification of culture would take time, that the company was still far from meeting the critical success factors identified in the literature, and that there was significant room for improvement.

6.4.2. Strategy

For the first time, the company made an effort to set its strategy. It defined its Mission and Vision, and established a Strategic Plan using the active participation of the Senior Staff. By the end of the phase, it defined 18 Action Plans which will be the basis for future improvements.

The company was highly successful in this regard. This was felt internally, but also assessed externally by the significant improvements on the Strategy category noted by the SKIA (a progress of 21 point, and a score of 88%, which is the company’s highest enabler score). The company was asked to present its strategic planning process in a “best practice” workforce in the Abu Dhabi chamber of commerce, further confirming its significant success in that regard.
6.5. **Reflection on company's objectives**

The first period was characterised by a recovery. Although the effects of the crisis were not fully reversed, there were clear indications that the path taken by the company was leading towards performance improvement. Thus, the first objective – “to implement TQM principles in view of raising the overall performance, and overcoming its crisis situation” – can be assessed as progressing towards achievement, subject to confirmation in subsequent stages.

The assessment of the second objective – “to improve the satisfaction of all its stakeholders through this TQM implementation” – is not that clear cut. Internal indicators did show a recovery in customer satisfaction, confirmed by the rise in the “Customer & Market Focus” category of the SKIA (see figure 27). Some internal employee satisfaction indicators also showed slight improvements. This was however not confirmed by the scores obtained in the “Human Resources” category of the SKIA (see figure 28). The satisfaction of shareholders had clearly improved, as the company was demonstrating a recovery in profitability. Supplier satisfaction had not improved much or may even have further deteriorated, as the company was not yet able to honour its debts toward them. It was doubtful that society satisfaction had raised much. In this regard, the SKIA results in the “Business environment” category showed deterioration rather than improvement (see figure 29).

![Customer & Market Focus - Satisfaction Indicators](image)

*Figure 27 Customer & Market Focus – Satisfaction Indicators – Percentage of Progress in 2001*
For graphical reasons, the "Training Hours" indicator was not represented in this graph (progress of 1,785%).

Figure 28 Human Resources – Satisfaction Indicators – Percentage of Progress in 2001

Thus it was unclear at this stage whether the stakeholders’ satisfaction was raised by TQM implementation. This may be due to the fact that the company was only at its initial implementation stage.

During the first period, the company based most of its improvement initiatives on the recommendations of the SKIA. Thus, the guidance of the SKIA was an important factor in the recovery shown by many indicators. At this stage, indications were that the third objective – “to offset the limited TQM knowledge available in the company through the application of the recommendations provided by the SKIA body” – was realised. However, further corroboration from subsequent stages is required before this can be fully confirmed.
As for the fourth objective – “to overcome or minimise implementation difficulties linked to the specific culture of the company” – it remains inconclusive at this stage (see paragraph 6.4.1). However it was recognised that the cultural specificity of the company does play an important role in the success or difficulties of the organisation when introducing improvements. The result of the company’s attempt to modify its original culture in order to ease its TQM implementation process was yet unclear. However, the organisation was, at the end of first phase, fully aware that its specific culture influenced its TQM implementation process, and tried to readjust accordingly whenever possible. At this stage, there was, at best, a limited success in overcoming or minimising implementation difficulties linked to the company’s culture.
7. CASE STUDY 2 : 2002 - Quality Integration

7.1. Initial Priorities

Out of the two priorities set at the onset of the first phase, the company decided to pursue its efforts of improvement in relation to five Critical Success Factors identified through literature review. The company had achieved limited success yet in changing the culture of the company as to facilitate the five CSFs, and believed that long term action was required. Thus, culture modification remained the first priority of the second period. Strategy improvements, however, were no longer a priority as the organisation reassured by the progresses made during the first phase.

The second priority of the second phase was for the company to improve its measuring system. Unless the efficiency of the company’s measuring system was raised, the company would face difficulty in assessing the effectiveness of improvement initiatives, and hence set clear objectives.

The third priority was to improve the effectiveness of its ISO quality system. The company believed that, in its current form, this system was holding the organisation back and was a barrier to progress.

Finally, the organisation wished to improve its customer’s image. This meant improvement in two areas: Improve the Quality of the production. Launch a promotional campaign portraying the organisation as solid, quality oriented, modern and at the leading edge of technology, in other words, a desirable supplier.

7.2. Detailed description of TQM implementations

7.2.1. Defining key performance indicators

Unlike previous Sheikh Khalifa Industry Award participation rounds, in which the performance of the company was assessed through a number of indicators proposed by the assessors, the company was asked to prepare its own performance indicators covering four different categories: Customer results, Business Environment results, People results and Key performance results.

Some of the analyses proposed by the company were readily available, as they were routinely studied by the top management. Others analyses were used internally by the
concerned departments, but were not submitted to the Top Management for review. In some cases, data were available, but no corresponding analyses undertaken.

7.2.1.1. Methodology used.

For each of the four results categories of the SKIA, a list of possible indicators was compiled by the researcher, indicating if the data were readily available or not, and the difficulty of the necessary data collection process.

The list was reviewed by the Top Management, and final indicators were selected.

For each selected indicator, the employee(s) responsible for data collection and analysis were identified, and tasks were distributed. A department was in charge of collecting specified analyses and of following up on progresses.

The obtained analyses were then reviewed, validated by the Top Management, and submitted to the Sheikh Khalifa Industry Award auditors.

7.2.1.2. Performance Questionnaire

A performance questionnaire was completed for each selected indicator, specifying the measuring method, the employee receiving the corresponding data, the date on which the indicator was initially measured, if related targets had been set, and if so how, the frequency of the readings, and any actions carried out as a consequence of the readings.

Both actual figures and targets for the last three years were specified, and when necessary graph(s) were joined to the questionnaire.

Example of Performance Questionnaire

<table>
<thead>
<tr>
<th>Customer Results - Customer Perception 30 marks out of 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>This section relates to what the company is achieving in relation to its external customers. World Class companies have measures in place to assess this and it is used to initiate improvement actions.</td>
</tr>
<tr>
<td>The achievement of the company may be determined from the customers’ perception of the company. This may be found, for example, using customer surveys, focus groups, vendor ratings, compliments and complaints. It may cover, depending on the nature of the business, the overall image of the company, the performance of its products and services, the sales and after-sales support and customer loyalty.</td>
</tr>
<tr>
<td>What measures do your company have of its customers’ perception of the company? (For each measure you have to complete one form)</td>
</tr>
<tr>
<td>Customer Loyalty / New Customer Attraction</td>
</tr>
<tr>
<td>How is this measured?</td>
</tr>
<tr>
<td>Considering the Clients of the Projects started during the year analysed, we counted the number of projects that have been executed for this Client to the end of the year analysed.</td>
</tr>
</tbody>
</table>
Who in the company receives this information?
The accountants record this information in the Financial Database. The support and Development Manager extracts them from the Database, and prepare the analysis.

When was it first measured? 1998

Have targets been set for this measure? If so, how were they determined?
We need both to encourage the loyalty of our clients, and to attracting new clients. In 1998 when the customer loyalty was first measured, it was decided that our target should be of a minimum of 30% of clients which we have already completed three projects or more for, and a minimum of 30% of new customers.
Those targets are reviewed when establishing the Strategic Plan. Note that those targets have not been modified since 1998, but that they might be modified this year. As the Production in our Dubai branch may start in mid 2002, we may want to increase the ratio of new customers.

How frequently is this measure produced? Once per year

What actions have been taken as a result of this information?
The best way to encourage Customer Loyalty is to be Customer Focused. Gulf Precast has set up over the years a number of Customer Satisfaction oriented procedures, in order to make sure that our Clients will give us the preferences for next Projects.
From a commercial point of view, special rates are given to loyal Clients, and we quote for their projects even when those projects are not of a high interest for us.
To attract new Clients, Gulf Precast promulgates its image of Quality and Customer Focus. This is done through ISO certification, participation in TQM Awards etc.

What were the results over the last three years? (graphs, charts etc may be attached)

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Loyalty</td>
<td>Minimum 30% Clients with already 3 projects or more</td>
<td>Minimum 30% Clients with already 3 projects or more</td>
<td>Minimum 30% Clients with already 3 projects or more</td>
</tr>
<tr>
<td>New Customers</td>
<td>Minimum 30% of new Clients</td>
<td>Minimum 30% of new Clients</td>
<td>Minimum 30% of new Clients</td>
</tr>
<tr>
<td>Actual measure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Loyalty</td>
<td>34.78%</td>
<td>42.86%</td>
<td>54.05%</td>
</tr>
<tr>
<td>New Customers</td>
<td>50.00%</td>
<td>25.71%</td>
<td>27.03%</td>
</tr>
</tbody>
</table>

Table 31 Example of Performance Questionnaires submitted to the SKIA in 2002

Statements and questions from the SKIA are presented in blue in the above example, whereas the company’s answers are presented in black.

7.2.1.3. Benefits of the work on key performance indicators

The benefits of the exercise proposed by the Sheikh Khalifa Industry Award were multiple.

Firstly, the company had to study what could be its key performance indicators. Once they were identified, the top management started to use them in their assessment of the company’s progress. Some departments were asked to submit their analyses on a regular basis, while others were asked to both initiate analyses and submit them on a regular basis.

Secondly, it taught the management that performance indicators were to be studied from different perspectives, as requested by the Sheikh Khalifa Industry Award, and were to be
a mixture of internal and external measures. This would later lead the company to adopt the concept of Balanced Scorecards.

7.2.2. A second Gold Award in the Sheikh Khalifa Industry award

The assessment of the Sheikh Khalifa Industry Award for 2001-2002 was based on several elements:

- The self-assessment performed by the company
- The audit by the Sheikh Khalifa Industry Award team on the self-assessment, conducted on the 3rd March 2002.
- The percentage of implementation of the Actions Plans set during the 2000 award, as reviewed by the auditors
- The Action Plans presented during the 2001-2002 preparation work
- The key performance indicators of the company

Based on these elements, the company was informed that it had won a Gold Award for the second consecutive occasion. In fact, the score of the company was one point below the Diamond winner (best of all evaluated companies), and therefore headed the list of Gold winners.

The obtained results for enablers’ categories, in comparison with average scores of participants, were as follows:
Action planning accounted for 10% of the overall score. The action planning score obtained by the company was 88%, while the average score for all companies was 47%.

Business results Criterion, which accounted for 27% of the total score, was subdivided in four categories: Customer results; Key performance results; People Results; and Business Environment. The company obtained 92% in this criterion, which is to be compared with the 56% obtained in average by participating organisations, and the 57% obtained by the company during its previous participation.

7.2.3. An effective Quality System

At the beginning of 2002, the Top Management became aware that the Quality Procedures of the company had to be urgently reviewed. The procedures were last modified in June 2000, and since that time the organisation structure had been entirely modified following the review carried out by newly appointed Executive Manager.

During audits, employees were audited on responsibilities what they were no longer assigned to them.

The top management shifted the responsibility of Management representative for Quality, once the intended candidate (the researcher) had been trained as Lead Auditor.
7.2.3.1. Review of Quality Policy

The first step in regaining an effective Quality System was to update the Quality Policy of the company. In order to do so, the current Quality Policy statements were sent to all Senior Staff, and their proposals for improvement were requested.

The Executive Manager and the researcher examined the received suggestions and decided on an updated version.

7.2.3.2. Quality Documentation reflecting the actual situation of the Company

The procedures had then to be updated to reflect the company’s new organisation chart. In some cases, the processes themselves had been modified, and those modifications had to be incorporated.

A number of improvements in the procedures were necessary so that they would remain appropriate for both current times and the immediate future.

After a first review of the procedures, the Management representative for Quality sent the proposals of modification to the concerned employees for review. They were asked to check, validate or propose alternatives.

Whenever a consensus could not be reached, the concerned employees discussed the options, and if necessary the Executive Manager had the final say.

Once the procedures reflected the present situation of the company, it was important to ensure they remained so.

7.2.3.3. Updates on the Quality System using feedback on audits

During internal audits, the auditees were routinely asked for improvement suggestions. It was stressed that the Procedures should be a useful guide to their work and not a burden.

Observations from external auditors were carefully studied and taken into consideration.

Procedure revision took place every few months, reflecting the rapid speed of improvements in the company. By the end of 2002, everyone felt that the procedures were an asset again, and were no longer having a negative effect on company progress.
7.2.3.4. Non-Conformances are openly discussed as well as actions to prevent recurrence

The small number of non-conformance reports written before 2002 was clearly not reflecting a healthy quality, but deficiencies in the non-conformance reporting system. Therefore, the first step to improve the quality system was to seek to increase the number of non-conformances reported (an apparent contradiction). Unless quality issues were known, actions to prevent recurrence could not be studied and implemented.

Through interviews with several Heads of Departments, it was noted that not reporting non-conformances was often thought to promote positive team-spirit, by refusing to denunciate the department responsible for the problem. A meeting was organised with the Heads of Departments, chaired by the Executive Manager, to highlight the positive aspects of reporting non-conformances in order to improve the Quality system of the company. The newly created Quality Control Department helped greatly on this issue of disassociating the reporting of non-conformances from a ‘blame culture’ interpretation.

As non-conformances were investigated and actions to prevent recurrence implemented, the Quality System effectiveness started to improve.

The number of non-conformances related to Product Manufacturing, which increased in the beginning of 2002 due to a better reporting, started to decrease due to the implementation of corrective actions.

![Number of NCR related to Product Manufacturing](image)

*Figure 31 Number of product non-conformances reported from 2002 to 2003*

The company started to evaluate the direct cost of non-conformances from June 2002 onwards. It took a few months for this newly implemented procedure to operate correctly.
Considering the direct cost of non-conformances from the fourth quarter of 2002, a descending trend can be observed.

![Diagram of Cost of NCR related to Product Manufacturing](image)

**Figure 32** Direct cost of non-conformances from the last quarter of 2002 to the third quarter of 2003

These two analyses reflect the improvement in the effectiveness of the Quality System.

Reported non-conformances were discussed in Management Review meeting, as well as the recommended actions to prevent recurrence.

### 7.2.4. Improving the Marketing

One of the eighteen action plans proposed to the Sheikh Khalifa Industry Award assessors was to improve lines of communication with Customers and potential customers. Several initiatives were taken in this sense.

#### 7.2.4.1. Creation of a WEB Site

As the company is not selling standardised products but tailor-made ones, e-commerce was not an option. However, it was decided to create a WEB Site for prestige and commercial reasons.

All main companies in the United Arab Emirates were setting up WEB sites. It was important for the company to keep up with the technology, and to refer to its WEB site on visiting cards, letter heads and commercial literature.

The creation of a WEB site was only of marginal value to the Abu Dhabi clients of the company. Their knowledge of the company products was excellent and did not require the information provided on the WEB site. However, a strategic decision was made to
penetrate a market in which potential clients were not as knowledgeable about the company: the Dubai and Northern Emirates market. For those potential new clients, a WEB site was a good marketing tool.

7.2.4.2. **Reviewing the Tender Documents**

Tender documents are handed over to potential clients whenever the company is bidding for a project. They contain the documented Quality System of the company, its projects’ references, a description of its production capacity as well as any documents that may influence the decision of the potential client in selecting the company for the project (ISO certificate, Awards obtained etc).

No in-depth review had been made on tender documents for more than three years. Obsolete documents were replaced with new ones, and new certificates were added, but the coherence of the set of documents and their external aspect was not revised. This was not a major handicap in the traditional market of the organisation, but it was for the Dubai market, as the tender documents were not reflective of the potential or size of the company.

Tender documents were subsequently revised for coherence and aspect, with the objectives of presenting the company as a major Precast producer, reliable and well-established, with a reputation for quality.

7.2.4.3. **Participation in construction exhibition**

For the first time, the company participated in an international construction exhibition, which took place in Dubai. The aim was not to advertise the company internationally, but rather to raise its profile in Dubai. The objective was that Dubai's main contractors would recognise the company as a potential alternative to their usual precast subcontractors.

A second objective was to present precast products as an alternative to traditional construction methods. The advantages in terms of speed, quality, cost and safety were put forward, as well as the capability of the company’s design team to propose precast solutions based on architectural drawings not originally intended for precast construction.

The third objective was to present an offer of a “turnkey” villa, designed to attract U.A.E. nationals. This product had been recently added to the range of products, and could appeal to affluent individuals looking for a financially attractive and rapidly constructed new villa.
7.2.4.4. Creating Brochures and flyers for specific Products

Apart from Tender Documents which consisted of more than a hundred pages, the company did not have any concise promotional documentation that could be distributed during an exhibition.

Brochures and flyers specific to particular products were designed, some with the help of summer training students.

7.2.4.5. Creating a promotional 3D film of a virtual visit to a villa

Three dimensional films were rarely available in the United Arab Emirates. The company decided to use this innovative technique, in order to stimulate the curiosity of the public, first to this new way of presentation, and then hopefully to the product range depicted.

The film presented a three dimensional visit to the “turnkey” villa promoted by the company. It was created by a 3D engineer, with an expertise on special effects for the film industry.

7.2.4.6. Creating a presentation film of the Company

A presentation film giving an overview of the company was also prepared. It was to be used both as an introduction on the company for new clients, and as a promotional film that would be run in the reception area of the company. The intention being to attract the attention of the visitors on company’s production processes, past realisations and potential.

Compact disks of the presentation film and of the three dimensional visit of the turnkey villa product were prepared in an attractive format, and handed over to potential clients, projecting the image of a company making use of technological progresses.

7.2.4.7. Increased Market Knowledge by systematic storing marketing information in a Database

The initial analyses of market research data highlighted their potential at providing elements on which to base the strategy of the company. The data collection extended to projects for which the company had not been asked to quote, in particular in the Dubai and Northern Emirates market.
7.2.5. Training

The focus on training, started in 2001, was maintained in 2002. Although the number of hours was slightly reduced (11,690 hours of training in 2001 against 8,435 in 2002), the expenditure on training increased significantly (20,600 Dhs in 2001 against 26,780 in 2002), largely spent on managerial and supervisory training which could not be conducted in-house.

New training techniques were also inducted.

7.2.5.1. Coaching

As the company was expanding, the need for qualified employees increased. The top management considered two possible alternatives: hiring new employees to fill the required position or promoting employees internally. A mixture of those two techniques was adopted: internal promotion when employees were close to reaching the required competence level, hiring of new employees otherwise. Employees selected for possible promotion had to receive intensive practical training. The coaching technique was used, by forming in a trainee-trainer relationship between the candidate and an employee having several years experience of the post. The duration of the training was decided by the concerned Head of Department, and regular meetings were scheduled between the researcher in charge of the organisation of the training, the Head of Department, the trainees and the trainers in order to examine the training progress. The concerned Head of Department was requested to establish a list of required qualifications prior to granting the promotion. The trainers were asked to regularly rate the trainees according to this established criteria. The trainees were also asked to evaluate the quality of the training received.

This scheme was used successfully in two departments. It was later discontinued due to the unwillingness of other Heads of Department to participate in it, as they saw it as an interference with their promotion prerogative.

7.2.5.2. In-house Training

In-house training was intensified, mainly in two areas: safety and information technology. In safety, regular in-house courses on fire fighting and first aid which had started in 2001
were maintained. In IT, courses on Excel, Powerpoint, Word and Access where proposed to the employees.

Those courses where highly successful as the training was prepared with examples and exercises relative to the work environment of the employees.

7.2.5.3. **On-the-job training**

As the number of newly hired employees increased, so did the on-the-job training. The number of on-the-job training hours provided in 2002 was 4.5 times the ones of 2001, with a total of more than 6,500 hours.

7.2.5.4. **Training by Suppliers**

The company asked some of its Suppliers to train the company’s employees on their new products/techniques. This was highly beneficial in two aspects:

Instead of continually ordering the same range of products, tests on alternative products and alternative techniques of production using those products were carried out. Some of them were done in joint collaboration with the Suppliers.

This training reinforced the links and the cooperation between the Suppliers and the Company. Personal contacts were made, which increased mutual understanding.

7.2.6. **Improve performance measures of main Processes**

Efforts on process measurement were first directed towards the production processes, here referred to, as main Processes. The performance measurement of support processes will be dealt with in a second stage.

Until 2001, the performance of the projects was measured using the project costing method. Costs relative to the projects were accrued in the Accounting Database on projects’ cost centres. Over heads were accrued on a monthly basis, and then split among the projects’ cost centres pro-rata to the sale figures of the month. The project costing of a given month was known generally four months later, as data such as suppliers’ invoices take time to be collected and allocated to the appropriate cost centre.

The advantage of the system is that all costs were distributed to specific projects, and that is was easy to check which projects had been profitable and which had not.
Comparisons between actual costs and original budget was possible but not easy, as the Accounting and Estimation databases were not integrated, and as accounting cost items and estimation cost items did not always match (the first ones had been designed to report accounting costs while the others had been designed to calculate estimated costs.)

A main disadvantage was the delay in data availability: The company may discover that a project was losing money when it was too late to do anything about it.

The process owners of the main processes were able to know their actual financial performance once their process was completed for the given project. However, their monthly performance was not available, as data were not meaningful prior to project completion, which might take several years for some projects.

Thus, the only performance measures available were the retrospective, financial projects performances. Non-financial performance was generally not calculated.

7.2.6.1. Objectives for improving Data collection and analyses

By the end of 2001 and the beginning of 2002, top management realised that improvements were required in the data collection system of the company. The following objectives were set.

- Collect and analyse data relative to the overall financial performance of the main processes, in addition to monitoring the performance of individual projects.

- Obtain the results of the analyses sufficiently early in order to detect and correct negative trends.

- Improve the integration of collected data in order to provide analyses that may cover all processes and allow easy comparisons.

- Provide non-financial performance analyses.

By 2002 some new analyses were starting to become available, and process owners were able to follow up more easily their process performance.

The improvement of data collection and analysis will continue in 2003. The overall IT integration was targeted to be complete by the end of 2003.
7.2.6.2. Manpower factory productivity analyses

Data concerning the daily number of units produced in the factory (in M3 or in Kg depending on the Product) and the daily number of hours worked by product and by section, was available in the Factory Database from the beginning of 2001 onwards.

The factory management was able to consult those figures and take action accordingly.

However, the first graphical representation of factory productivity, by product, was compiled beginning of 2002. This was to be incorporated in the “Key performance indicators” of the Quality System as requested by the Sheikh Khalifa Industry Award assessor.

![Graphical representation of productivity analysis by product](image)

Figure 33 Example of graphical representation of productivity analysis by product

Graphical representations were providing rapid assessment of the situation for both the Top Management and the Factory Management. The Factory Management had the possibility to interrogate the data in order to examine detailed data e.g. on a daily or project basis.

In view of the interest in such analysis, the factory management decided to take it a step further, and to calculate productivity ‘by Product’ and ‘by Sections’, using graphical representations.

From February 2002 onwards, the factory productivity ‘by section’ would be computed monthly by the researcher and reviewed by the top management and the Factory Management. It may be noted that the graphs constructed differed from those first proposed to the Sheikh Khalifa Industry Award (Number of hours per production unit, and not number of unit per hour), as the resulting values were considered easier to grasp by the majority of company staff.
During the years 2002, additional monthly graphical representations of the factory productivity were proposed. The following figure is a comparison between the productivity of three different products.
The graph clearly indicates that Hollowcore productivity is higher than Precast and Prestressed productivity. The strategic decision to increase the company’s production capacity of Hollowcore and propose this product for production in Dubai was based on those analyses.

The productivity of the factory depends on the units produced and the worked hours. The factory management has a limited control over the number of units produced, which depend mostly on the contracts signed and on the shop drawings approved by the client. However, it can control the hours spent by controlling the overtime hours. In the Emirates, workers are always willing to work overtime in order to provide better living conditions to their family in their country of origin. When production is decreasing, the factory management can limit overtime hours, and thus control the productivity. Therefore, it is important to verify the adjustment of overtime hours depending on the production figures. The following monthly analyses were provided by the researcher from mid 2002 onwards.
Every three months, an analysis of productivity by project was prepared by the researcher and submitted to the top management. Depending on the complexity of the projects, variations from project to project may be important. The following example considers GRC projects.

**PROJECTS HOURS & PRODUCTION**

<table>
<thead>
<tr>
<th>Product</th>
<th>Project</th>
<th>Production</th>
<th>Tot Hours</th>
<th>Hours/Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRC</td>
<td>0115 - GULF CONTRACTORS</td>
<td>467,995.00</td>
<td>19,488.94</td>
<td>0.04164</td>
</tr>
<tr>
<td>GRC</td>
<td>0107 - AL GHAFLY GEN.CONT.</td>
<td>115,040.00</td>
<td>6,043.66</td>
<td>0.05254</td>
</tr>
<tr>
<td>GRC</td>
<td>0021 - DHABI CONTRACTING</td>
<td>497,120.00</td>
<td>28,582.62</td>
<td>0.05750</td>
</tr>
<tr>
<td>GRC</td>
<td>0220 - GROUP 3 ENG’G.</td>
<td>133,575.00</td>
<td>8,799.01</td>
<td>0.06587</td>
</tr>
<tr>
<td>GRC</td>
<td>0112 - AL FADA</td>
<td>206,180.00</td>
<td>17,817.77</td>
<td>0.08642</td>
</tr>
<tr>
<td>GRC</td>
<td>0243 - GPCC - SHKH. MANSOOR MAJLIS</td>
<td>6,250.00</td>
<td>698.10</td>
<td>0.11170</td>
</tr>
<tr>
<td>GRC</td>
<td>0227 - S.ALMIN HMOUD</td>
<td>9,700.00</td>
<td>1,404.49</td>
<td>0.14479</td>
</tr>
<tr>
<td>GRC</td>
<td>0234 - TARGET</td>
<td>10,270.00</td>
<td>1,611.13</td>
<td>0.15688</td>
</tr>
<tr>
<td>GRC</td>
<td>0129 - AL OTAIBA &amp; GARG</td>
<td>5,975.00</td>
<td>961.49</td>
<td>0.16427</td>
</tr>
<tr>
<td>GRC</td>
<td>946 - GROUP 3 ENG’G.</td>
<td>133,425.00</td>
<td>23,645.03</td>
<td>0.17722</td>
</tr>
<tr>
<td>GRC</td>
<td>0013 - MASAKEN</td>
<td>263,426.50</td>
<td>47,117.59</td>
<td>0.17886</td>
</tr>
<tr>
<td>GRC</td>
<td>0131 - TARGET - SAEI</td>
<td>7,160.00</td>
<td>1,329.28</td>
<td>0.18565</td>
</tr>
<tr>
<td>GRC</td>
<td>0248 - AL RYUM CONT.</td>
<td>13,185.00</td>
<td>2,448.30</td>
<td>0.18569</td>
</tr>
<tr>
<td>GRC</td>
<td>0204 - AL DARMAKI</td>
<td>9,575.00</td>
<td>1,843.56</td>
<td>0.19254</td>
</tr>
<tr>
<td>GRC</td>
<td>0133 - SAIF BIN DARWISH</td>
<td>26,230.00</td>
<td>5,401.26</td>
<td>0.20592</td>
</tr>
<tr>
<td>GRC</td>
<td>0014 - AL FALAK ENG’G&amp;CONT.CO.</td>
<td>96,730.00</td>
<td>20,034.29</td>
<td>0.20712</td>
</tr>
<tr>
<td>GRC</td>
<td>0025 - MR. RASHID BIN DARWISH</td>
<td>6,365.00</td>
<td>1,534.09</td>
<td>0.24102</td>
</tr>
<tr>
<td>GRC</td>
<td>0117 - ALEPPO</td>
<td>5,690.75</td>
<td>1,501.41</td>
<td>0.26430</td>
</tr>
</tbody>
</table>
7.2.6.3. Cost of repair analyses

One of the 18 Action Plans proposed to the Sheikh Khalifa Industry Award assessors was to reduce the cost of repair. In order to do so, repair data had to be analysed. The following monthly analyses were computed by the researcher from February 2002 onwards for each product (the given examples are related to the GRC product only).

<table>
<thead>
<tr>
<th>Product</th>
<th>Month</th>
<th>Prod</th>
<th>Casting Hours</th>
<th>Repair Hours</th>
<th>Hours Repair / Hours Casting</th>
<th>Hours Repair / Production</th>
<th>Reduction in hours repair, compared with the one of November</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRC</td>
<td>07/2001</td>
<td>65,195.00</td>
<td>2,857.71</td>
<td>5,249.65</td>
<td>1.8370</td>
<td>0.0805</td>
<td>-33.40%</td>
</tr>
<tr>
<td>GRC</td>
<td>08/2001</td>
<td>60,333.00</td>
<td>3,334.84</td>
<td>5,140.22</td>
<td>1.5414</td>
<td>0.0852</td>
<td>-57.16%</td>
</tr>
<tr>
<td>GRC</td>
<td>09/2001</td>
<td>120,190.00</td>
<td>3,514.67</td>
<td>5,828.42</td>
<td>1.6583</td>
<td>0.0485</td>
<td>-63.92%</td>
</tr>
<tr>
<td>GRC</td>
<td>10/2001</td>
<td>132,540.00</td>
<td>3,958.75</td>
<td>8,090.46</td>
<td>2.0437</td>
<td>0.0610</td>
<td>-56.48%</td>
</tr>
<tr>
<td>GRC</td>
<td>11/2001</td>
<td>144,910.00</td>
<td>3,754.05</td>
<td>8,367.33</td>
<td>2.2289</td>
<td>0.0577</td>
<td>-68.35%</td>
</tr>
<tr>
<td>GRC</td>
<td>12/2001</td>
<td>205,912.50</td>
<td>3,448.07</td>
<td>7,917.97</td>
<td>2.2963</td>
<td>0.0385</td>
<td>-73.59%</td>
</tr>
<tr>
<td>GRC</td>
<td>01/2002</td>
<td>241,260.00</td>
<td>7,032.93</td>
<td>5,968.54</td>
<td>0.8487</td>
<td>0.0247</td>
<td>-57.16%</td>
</tr>
<tr>
<td>GRC</td>
<td>02/2002</td>
<td>185,075.00</td>
<td>6,410.50</td>
<td>3,855.92</td>
<td>0.6015</td>
<td>0.0208</td>
<td>-63.92%</td>
</tr>
<tr>
<td>GRC</td>
<td>03/2002</td>
<td>180,820.00</td>
<td>6,795.74</td>
<td>4,543.43</td>
<td>0.6686</td>
<td>0.0251</td>
<td>-56.48%</td>
</tr>
<tr>
<td>GRC</td>
<td>04/2002</td>
<td>153,560.00</td>
<td>4,997.02</td>
<td>2,806.41</td>
<td>0.5616</td>
<td>0.0183</td>
<td>-68.35%</td>
</tr>
<tr>
<td>GRC</td>
<td>05/2002</td>
<td>83,875.00</td>
<td>2,509.48</td>
<td>1,279.10</td>
<td>0.5097</td>
<td>0.0153</td>
<td>-73.59%</td>
</tr>
<tr>
<td>GRC</td>
<td>06/2002</td>
<td>27,630.00</td>
<td>3,297.25</td>
<td>1,238.75</td>
<td>0.3757</td>
<td>0.0448</td>
<td>-22.35%</td>
</tr>
</tbody>
</table>

Table 33 Example of repair Analyses available from February 2002 onwards

The last column indicates the improvement in comparison with the hours of repair per Kg obtained in November. The figure for May shows a 74% improvement which drops to 22% in June due to a fall in the number of Kg produced (from 84,000 to 28,000).
Figure 38 Example of graphical representations of repair analyses

### REPAIR DATA BY PROJECTS

Project of the last year; Data from Sep 2000; with Prod GRC >= 5000Kg, Prod Precast >= 50 M3, Prod Hollowcore >= 50 M3, Prod Prestressed >= 50 M3; Prod GRP >= 1000 Kg

<table>
<thead>
<tr>
<th>Product</th>
<th>Project</th>
<th>Production</th>
<th>Repair Hours</th>
<th>Repair Hours/Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRC</td>
<td>0115 - GULF CONTRACTORS</td>
<td>467,995.00</td>
<td>5,335.39</td>
<td>0.01140</td>
</tr>
<tr>
<td>GRC</td>
<td>0107 - AL GHAFLY GEN.CONT.</td>
<td>113,090.00</td>
<td>1,345.55</td>
<td>0.01190</td>
</tr>
<tr>
<td>GRC</td>
<td>0112 - AL FADA</td>
<td>206,180.00</td>
<td>4,188.55</td>
<td>0.02032</td>
</tr>
<tr>
<td>GRC</td>
<td>0109 - PIVOT</td>
<td>37,090.00</td>
<td>1,144.08</td>
<td>0.03085</td>
</tr>
<tr>
<td>GRC</td>
<td>0021 - DHABI CONTRACTING</td>
<td>497,120.00</td>
<td>16,036.57</td>
<td>0.03226</td>
</tr>
<tr>
<td>GRC</td>
<td>0135 - C. G. C. H</td>
<td>27,000.00</td>
<td>1,244.99</td>
<td>0.04611</td>
</tr>
<tr>
<td>GRC</td>
<td>0133 - SAIF BIN DARWISH</td>
<td>26,230.00</td>
<td>1,317.76</td>
<td>0.05024</td>
</tr>
<tr>
<td>GRC</td>
<td>956 - AL RADEEM</td>
<td>54,850.00</td>
<td>4,051.50</td>
<td>0.07387</td>
</tr>
<tr>
<td>GRC</td>
<td>0013 - MASAKEN</td>
<td>213,745.50</td>
<td>16,951.53</td>
<td>0.07931</td>
</tr>
<tr>
<td>GRC</td>
<td>0129 - AL OTAIBA &amp; GARG</td>
<td>5,975.00</td>
<td>615.56</td>
<td>0.10302</td>
</tr>
<tr>
<td>GRC</td>
<td>0014 - AL FALAK ENG&amp;CONT.CO.</td>
<td>90,730.00</td>
<td>11,725.83</td>
<td>0.12122</td>
</tr>
<tr>
<td>GRC</td>
<td>0131 - TARGET - SAEI</td>
<td>7,160.00</td>
<td>958.10</td>
<td>0.13381</td>
</tr>
<tr>
<td>GRC</td>
<td>946 - GROUP 3 ENG'G.</td>
<td>133,425.00</td>
<td>18,395.34</td>
<td>0.13787</td>
</tr>
<tr>
<td>GRC</td>
<td>0117 - ALEPPO</td>
<td>5,880.75</td>
<td>827.20</td>
<td>0.14561</td>
</tr>
<tr>
<td>GRC</td>
<td>0121 - AL OTAIBA &amp; GARG</td>
<td>7,140.00</td>
<td>1,240.48</td>
<td>0.17374</td>
</tr>
</tbody>
</table>

Table 34 Example of repair data by project
Monthly analyses were greatly improving the knowledge of both the top management and of the factory management about the repair work in the factory.

7.2.6.4. **Basing equipment replacement decisions on performance data**

Some of the factory equipment was old. In order to take decisions regarding their possible replacement, the top management needed to collect data both on equipment maintenance costs and on the production disruption resulting from equipment breakdowns.

A history card was already available for each piece of equipment. Recorded on this card were the dates of preventive and corrective maintenance. The top management requested the Maintenance Section to incorporate in those cards the cost of maintenance, calculated on spare parts cost plus manpower cost, as well as the number of breakdown days.

History cards were sent to the top management every four months, allowing equipments’ replacement decisions to be factually based.

7.2.6.5. **Housekeeping evaluation**

As the volume of production increased and as the focus of the factory teams was on productivity, the housekeeping of the factory infrastructure started to be considered more as an issue of reduced importance. Soon, safety and environmental problems started to emerge, followed by maintenance problems due to the lack of daily care on the equipment. The trend had to be reversed, and a balance found between productivity and housekeeping.

Unless a way for measuring housekeeping was found, it was doubtful that the Factory Management would be able to increase the focus on this issue.
The researcher identified that an adapted version of CANDO (cleanliness, arrangement, neatness, discipline and orderliness) or SS (in Japanese the corresponding terms are all starting with an S) evaluation sheet, presented by Dale (2000), could be used to that effect.

The possibility of using Housekeeping evaluation sheets was proposed to the Executive Manager, the Factory Manager and the HSE Officer, who validated it. The Factory Manager and the HSE Officer elaborated the evaluation sheets depending on the characteristics of each section. The following example is relative to the evaluation sheet for the Carpentry and GRP Section.

**Housekeeping evaluation form – Factory: Mould Carpenters & GRP Section**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Activity</th>
<th>Activity Description</th>
<th>Score</th>
<th>Action for improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Routine cleaning of floors of all rubbish.</td>
<td>Routine cleaning of wood-waste, wood shavings, saw dust from the floor.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Segregation of waste and disposal to rubbish store area.</td>
<td>Segregating of waste into waste wood, and wood shavings, saw dust, GRP waste and disposing in rubbish store area.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Routine cleaning of work tables.</td>
<td>Routine cleaning of work tables of sawdust, shavings etc. and disposal of waste in rubbish store area.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Storage of raw material.</td>
<td>Proper storage of raw material in designated areas</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Equipment maintenance.</td>
<td>Routine cleaning of equipment of dust and dirt. Regular oiling and greasing, labelling of Eq. Ref. Nos. and proper storage of hand tools.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Aisle-ways and walkways.</td>
<td>Proper marking of aisle-way and walkways. Removal of all materials lying on aisle-ways and walkways.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Storage of finished goods.</td>
<td>Proper and neat storage of finished goods in designated areas.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Removal of waste wood, unwanted shutters from casting yards and disposal to respective store area.</td>
<td>Removal of waste wood, unwanted shutters from casting yards and disposal to mould storage area or rubbish store area as required.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Disposal of rubbish to specified dump yards.</td>
<td>Fixing of trailer with side shutters, loading and unloading of rubbish to specified dump yards.</td>
<td>/20</td>
<td></td>
</tr>
</tbody>
</table>

Table 35 Example of Housekeeping evaluation form (one form per section)

On a monthly basis, from July 2002 onwards, housekeeping evaluations were collected for all factory sections, and analysed.
Daniele Scraphim - Ph.D.

**Comparison between Sections**

<table>
<thead>
<tr>
<th>Grade by Section</th>
<th>July/02</th>
<th>Aug/02</th>
<th>Sep/02</th>
<th>Grand Total</th>
<th>Total Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory Improvement</td>
<td>63.00</td>
<td>63.00</td>
<td>61.00</td>
<td>187</td>
<td>62.33</td>
</tr>
<tr>
<td>Hollow Core</td>
<td>62.00</td>
<td>60.00</td>
<td>65.00</td>
<td>187</td>
<td>62.33</td>
</tr>
<tr>
<td>Maintenance</td>
<td>61.00</td>
<td>65.00</td>
<td>61.00</td>
<td>187</td>
<td>62.33</td>
</tr>
<tr>
<td>Precast production</td>
<td>63.00</td>
<td>64.00</td>
<td>65.00</td>
<td>192</td>
<td>64.00</td>
</tr>
<tr>
<td>Mould Carpenters &amp; GRP</td>
<td>65.00</td>
<td>67.00</td>
<td>64.00</td>
<td>196</td>
<td>65.33</td>
</tr>
<tr>
<td>Mould Fabricators</td>
<td>66.00</td>
<td>66.00</td>
<td>69.00</td>
<td>201</td>
<td>67.00</td>
</tr>
<tr>
<td>Steel fixing</td>
<td>66.00</td>
<td>66.00</td>
<td>69.00</td>
<td>201</td>
<td>67.00</td>
</tr>
<tr>
<td>Repair and loading</td>
<td>67.00</td>
<td>68.00</td>
<td>71.00</td>
<td>206</td>
<td>68.67</td>
</tr>
<tr>
<td>GRC Production and repairs</td>
<td>67.00</td>
<td>70.00</td>
<td>71.00</td>
<td>208</td>
<td>69.33</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>580</td>
<td>589</td>
<td>596</td>
<td>1765</td>
<td>65.37</td>
</tr>
<tr>
<td><strong>Total Average</strong></td>
<td>64.44</td>
<td>65.44</td>
<td>66.22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 36 Example of Housekeeping evaluation results – Comparisons between sections**

It was then decided to extend the scheme to the sites. By November 2002, a Housekeeping evaluation form was validated by the Top Management, the Sites Management and the HSE Officer. Readings would be taken on a monthly basis.

**Housekeeping evaluation form – Sites**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Activity</th>
<th>Activity Description</th>
<th>Score</th>
<th>Action for improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cleaning of area around site office store.</td>
<td>Daily cleaning of area around site office. Removing and disposing of rubbish to site dump area.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cleaning of site office and toilets</td>
<td>Daily cleaning of site office floors and dusting of furniture. Providing bins for waste paper and daily disposal of waste, collection of food waste in separate bags and disposal to site garbage area. Daily cleaning of toilets with diluted antiseptic lotion.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Removal of packing wood.</td>
<td>Removal of packing wood used as packing for storing precast for reuse. Collection in designated area.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Storage of tools, materials and equipment.</td>
<td>Proper storage of materials, tools, tackles and equipment in designated areas of storage.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Storage of precast elements.</td>
<td>Proper storage of precast elements to ensure they are not damaged by vehicles or by sliding or toppling.</td>
<td>/20</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Providing of warning signs and notice.</td>
<td>Providing of notice board. Displaying of Safety instructions. Warning signs, policy statements.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Removal of unwanted items.</td>
<td>Periodical removal of unwanted material after obtaining necessary permission.</td>
<td>/10</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Maintaining first aid box.</td>
<td>Maintenance of first aid box.</td>
<td>/10</td>
<td></td>
</tr>
</tbody>
</table>

**Table 37 Housekeeping evaluation form for Sites**
By the end of 2002, a housekeeping evaluation sheet was also elaborated for the Head office.

A database was created in which the results of housekeeping evaluation would be recorded.

In order to maintain the system over time, monthly housekeeping evaluations were integrated in the corresponding documented ISO Procedure of the company.

7.2.6.6. Detailed Feasibility studies

Until 2001, the partners were taking major investment decisions based on qualitative opinions about possible return on investments.

From 2002 onwards, all major investment decisions were based on detailed feasibility studies, comparing several investment options, taking into consideration estimations of possible market and market share evolution.

When investments were required for a project having a size that would require further investment, the decision to proceed was taken only if its investment cost could be absorbed by the estimated benefits of the project.

As an example, the following investment decisions were based on detailed feasibility studies:

- Set up of the production facilities in the Dubai factory
- Purchase of the Shahama factory
- Increase of the Hollowcore production capacity in the Mussafah factory.
- Extension of the Shahama factory (return on investment on the duration of the project for which the extension was required).
- Purchase of additional Prestressing facilities (return on investment on the duration of the project for which the facilities were required).
- Decision not to purchase transport facilities for the company.
The recruitment process itself shifted from a selection based entirely on interviews with the intended Head of Department, to partly quantifiable decisions based on results obtained by the candidates in recruitment tests.

Each major department was requested to prepare a set of tests based on the skills required, and to grade candidates based on both the results on those tests and on interviews.

One of the new recruitment strategies of the company was to recruit recently graduated engineers, as a demographics survey had highlighted that very few young employees would have the potential to take over from the very experienced senior staff in a few years time.

The main criteria for recruitment of such junior staff, was their general ability and potential, rather that their in-depth knowledge of a specific trade. Therefore, they were tested in several departments before the recruitment decision was made. They were then sent on training/further evaluation in those departments in order for the company to gain an in-depth knowledge of their aptitudes, and for the employee to gain a complete view of the processes in the organisation and their interactions.

One of the main quality issues faced by the company in 2000, was its inability to meet projects deadlines, in a situation of rapid production growth. As the strategy of the company was to accelerate further the pace of production growth, it was of critical importance to improve the planning and monitoring of its production activities.

Until 2001, the planning responsibilities were held by each head of department, and project planning throughout the project’s life was not available. In order to manage time restrictions on projects, planning and monitoring activities would have to be integrated through the different process phases.

The need for an integrated project planning which had been highlighted by the senior staff when analysing the poor financial results of 2000 would be fulfilled by 2002 through the creation of a planning department.
The role of the planning department was to propose a timeframe per project for the tasks to be carried out by the different departments who, in turn, would study and comment this initial plan. Each department would then prepare, whenever required, a plan of sub-tasks to be completed in order to reach the timeframe set by the planning department.

Any deviation from the initial planning would be reported to the planning department, who would study the possible implications of the delay, and decide on remedial actions in coordination with the concerned departments and the top management, if required. Possible remedial actions may range from an agreement over time extension with the client, to increasing the resources allocated to the project.

Measuring and monitoring the projects' phases over time has been a major improvement in the quality system of the company, allowing controlled production growth.

7.2.6.9. IT Integration

In order to improve further the process performance measurement and analysis, the data collected by the different processes would have to be integrated in a database in which data can be brought together from different perspectives depending on the processes.

For example, comparing project’s estimation data with purchase operations, material and manpower utilisation and their accounting values, taking into consideration the progresses on the project as reported by the quantity surveying data, was a difficult and time-consuming analysis. Integration across processes, both physically and logically, would ease such analysis.

A study was carried out concerning which processes’ data should be integrated, on which level, and what missing data needed to be collected.

Following this study, two options were examined: Performing the integration project internally by hiring news resources in the IT department, or outsourcing the project. The second option was retained, and the IT integration project would be developed in close partnership with a sister company specialised in software development.

The integration process started in 2002 would provide improved performance measures and analysis by the end of 2003.
7.2.7. 360 degrees leadership evaluation

The top management and the researcher were convinced that the leadership of the company’s senior staff was a key element in its continual improvement process. However, measuring a human quality such as leadership had not been previously attempted by the company.

After a literature review of leadership measurements, it appeared that the 360 degrees evaluation was often quoted as a reliable method for leadership evaluation. The technique consists of selecting a list of questions relevant to the leadership quality, and to ask employees to evaluate the senior staff on those qualities. The evaluators should be the hierarchical superior of the senior staff, the senior staff himself, several peers and several subordinates (hence the name: 360 degree evaluation).

The first task was to decide on the questionnaire that would reflect the leadership quality. A literature review was performed by the researcher both through books and using the internet. Several possible questionnaires were proposed to the top management for review.

The next step was to explain the scheme to both evaluators and senior staff. The anonymity of peers and subordinates answers was stressed, highlighting that peers and subordinates results would be provided in average value.

The data collection took time to complete, as employees were wary that the anonymity may not be respected.

Once the data was collected, averages were computed by the researcher, and results were handed over to the Senior Staff and to the Executive Manager.
<table>
<thead>
<tr>
<th>Question</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Ignores employees' small mistakes and focus on more important matters.</td>
</tr>
<tr>
<td>02</td>
<td>Accepts criticism and always react to it well.</td>
</tr>
<tr>
<td>03</td>
<td>Is relaxed at work and keep calm when dealing with others.</td>
</tr>
<tr>
<td>04</td>
<td>Is extremely secure and confident in what he undertakes.</td>
</tr>
<tr>
<td>05</td>
<td>Keeps professional and personal relationship separate.</td>
</tr>
<tr>
<td>06</td>
<td>Gives credit to the team as a whole when high levels of productivity are achieved.</td>
</tr>
<tr>
<td>07</td>
<td>Is seen as a fair and just person who never takes sides.</td>
</tr>
<tr>
<td>08</td>
<td>Conveys feelings of security and tranquillity to his team.</td>
</tr>
<tr>
<td>09</td>
<td>Conveys a sense of friendliness and concern for the problems of others.</td>
</tr>
<tr>
<td>10</td>
<td>Treats people in inferior positions with respect when dealing with them.</td>
</tr>
<tr>
<td>11</td>
<td>Treats his subordinates in exactly the same way as his superiors.</td>
</tr>
<tr>
<td>12</td>
<td>Avoids making a point of being the boss, and treat others as equals.</td>
</tr>
<tr>
<td>13</td>
<td>Shows that he is an excellent communicator and can motivate his team.</td>
</tr>
<tr>
<td>14</td>
<td>Participates with vigour to help his team achieve a specific goal.</td>
</tr>
<tr>
<td>15</td>
<td>Feels that he is well-respected and held in good opinion by his team.</td>
</tr>
<tr>
<td>16</td>
<td>Shows impartiality in respect of colour, religion, nationality, or gender.</td>
</tr>
<tr>
<td>17</td>
<td>Accepts the opinions of others, even when they differ from his own.</td>
</tr>
<tr>
<td>18</td>
<td>Is just and impartial when awarding prizes and promotions.</td>
</tr>
<tr>
<td>19</td>
<td>Endeavour to help the group stick together during a crisis.</td>
</tr>
<tr>
<td>20</td>
<td>Chooses between speed and perfection, depending on the situation.</td>
</tr>
<tr>
<td>21</td>
<td>Involves himself in situations only when his intervention is required.</td>
</tr>
<tr>
<td>22</td>
<td>Demonstrates deep knowledge of his area of expertise.</td>
</tr>
<tr>
<td>23</td>
<td>Performs better than his staff if he has to replace someone temporarily.</td>
</tr>
<tr>
<td>24</td>
<td>Clearly distinguishes between what is urgent and what is important.</td>
</tr>
<tr>
<td>25</td>
<td>Concentrates less on small details and gives more time to important matters.</td>
</tr>
<tr>
<td>26</td>
<td>Shows that he is a creative person who is always change-orientated.</td>
</tr>
<tr>
<td>27</td>
<td>Promotes creativity and innovation so that people feel free to suggest ideas.</td>
</tr>
<tr>
<td>28</td>
<td>Chooses the right people as far as his team is concerned.</td>
</tr>
<tr>
<td>29</td>
<td>Makes excellent use of the financial resources at his disposal.</td>
</tr>
<tr>
<td>30</td>
<td>Makes sure that training and related matters is properly done.</td>
</tr>
<tr>
<td>31</td>
<td>Performs his tasks well and proves himself to be trustworthy.</td>
</tr>
<tr>
<td>32</td>
<td>Represents the company well, encouraging other people to trust it.</td>
</tr>
</tbody>
</table>

Table 38 Questionnaire – 360 degree leadership evaluation

A graphical representation of the collected data was also proposed.

Figure 40 Example of graphical representation of a 360 degree leadership evaluation
The Executive Manager then met the evaluated Senior Staff, and the results were discussed, as well as possible actions for improvement.

This first leadership evaluation was the occasion of an open discussion between the Executive Manager and the Senior Manager on their leadership qualities and was generally perceived as positive by the evaluated employees.

### 7.2.8. Employee satisfaction and Welfare

2002 was characterised by a desire of Management to improve employees’ satisfaction and welfare. The accent would be placed on improving the workers’ living conditions, as it was perceived as an area in which there was room for improvement.

#### 7.2.8.1. Salaries paid on time

The first step towards employee satisfaction was the payment of salary on regular dates, unrelated of the financial and cash flow situation of the company. Prior to 2002, in case of financial or cash flow crisis, the first decision of the management was to hold salary payments until the situation improved.

Unlike suppliers, employees could not threaten the management to withdraw their services, as strikes are illegal in the United Arab Emirates, and changing employer is either impossible or at best highly difficult. Therefore, delaying salary payment was a normal practice used by U.A.E. based companies in case of financial or cash flow crisis (by 2005, the UAE government will start reacting against such practices).

The management’s commitment not to delay salary payment was the recognition that maintaining employee satisfaction was a major concern.

#### 7.2.8.2. Appraisal and bonus sharing

The appraisal system detailed previously was used again in 2002, insuring that salary review was carried out for all company’s employees.

Traditionally the total bonus payment was a percentage on the financial benefits of the previous year, and as 2000 was a year of financial loss, no bonuses were attributed in 2001.

This was not the case for the financial results of 2001. The Management Committee (the shareholders and the Executive Manager) decided on the total bonus figure. The Executive
Manager then presented a possible distribution among employees, which was reviewed and validated by the committee.

7.2.8.3. Measuring Job Satisfaction

The first job satisfaction survey which was carried out in 2001 was limited to staff, at the exclusion of workers. For the first time in 2002, the job satisfaction survey would include workers.

The questionnaire was first translated in Arabic, Urdu and Hindi in order to improve its communication to workers. Questionnaires were then sent individually to all employees.

The results for staff and workers were then analysed by the researcher in the following way:

**AVERAGE EMPLOYEE SATISFACTION BY SENIORITY**

<table>
<thead>
<tr>
<th>Item</th>
<th>SENIOR STAFF</th>
<th>JUNIOR STAFF</th>
<th>WORKERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>For your skills and your work efforts, are you happy with your salary?</td>
<td>33.33</td>
<td>45.52</td>
<td>46.08</td>
</tr>
<tr>
<td>Do you feel that you are rewarded for your work and efforts?</td>
<td>39.58</td>
<td>52.73</td>
<td>66.60</td>
</tr>
<tr>
<td>Are you happy with your chance of progress in the future?</td>
<td>81.82</td>
<td>68.94</td>
<td>73.21</td>
</tr>
<tr>
<td>Are you happy with your supervisor?</td>
<td>79.17</td>
<td>72.35</td>
<td>73.87</td>
</tr>
<tr>
<td>Are you happy with your timing and number of hours?</td>
<td>72.73</td>
<td>73.51</td>
<td>75.94</td>
</tr>
<tr>
<td>Are you happy with your progress in Gulf Precast up to now?</td>
<td>77.08</td>
<td>75.00</td>
<td>59.59</td>
</tr>
<tr>
<td>Are you happy with the persons in your work-group?</td>
<td>77.08</td>
<td>75.38</td>
<td>78.35</td>
</tr>
<tr>
<td>Do you think Gulf Precast is happy with your work?</td>
<td>72.50</td>
<td>77.73</td>
<td>82.22</td>
</tr>
<tr>
<td>Are you happy with your job?</td>
<td>79.17</td>
<td>79.48</td>
<td>78.53</td>
</tr>
<tr>
<td>Is everyone in your work-group treated equally?</td>
<td>88.64</td>
<td>79.44</td>
<td>53.59</td>
</tr>
<tr>
<td>Are you happy with your productivity (efficiency)?</td>
<td>83.33</td>
<td>81.72</td>
<td>73.85</td>
</tr>
<tr>
<td>Are you satisfied with Gulf Precast?</td>
<td>85.42</td>
<td>83.21</td>
<td>82.71</td>
</tr>
<tr>
<td>Are your duties defined enough?</td>
<td>91.67</td>
<td>82.02</td>
<td>75.20</td>
</tr>
<tr>
<td>Are you proud to work for Gulf Precast?</td>
<td>91.67</td>
<td>90.63</td>
<td>84.52</td>
</tr>
<tr>
<td>Grand Total</td>
<td>75.15</td>
<td>74.01</td>
<td>71.73</td>
</tr>
</tbody>
</table>
The same analysis was carried out by department.

These analyses were demonstrating that employees in the company were generally satisfied with their job, with a satisfaction over 70% for the three employees’ categories (to be compared with an average satisfaction about living conditions in the camps below 30%).

However, employees had a salary satisfaction below 50%, and senior staff were unhappy with the recognition system. Workers did not feel that they were treated equally within their work-group and were unsatisfied with their progress in the organisation so far.

When asked how they got the most satisfaction from their job, by sorting in ascending order four statements, the following answers were collected.
How do GPCC Employees get the most satisfaction from their job? By seniority

<table>
<thead>
<tr>
<th>Statements</th>
<th>Senior</th>
<th>Junior</th>
<th>Workers</th>
<th>Senior</th>
<th>Junior</th>
<th>Workers</th>
<th>All Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement in your pay salary</td>
<td>21.00</td>
<td>130.00</td>
<td>623.00</td>
<td>33.33%</td>
<td>35.42%</td>
<td>36.54%</td>
<td>36.22%</td>
</tr>
<tr>
<td>Recognition - sense of good achievement</td>
<td>27.00</td>
<td>119.00</td>
<td>372.00</td>
<td>42.86%</td>
<td>32.43%</td>
<td>21.82%</td>
<td>24.28%</td>
</tr>
<tr>
<td>Allocation more responsibilities to you</td>
<td>9.00</td>
<td>75.00</td>
<td>401.00</td>
<td>14.29%</td>
<td>20.44%</td>
<td>23.52%</td>
<td>22.72%</td>
</tr>
<tr>
<td>Promotion to a higher job position</td>
<td>6.00</td>
<td>43.00</td>
<td>309.00</td>
<td>9.52%</td>
<td>11.72%</td>
<td>18.12%</td>
<td>16.77%</td>
</tr>
</tbody>
</table>

Table 39 Employee wishes that would lead to satisfaction increase

Raises in salaries would give most satisfaction increase, while promotion was the less attractive of the statements. Senior Staff rated recognition as the highest possible satisfaction element. The lower the seniority the lower the satisfaction derived by this element. Allocating more responsibility and promotion were rated higher an inverse proportion of seniority.

The Human Resources improvement actions of the company were, to a great extent, based on the results of this survey.

7.2.8.4. Measuring labour camps satisfaction

Measuring labour camp satisfaction was also selected by the company as an Action Plan presented to the Sheikh Khalifa Industry award assessors.

A questionnaire relative to the satisfaction regarding the living conditions in the labour camps was elaborated. The questionnaire was then distributed individually to all workers. The obtained results were the following:

<table>
<thead>
<tr>
<th>Facility</th>
<th>NG</th>
<th>AV</th>
<th>G</th>
<th>VG</th>
<th>Total</th>
<th>%Sat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>43</td>
<td>73</td>
<td>103</td>
<td>33</td>
<td>252</td>
<td>49.63</td>
</tr>
<tr>
<td>Leisure</td>
<td>166</td>
<td>37</td>
<td>26</td>
<td>10</td>
<td>239</td>
<td>16.47</td>
</tr>
<tr>
<td>Cleanliness</td>
<td>62</td>
<td>45</td>
<td>71</td>
<td>13</td>
<td>191</td>
<td>39.12</td>
</tr>
<tr>
<td>Toilets / Showers</td>
<td>113</td>
<td>31</td>
<td>85</td>
<td>14</td>
<td>243</td>
<td>33.06</td>
</tr>
<tr>
<td>Green Areas</td>
<td>169</td>
<td>27</td>
<td>21</td>
<td>8</td>
<td>225</td>
<td>13.68</td>
</tr>
<tr>
<td>Cloth Washing</td>
<td>172</td>
<td>19</td>
<td>32</td>
<td>5</td>
<td>228</td>
<td>14.21</td>
</tr>
<tr>
<td>Room Cleaning</td>
<td>40</td>
<td>42</td>
<td>128</td>
<td>35</td>
<td>245</td>
<td>54.42</td>
</tr>
<tr>
<td>Ventilation/ ac</td>
<td>31</td>
<td>73</td>
<td>125</td>
<td>16</td>
<td>245</td>
<td>50.04</td>
</tr>
<tr>
<td>Space in rooms</td>
<td>82</td>
<td>35</td>
<td>99</td>
<td>22</td>
<td>238</td>
<td>41.55</td>
</tr>
<tr>
<td>Storage/ Cupboards</td>
<td>149</td>
<td>28</td>
<td>42</td>
<td>16</td>
<td>235</td>
<td>22.54</td>
</tr>
<tr>
<td>Mess Cleanliness</td>
<td>123</td>
<td>9</td>
<td>13</td>
<td>6</td>
<td>151</td>
<td>11.62</td>
</tr>
<tr>
<td>Restaurant Facilities</td>
<td>131</td>
<td>8</td>
<td>3</td>
<td>4</td>
<td>146</td>
<td>5.90</td>
</tr>
<tr>
<td>Food Quality</td>
<td>130</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>146</td>
<td>6.81</td>
</tr>
<tr>
<td>Food Quantity</td>
<td>115</td>
<td>5</td>
<td>10</td>
<td>4</td>
<td>134</td>
<td>9.14</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1,526</td>
<td>438</td>
<td>764</td>
<td>190</td>
<td>2,918</td>
<td>28.75</td>
</tr>
</tbody>
</table>

NG: Not Good Percentage of Satisfaction : 0%
The obtained data were also analysed by camp (two camps in Mussafah and one in Dubai), which showed high differences of satisfaction depending on the camp of residence.

With a total average satisfaction of 28.75%, improving the living conditions in the camps was to be a major objective of the company and would be selected as a Human Resources objective for continual improvement.

7.2.8.5. Awards for Employees of the year

The success of the employee of the month scheme led the top management to set several yearly awards: Manager of the year, Project leader of the year, Foreman of the year and Staff of the year.

Those awards recognised the competence, and the improvement of award winners and the alignment of their personnel development with the strategy of the company.

7.2.8.6. Immediate recognition of exceptional work

The employee of the month and employee of the year schemes were retrospective recognition of employee performance.

However, the management wanted to encourage immediate recognition of exceptional work. Unlike the monthly or yearly awards for which the financial reward was set in advance, immediate recognition rewards may vary depending on the circumstances.

Example of immediate recognition: one month extra salary, an air-ticket, a computer etc.

In some cases the reward was agreed with the corresponding employee(s) beforehand. Example: Bonus for welders if they manage to complete a project on time while operating in a situation of human resources well below what was deemed ‘normal’; An air-ticket to the maintenance supervisor if a crane for which spare parts were no longer available on the market could be repaired, etc.
Every employee of the company was entitled to a health card, allowing him free medical consultations in the government clinics. However, some of the workers were not using such facilities for several reasons.

The government clinics were located far away from the camps. As workers do not own cars, they had to take a taxi to and from the clinic, except for emergency cases, and were paid for their days-work only if the doctor provided a sickness certificate. Thus indirect costs on medical consultation were often preventing workers to seek medical advice.

The workers had also a limited trust in doctors working in government clinics, and private medical services were too expensive for them.

Consequently, workers had a tendency not to seek medical attention, which was creating two main concerns for the management: An epidemic situation may develop in the camps. Employees tended to wait until their leave in their country of origin to seek medical advices, which could endanger their health in some cases.

In order to prevent such situations, it was decided to provide a medical clinic in the camps, with a doctor and nurse visiting twice a week, totally free of charge for the workers. These regular visits were also providing medical follow up services when required.

The labour camps being located far away from town and from any recreation activities, and as workers did not have the financial means to pay for transportation, most of the workers were spending their free time in the camps, even during week-ends. This lack of recreation activities was creating tensions between workers, in a situation were living conditions were poor.

The management decided to provide recreation trips every second week-end for the workers. The company buses were collecting workers from the camps at preset times, and bringing them to shopping malls, towns, parks or souks on rotational basis.

By the end of 2002, the second suggestion competition was launched with a revised scheme.
It was decided to create a committee in charge of the competition. Volunteers were requested among the Senior Staff. The committee comprised of senior staff from the support processes and the factory production process, as well as the Executive Manager.

It was decided to propose two categories: “Problem solving” and “Free entry”. The problem solving category was dealing with a list of currently unsolved issues. Heads of department were asked to suggest items to be placed in this category. The received proposals were then examined by the committee and the following questions were agreed upon:

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>PROBLEM SOLVING ISSUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>How to reduce cost of concrete repair.</td>
</tr>
<tr>
<td>2.</td>
<td>How to reduce waste in the binding wire used for fixing the steel.</td>
</tr>
<tr>
<td>3.</td>
<td>How to increase the number of employees who are regularly reading the display boards.</td>
</tr>
<tr>
<td>4.</td>
<td>How to encourage employees to give their ideas/suggestions to the Management.</td>
</tr>
<tr>
<td>5.</td>
<td>How to increase the understanding that employees must participate with ideas and</td>
</tr>
<tr>
<td></td>
<td>suggestions, that the management will take their ideas/suggestions into</td>
</tr>
<tr>
<td></td>
<td>consideration and recognised them for this participation.</td>
</tr>
<tr>
<td>6.</td>
<td>How to improve the communication ways so that the idea/suggestion of any</td>
</tr>
<tr>
<td></td>
<td>employee can reach the corresponding manager easily.</td>
</tr>
<tr>
<td>7.</td>
<td>How to measure our involvement and influence in the Society.</td>
</tr>
<tr>
<td>8.</td>
<td>What would be the best location for the new laboratory.</td>
</tr>
<tr>
<td>9.</td>
<td>How to improve Aggregate Storage</td>
</tr>
<tr>
<td>10.</td>
<td>How to improve curing</td>
</tr>
<tr>
<td>11.</td>
<td>How to improve product storage &amp; its effects on quality</td>
</tr>
<tr>
<td>12.</td>
<td>Investigating &amp; developing better technologies for connections.</td>
</tr>
<tr>
<td>13.</td>
<td>How to reduce the cost of drawing plotting and photocopying in the Design Department</td>
</tr>
<tr>
<td>14.</td>
<td>How to encourage staff to clean and tidy their desks at the end of the day.</td>
</tr>
<tr>
<td>15.</td>
<td>How to encourage employees to rejoin work on time once their vacation is over.</td>
</tr>
<tr>
<td>16.</td>
<td>How to decrease the water/electricity consumption in the Factory/Camps.</td>
</tr>
<tr>
<td>17.</td>
<td>How to improve the coordination between the Quality Inspection &amp; the Production Foremen.</td>
</tr>
<tr>
<td>18.</td>
<td>How to improve the quality of the Precast tables in order for them to last longer, even</td>
</tr>
<tr>
<td></td>
<td>when used frequently.</td>
</tr>
<tr>
<td>19.</td>
<td>How to speed up the mould manufacturing process.</td>
</tr>
<tr>
<td>20.</td>
<td>How to distinguish between hard working employees and lazy ones, and what sanctions</td>
</tr>
<tr>
<td></td>
<td>should be taken against the lazy employees.</td>
</tr>
</tbody>
</table>

Table 41 Items placed in the “Problem solving” category of the 2002 Suggestion Competition

One of the difficulties faced by the 2000 Suggestion Competition was that employees were insufficiently aware of the competition. It was therefore decided to improve on this issue.
Posters were placed on the display boards. Door boards were fixed on the doors of each room in the labour camps, and posters were also displayed on them in order to increase the awareness.

In addition to this increased written communication, it was decided to rely heavily on verbal communication. A team of employees having both communication skills in English and in one of the main languages spoken by the workforce were trained by the personnel department on the suggestion scheme. Then, the teams toured the camps, organising explanation meetings during which the competition was promoted. Similar meetings were organised (in English only) in the Head Office.

Employees were instructed to post their answers in the suggestion boxes which were painted in red for this occasion.

264 suggestions were collected in the “Problem solving” category, and 129 in the “Free entry” one.

Translating, typing and sorting those suggestions took time, and the study process started in 2003.

7.2.8.10. Safety Training for site management

If in 2001, the safety training was mostly directed towards safety awareness among the workforce. In 2002, safety training was directed towards site project managers, who were sent on external training in a “Health & Safety in the Construction Industry” course, during which the specificity of health and safety on construction sites were reviewed.

This decision was made in reaction to the safety statistics showing that if safety procedures in the factory were established and followed, sites were often not successful in maintaining a safe working environment. Safety was often thought as antagonist to productivity by the site management.

7.2.8.11. Hiring policy giving priority to Employees’ family

The company has, for several years, giving preference, when hiring employees, to the family members of the company’s employees. However this was not stated as a policy by the company. In 2002, the top management decided to officially recognise this policy.
The objective was to make a long-term commitment to the company’s employees. This initiative would have several additional benefits. It would increase the integration of the employees, and the image of the company’s management as a “caring” management.

In many cases, company workers had made the decision to work in the United Arab Emirates in difficult conditions in order to provide a higher education to their family in their country of origin. Acting upon the knowledge that their children will have preferential employment opportunities in the company, they would direct their choice of curriculum towards careers within demand in the company.

Thus, this explicit policy reinforced the synergy between the company and its employees.

**7.2.8.12. Procedure set in place for solidarity among employees**

Before 2002, if an employee was facing a family crisis which required a financial investment that was not possible for him, a colleague or a hierarchical superior of the employee may have taken the decision to organise a fund raising collection. However, this initiative was done on an individual basis and did not receive the validation of the management.

In 2002, the daughter of an employee had a car accident in his country of origin. The child’s leg was severely crushed and the 11 year old would have to have an amputation unless she was sent to a specialist hospital of a neighbouring country, which was optimistic of saving her leg.

A collection was organised and the child operated on successfully.

This incident attracted the management attention to the necessity of setting up a procedure for solidarity among employees. The following mechanism was set into place.

If an employee is facing an emergency situation to which he cannot respond financially, his Head of Department may be contacted by anyone aware of the circumstances. The Head of Department conducts an investigation to make sure that the case is genuine. If confirmed he contacts the Executive Manager and requests his approval. Once the case officially recognised as a “solidarity among employees” case, a collection form is circulated among all employees, on which the amount to be donated is individually recorded and signed. The financial department provides the totality of the collected...
amount, and the agreed donations are deducted from the next salary of the donating employees, thus avoiding any physical circulation of cash.

This procedure was used twice in the twelve months following the initial case that triggered its adoption.

**7.2.9. Improved communication**

7.2.9.1. Door boards in the camps

Door boards in the camps were originally installed to improve the communication on the suggestion competition scheme. From then onwards, they were used regularly by the management to communicate its policy to the workers.

It proved to be a more effective communication tool than the general boards.

7.2.9.2. Open Door

The company traditionally had ‘open door’ policy for its workforce, to encourage the employees to communicate their complaints and suggestions.

In practice, when an employee asked for a meeting with his head of department, the personnel officer or the Executive manager, he had a high probability of having his request met within half an hour of his demand, provided the employee he wanted to meet was available.

For scheduled meetings, employee request demands were examined on a priority basis.

It was however decided to adopt a written policy for cases where an employee requests a meeting, in order to clearly establish employee rights.

An employee requesting a meeting with his Head of Department or with the Personnel Officer must be granted the interview within one week of his request. A request to meet the Executive Manager must either be granted within a week, or subject to a pre-meeting with the Personnel Officer within three days of the demand, who will advise the Executive Manager on his recommendation of whether or not to grant the meeting. Upon a positive recommendation, the Executive Manager had to fix the meeting within one week of the original request.
Although this procedure was seldom used, as employees were general granted meetings on a priority basis, setting it in writing confirmed the management obligations towards communication with the workforce.

### 7.2.9.3. Inter-departmental Communication

During 2002, the communication between the different departments improved greatly, because of the refusal of the top management to serve as intermediary in cases of disagreements between heads of departments, and of on-going reminders that direct communication was of prime importance. This finally broke through the culture of department isolation and top management arbitration in any inter-departmental issues.

Planned inter-departmental meetings helped ease the communication problem. However, the effective breakthrough occurred when heads of departments no longer waited for scheduled meetings to discuss an issue, and resorted to top management arbitration only after the issue had been examined at length between them, and no satisfactory solution was found.

### 7.2.10. Improved relations with Suppliers

The key element of improved relations with Suppliers was a better respect by the company of the agreed payment terms. This improvement was gradual, and was rendered possible by the amelioration in the company’s financial and cash flow situation.

As a first step towards improved relationship with Suppliers, the company implemented a policy of information and negotiation with its Suppliers whenever it was foreseen that the originally agreed payment terms may not be met. Instead of ignoring the issue altogether, meetings were organised and agreements on scheduled instalments were drawn.

As the financial and cash flow situation improved, the need for such agreements decreased and the company was able to improve on compliance with the original payment terms.

As the reputation of the company as a reliable client improved, some of its suppliers were ready to renegotiate their payment terms. During and following the financial crisis of 2000, the company had to diversify its supply sources in order to avoid a possible disruption in the production resulting from the decision by main suppliers to discontinue deliveries. As the situation improved, supply sources were redirected towards preferred suppliers, with renegotiated payment conditions.
The company also tried to establish cooperative relationships with its main suppliers through increased personal relations with the management, and through training provided by the suppliers on their newly introduced products.

### 7.2.11. Involvement in Community

#### 7.2.11.1. Student Summer Training

The company decided to increase its involvement in the community. A proposal to receive students in summer training was sent to all major universities in the U.A.E.

Several objectives were pursued through this training proposal:

- Gain in-depth knowledge about young would-be engineers, who may be interested in finding employment in the company after their graduation.
- The young engineers may find employment, once graduated, among clients or potential clients of the company, which could foster client company relations.
- Increase the appreciation of Precast Construction as a valuable alternative to traditional construction among would-be construction engineers.
- Improve the image of the company as caring about the community in which it is established.
- Obtain recognition by achieving higher grades in the business environment category of the Sheikh Khalifa Industry Award.

During the summer 2002, six students from three different universities were received.

On a weekly basis, all students were meeting the researcher who was responsible for the training organisation, and the suggestions and complaints were examined. The students were also given lectures and training on a wide range of subjects.

Once the training in one department was completed, the students were asked to grade the training received, and the department to grade the trainees using evaluation sheets prepared by the researcher.
7.2.11.2. Cooperation with United Nation training institutes

The labour law of the United Arab Emirates imposes a quota of Arabs in all group visas for new employee recruitment. As the company wanted to hire newly graduated engineers, the company looked for the best way to satisfy those two requirements.

The United Nation had set up a civil engineering school in Lebanon, for children from the Palestinian refugee camps. Palestinians from the refugee camps are not allowed to work in Lebanon. Therefore, it was of major importance for the school to find work employment for their graduated students outside Lebanon. Very few countries offer residence visas to Palestinian refugees. The United Arab Emirates does provide this opportunity on condition that they have a work contract offer.

The management of the company visited the school, and a synergic agreement was decided upon. The company would yearly hire graduated students from the school, which would include in its curriculum courses on Precast Concrete Production techniques.

It has to be noted that the company was highly satisfied by the agreement. The young engineers were often ambitious and eager to make the most out of the opportunity offered to them. They often started a successful and fast promoting career showing initiative and dedication.

7.2.11.3. Employee involvement in cause-related initiatives

In order to increase the cohesion in the company, the management proposed a joint participation between the company and the employees in humanitarian cause-related initiatives. One cause per year was selected from 2002 onwards. These actions were directed towards help for countries suffering from war or natural disasters.

The Top Management proposes one annual cause, and asks employees if they wish to participate. If such is the case, the employee signs the collection form and selects the amount of his participation, which will be deducted from his next salary.

The first initiative of this kind was a fund collection for Humanitarian aid to the Palestinian people affected by the war. This subject had a strong appeal to the employees, because of the high number of staff of Palestinian origin. It may be noted that the participation was not limited to those employees, but that the initiative was supported by the majority of employees, as shown in the table below:
Daniele Seraphim - Ph.D.

<table>
<thead>
<tr>
<th>Employee category</th>
<th>Percentage of participation</th>
<th>Average amount per participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Staff</td>
<td>100%</td>
<td>233 Dhs</td>
</tr>
<tr>
<td>Staff</td>
<td>81.25%</td>
<td>80 Dhs</td>
</tr>
<tr>
<td>Workers</td>
<td>76.51%</td>
<td>19 Dhs</td>
</tr>
</tbody>
</table>

*Table 42 Example of employee participation in a cause-related initiative*

The company rounded up the 17,135 Dhs collected from the employees, and a total of 25,000 Dhs was raised.

The high level of participation among employees encouraged the Management to propose such humanitarian cause-related initiatives on a regular basis.

7.2.11.4. *Initiate Research and Development in partnership with the University*

As it was not financially viable for the company to hire employees specialised in Research and Development, it sought to develop a partnership with a Research Institute. The United Arab Emirates University was interested in such a partnership.

Three areas of Research and Development were proposed by the Company:

- Setting a standard for testing and verifying the concrete strength of Prestressed and Hollowcore slabs.

This issue is highly sensitive for the company. The recognised standard in the U.A.E. for testing the strength of concrete is defined by the British Standards. Concrete cubes are cast, stored in water and their strength is calculated by crushing. However, the strength of a Prestressed slab depends not only on the Mix Design of the concrete, but also on the stressing strands used. A cube test does not contain any prestressing, and therefore the strength indicated during its crushing is not a direct indication of the strength of the Prestressed element.

The company could not gain any benefit by carrying out an internal research and development programme on this issue, as the results of such study would not be recognised. However, a study by an independent and recognised party such as the United Arab Emirates University, would be credible, and may influence the Standards of verification and testing in the U.A.E.
Improving the quality & cost effectiveness in concrete mix design used in present work.

The United Arab Emirates University has a state of the art laboratory as well as qualified staff, and students willing to test alternative mix designs. A partnership with the University on this issue would be mutually beneficial.

Study the feasibility of using alternative additives in the concrete mix designs to achieve the best economical solution in obtaining higher early strength of concrete.

The aim of this study is to obtain the required concrete strength as soon as possible, in order to decrease the production time. As in the second subject, the University set up and its Human Resources would be assets for such studies.

Faculty members visited the Company grounds several times, and had several meetings with the Senior Management, in order to establish the basis of the Research and Development partnership.

7.2.12. Customer Satisfactions

7.2.12.1. NCR statistics

The characteristics of the non-conformances were fed into a Database, and analyses were made by the researcher using those data, in order to highlight possible negative trends. The study of the non-conformance statistics was made an agenda item for consideration during management review meetings.

At first, the cost of non-conformances was not considered, as it was deemed difficult to evaluate. Therefore, the analyses were based on number of non-conformances. The first analyses were provided by Department responsible and by Product as shown below. Later on, analyses by type of non-conformance (non-conformances in the Quality System / non-conformances in the Products), by consequences (possible product repair / scrap of non-confirming products) and by process (such as Design, Mould fabrication, Casting, Demoulding etc) provided increased knowledge.
Non-conformances from December 2001 to August 2002

<table>
<thead>
<tr>
<th>Responsible</th>
<th>2001</th>
<th></th>
<th>2002</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory</td>
<td>18</td>
<td>10</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Factory and Q.C.</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Design</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Site</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Supplier</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Subcontractor</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Unclear</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Contractor</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>QC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Transport and Site</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Dubai Site</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Client</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Planning &amp; Factory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Grand Total</td>
<td>27</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>15</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 43 Number of non-conformances by responsibility, from December 2001 to August 2002

<table>
<thead>
<tr>
<th>Product</th>
<th>2001</th>
<th></th>
<th>2002</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precast</td>
<td>14</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Hollowcore</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Prestressed</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>QA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Table</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>GRC</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Subcontractor Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Mould</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Bed</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Grand Total</td>
<td>27</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>15</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 44 Number of non-conformances by product, from December 2001 to August 2002

One of the responsibilities of the management representative for Quality was to identify negative trends. As recorded in the ISO procedure, she had the right to call a meeting to examine root causes and seek possible remedial actions. An employee invited to such a meeting could not decline this invitation, and the presence of the Executive Manager was mandatory.

Whenever possible, problems were satisfactorily solved without the need of such meetings. However, on two occasions in 2002, the meeting option was used: Once to examine defects in the Support System of the Tables, and once to discuss storage problems in the Factory.

Although such statistical analyses proved effective, they were limited by the lack of evaluation of non-conformance costs. The relative importance of the different non-
conformances was not taken into consideration. Estimating the cost of a non-conformance could also be a first step towards estimating the cost of Quality in the company. This improvement was introduced in June 2003.

7.2.12.2. Customer Satisfaction Survey

In 2002, the researcher proposed to the Management the introduction of a Customer Satisfaction Survey. Several objectives were behind this decision.

- The company wished to be ISO 9001:2000 certified, and determination of customer requirements, as well as customer feedback are important elements of this new standard.

- Although the company estimated that it had a good perception of the satisfaction and the requirements of its Abu Dhabi clients, this was not the case in Dubai. The production in the Dubai factory was scheduled to start in January 2003, and it was important to set in place a measuring tool that would allow the company to comprehend both critical factors for its customers, and their perception of Gulf Precast performance in this regard.

- Obtaining benchmarking information about competitor performance is not an easy task in the United Arab Emirates. Companies are very protective of their data, and secrecy is well established. It was thought that the Customer Satisfaction Survey could be a means to collect benchmarking data about competitors through the customers.

An extensive research was conducted by the researcher using the Internet, in order to collect specimens of Customer Satisfaction Surveys. They were then evaluated according to the above-mentioned objective.

One of the Customer Satisfaction Survey forms examined was thought to respond to the set criteria. It contained ratings of importance of services and processes, as well as the scoring of the company and its main competitor (according to the client) on these elements. Thus, clients’ needs, company performance as well as a benchmark with its competitors were available, meeting the set objectives. It also contained scorings on problem solving and problem prevention, which was not among the original objectives but was thought to be an
interesting concept. Several open questions allowed the customer to provide additional comments.

The selected questionnaire was reviewed by the researcher and the Top Management. The list of services and processes was modified to suit the company. Benchmarking against named competitors was added, as well as reasons pertaining to the choice of a Precast Supplier.

The revised questionnaire was circulated among the Senior Staff for review and comments.

The following Customer Satisfaction Survey was validated:

Gulf Precast Concrete Company L.L.C.
Customer satisfaction Survey

Please take a few moments to participate in this very important study. Your input will help Gulf Precast evaluate and improve the quality of service you receive. Your answers will remain confidential, and will not be used in any claim or in any dispute.

A - General Information / demographics

1. How many years have you been doing business with Gulf Precast? (Choose only one)
   - Less than 1 year
   - 1-3 years
   - 4-7 years
   - 8-15 years
   - 16+ years

2. Which of the following best describes your business? (Choose only one)
   - Main Contractor
   - Consultant/Architect
   - Private Owner
   - Public Owner

3. How many employees are working for your firm?
   - 1-10
   - 11-50
   - 51-200
   - 201-500
   - 501+

B - Sales / Delivery / Quality Issues

Listed below are a number of services and characteristics pertaining to Precast Concrete Suppliers. Please indicate by writing in a number, 1 to 5, the overall importance to you of each item and how satisfied you are with Gulf Precast and with your main Precast Concrete Suppliers (other than Gulf Precast).

Write 1, 2, 3, 4, or 5 in each box. Very Low 1 2 3 4 5 Very High

If you are not familiar with an item, please skip it.

<table>
<thead>
<tr>
<th></th>
<th>HOW IMPORTANT IS THIS FOR YOU?</th>
<th>SATISFACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courtesy of the Commercial Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionalism and efficiency of Commercials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response to requests for quotations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prompt resolution of problems</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GULF PRECAST

Other Main Supplier

Page 232 of 618
<table>
<thead>
<tr>
<th>Response to special product request</th>
<th>Quality of literature</th>
<th>Response to rush orders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DESIGN</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courtesy of Design Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionalism and efficiency of Design Team</td>
<td>Accuracy of drawings / calculations</td>
<td>Response to request for design modifications</td>
</tr>
<tr>
<td><strong>FACTORY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courtesy of Factory Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionalism and efficiency of Factory Team</td>
<td>Speed and quality of Manufacturing</td>
<td>Appearance of Premises</td>
</tr>
<tr>
<td>Appearance of Premises</td>
<td>Appearance of equipment</td>
<td></td>
</tr>
<tr>
<td><strong>SITE CONSTRUCTION / DELIVERY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courtesy of Site Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionalism and efficiency of Site Team</td>
<td>Deliveries arrive on schedule</td>
<td>Speed and quality of erection work</td>
</tr>
<tr>
<td>Deliveries arrive on schedule</td>
<td>Speed and quality of erection work</td>
<td>Project completed within schedule</td>
</tr>
<tr>
<td><strong>QUALITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product appearance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product manufactured to specifications</td>
<td>Consistency of Quality</td>
<td></td>
</tr>
<tr>
<td><strong>GENERAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product price for the value received</td>
<td>Invoice accuracy</td>
<td>Range of products offered</td>
</tr>
<tr>
<td>Responsiveness to suggestions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### C - Miscellaneous

1. Have you contacted Gulf Precast with a problem/complaint within the last year?  
   - Yes  
   - No (If "No", skip to question 3)

2. Please respond "Yes" or "No" to all questions in the first column, then answer the second column if a problem existed in that area.

<table>
<thead>
<tr>
<th>Was there a problem in the area of sales/estimating?</th>
<th>Answer each item in this column</th>
<th>If there was a problem, was it handled to your satisfaction?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was there a problem in the area of design/drawings?</td>
<td>Yes  No</td>
<td>Yes  No</td>
</tr>
<tr>
<td>Was there a problem in the manufacturing?</td>
<td>Yes  No</td>
<td>Yes  No</td>
</tr>
<tr>
<td>Was there a problem in the delivery?</td>
<td>Yes  No</td>
<td>Yes  No</td>
</tr>
<tr>
<td>Was there a problem in the area of site erection?</td>
<td>Yes  No</td>
<td>Yes  No</td>
</tr>
<tr>
<td>Was there a problem in the area of quality?</td>
<td>Yes  No</td>
<td>Yes  No</td>
</tr>
<tr>
<td>Was there a problem in the area of order invoicing?</td>
<td>Yes  No</td>
<td>Yes  No</td>
</tr>
<tr>
<td>Was there a problem with the project completion schedule?</td>
<td>Yes  No</td>
<td>Yes  No</td>
</tr>
</tbody>
</table>

3. While deciding on a Precast Supplier, how do you rate the importance of the following elements?  
   - Not Important  
   - Important  
   - Crucial
<table>
<thead>
<tr>
<th>Supplier</th>
<th>Do not use</th>
<th>Very Dissatisfied</th>
<th>Satisfactory</th>
<th>Very Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulf Precast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Al Mureikhi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Al Otaiba and Garg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Square</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Precast Concrete</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emirates Precast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jumal Majid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibrex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Is Gulf Precast your “preferred” precast concrete supplier? (i.e., the one you would turn to first for assistance with a general precast need?) (Choose only one)
   - [ ] Depends on product/need
   - [ ] Yes
   - [ ] No

3. How did you first learn about Gulf Precast? (Choose only one)
   - [ ] Word of mouth
   - [ ] Company rep. called on us
   - [ ] Advertising
   - [ ] Gulf Precast was specified
   - [ ] Other ________________________

4. Would you purchase from Gulf Precast again if you needed their product(s)?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

5. Would you recommend Gulf Precast to someone who needs a precast concrete product?
   - [ ] Yes
   - [ ] No
   - [ ] Maybe

6. What is the primary reason you do business with Gulf Precast?

7. What is one thing Gulf Precast can do to improve itself?

8. Do you have any additional comments regarding Gulf Precast or your needs that you wish to share?
   (Please write them in the box below or attach additional sheets if necessary.)

9. Would you like to meet a representative of Gulf Precast in order to discuss further your evaluation?
   - [ ] Yes
   - [ ] No

Your Company (optional) ________________________
Your Name (optional) ________________________
Your position (optional) ________________________

Thank you very much for your participation in this Survey. We appreciate the time you took in order to help us evaluate and improve our Products and Services.
The Customer Satisfaction Survey was distributed for the first time in January 2003, and the first analyses were available in June 2003.

7.2.12.3. Hollowcore Quality Improvement

From the NCR statistics, it appeared that most of the non-conformances were related to the Hollowcore production. As Hollowcore slabs were a newly introduced product, this may have indicated that the company was lacking expert knowledge on this product.

The demand for Hollowcore products was increasing in the Emirates, and the actual total production facilities in the country were well below this demand. In order to take advantage of this market opportunity, the Company wished to increase its production capacity. Before doing so, it seemed important to increase both process capabilities and the expertise level within the Company. The aim of the processes’ review was to improve the Quality of the Hollowcore production, to reduce production costs and, through benchmarking with world-wide best-in-class production techniques, gain confidence in the company’s production abilities.

It was decided to contact the Hollowcore machinery supplier from Finland, and to ask their advice. This supplier does not only sell Hollowcore machinery world-wide, but has provided regular consulting services to companies wishing to set up Hollowcore production lines. Thus, their knowledge is extensive, and they are used to taking into consideration regional factors.

During the first meeting in the Emirates on this subject, the supplier visited the Mussafah factory, and estimated that there was room for improvement.

The supplier proposed a complete review of Hollowcore production related processes, from Design to Transport, including Machinery maintenance and backed up by related technical training.

Three experts collaborated with the company’s employees on this study, from the second half of 2002 to the first months of 2003. They stayed for a total of 171 days, providing an estimated 2,736 training hours. This training was imparted to the Senior Managers involved in the Hollowcore production process (such as Chief Designers, Factory Managers, Quality Control Manager, Projects Manager etc), to the foremen and to the workers themselves. The following processes were reviewed and improved:
- Design of Hollowcore slabs
- Bed preparation before casting
- Mix Design of the concrete
- Casting process
- Storage and Hollowcore product handling
- Maintenance and adjustment of Hollowcore machinery

Following this processes’ review, the company improved its ability to produce a quality product, and proceeded with its plan of increased production as shown below.

![Figure 42 Hollowcore production in volume from 2002 to 2003](image)

The number of Hollowcore non-conformances per 10,000 M3 of Hollowcore produced, reduced significantly, proving the effectiveness of the approach.

![Figure 43 Number of non-conformances per volume produced, from 2002 to 2003](image)
A number of disagreements with clients of the company were the result of unclear contractual agreements. These conflicts with the clients were seriously affecting customer satisfaction, and may have been avoided entirely by a precise responsibility definition at the contracts’ stage. As they were generally uncovered during final payments, it left the client with a negative perception of the company, even when the product supplied was to its satisfaction.

As the company mainly acts as a Precast subcontractor, contracts may either be written by the client or by the company itself, usually depending on the clients’ wish. Clients such as government bodies or major main contractors are unwilling to leave contract drafting to their subcontractors. Other main contractors, however, agree to do so.

It was decided that the first aim in improving contractual specifications should be to improve the company’s own contract drafts. It was decided to prepare a number of typical contracts, in which responsibilities would be clearly defined, and to ask a lawyer having expertise in construction contracts to review them. As every contract is slightly different, and as the client may request amendments to the proposed contract, these typical contracts would often need to be slightly altered to suit a particular case. However, their utilisation as a basis for any new contract would limit of ambiguity areas.

It was also agreed that in the event of a conflict arising on one of the contracts drafted by the company, the Contracts Manager would examine the possibility of avoiding such conflict, seeking the advice of an expert lawyer if required, and modify the typical contracts if necessary, in order to increase their clarity.

Whenever possible, the company would insist for the draft of the contract to be proposed by the company and reviewed by the Client. When such an option was not possible, it was agreed that the review of the contract proposal submitted by the client would be done in two stages.

- Review of the clauses of the proposed contract, and highlighting of possible causes for dispute.

- From each of the clauses of the company’s typical contract (selected as the most appropriate for that type of project), find the corresponding clause(s) in
the contract proposed by the client, and compare them. In the event of such a clause not being available in the client’s proposal, suggest its addition.

Finally, it was agreed that when a possible cause of conflict is detected, its resolution should not be left to the final payment stage, but should be resolved with the client during the month of it being uncovered.

This policy proved effective, both in reducing the number of conflicts with the clients, and in minimising their adverse effects on the clients’ perceived level of satisfaction regarding the performance of the company.

7.2.13. From Quality Control to Prevention

From 2001 onwards, the company had set in place a comprehensive, independent Quality Control Department, verifying the product conformance throughout the entire factory production process.

In 2002, the Quality Control responsibility was extended beyond Factory production.

At the contract signature stage, if any possible quality issue was detected, Quality Control was involved in the contract review from a Quality point of view. Its recommendations were forwarded to the contracts team, and were reviewed by the Top Management before signing the contract.

Until 2002, the responsibility of the Quality Control Department covered production to Final Inspection performed while loading the concrete panels on the trailers. It was deemed that if the Quality of the panels was satisfactory while leaving the factory, there was a high probability of it being satisfactory at the erection stage. The experience, however, showed that several types of non-conformances could be either created or detected after the panels left the factory ground.

Among the non-conformances occurring after the panels left the factory ground, the followings may be noted: Panel damaged during transport, Panel damaged during unloading at site, Panel damaged during site storage, Panel wrongly placed during site erection (incorrect panel alignment for example).

As examples of non-conformances detected during erection, the following may be quoted: variation in the deflection of Hollowcore slabs, which does not affect the Quality of the
slabs themselves, but is noticeable while joining them together; Lack of homogeneity of panel colour, noticeable while joining them together at site etc.

In Precast Concrete production, the erection phase is often very short, and is performed by a small team, and a high number of sites are active on a given date. For the above reason, it was not financially viable to assign a Quality Control inspector to each site, so it was decided that any non-conformance detected at site would be investigated by the Quality Control team, which stayed based in the factories. Regular visits of main sites were also performed by Quality Inspectors.

Apart from extending the Quality Control responsibility before and after the Factory production stage, the effectiveness of the reporting system of non-conformances was improved. One of the main responsibilities of the Quality Control Department was to investigate non-conformances, finding root causes and initiating actions to prevent recurrence. Verifying that the set actions are implemented became an important mechanism for prevention of non-conformances.

Over the years, the Quality Control team become more and more involved in Quality improvement studies. For example, they performed tests on possible mix design improvements, they were actively involved with the Hollowcore improvement study performed in partnership with one of our supplies, they became one of the driving forces for the introduction of Statistical Process Control etc.

7.3. Analysis of findings

7.3.1. The internal perspective

7.3.1.1. Customer Results

7.3.1.1.1. Increased Market Share

The year 2002 was characterised by a significant increase of the market share of the company, both in the Abu Dhabi market and the UAE market, as shown by the following figures.

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market share in Abu Dhabi Emirate</td>
<td>21%</td>
<td>12%</td>
<td>36%</td>
</tr>
<tr>
<td>Market share in the UAE</td>
<td>12%</td>
<td>10%</td>
<td>19%</td>
</tr>
</tbody>
</table>

Table 45 “Market share” indicator from 2000 to 2002
It doubled its market penetration, reflecting the increased willingness of Precast customers to deal with the company.

The market share for 2002 overcame its 2000 level, recovering from the voluntary contraction of the company in 2001, while it sought to regain its profitability level.

7.3.1.1.2. Increased Customer Loyalty

Customer Loyalty in 2002 reached a record 65.38%.

![Figure 44 “Customer loyalty” indicator from 1999 to 2002](image)

Figure 44 “Customer loyalty” indicator from 1999 to 2002

It might be noted that such result were in part achieved because of the low “New Customer Attraction” level in 2002 (24.36% against 27.03 in 2001). The low level of New Customer Attraction was due to the low penetration of the Dubai market, as the Dubai factory was not yet ready for production, and as the Dubai Government regulations were restricting the company in its attempts to sell its products in Dubai.

From 2003 onwards, as the penetration of Dubai market gained in effectiveness, the increase in “New Customer Attraction” level would prevent the company from maintaining such high score on percentage of Customer Loyalty.

However, the 65.38% of customer loyalty obtained in 2002 clearly reflected the willingness of the company clients to work on a regular basis with the company.
7.3.1.3. Increased Success rate when quoting

Another internal measure confirming the company’s perception of a good and improving customer satisfaction level is the ratio of orders to enquiries, as indicated in the table below.

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of orders to enquiries</td>
<td>12.24%</td>
<td>11.02%</td>
<td>10.96%</td>
<td>17.78%</td>
</tr>
</tbody>
</table>

Table 46 “Success rate when quoting” indicator from 1999 to 2002

The 2002 figures reflect a significant increase in the success of the commercial team. For this indicator also, the increased penetration of the Dubai market in the following year will have an adverse effect on this ratio.

7.3.1.4. Increased expenditure in Quality Control, Assurance and TQM

The satisfaction of the client may also be thought as having a strong link with the company’s efforts to propose quality products and services to its clients.

In order to measure this effort, the evolution of Human Resources costs entirely dedicated to Quality Control, Quality Assurance and Total Quality Management, was selected by the company. Although all employees of the company spend time in QC, QA and QTM activities, it is difficult to evaluate with a confident level of accuracy, the related proportion. The company estimated that although an indicator reflecting Human Resource costs dedicated to QC, QA and TQM was not an ideal indicator of the real effort of the company for those activities, its trend over time would be a useful trend indicator.

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC, QA and TQM cost of dedicated Human Resources</td>
<td>210,644</td>
<td>303,623</td>
<td>488,299</td>
</tr>
</tbody>
</table>

Table 47 “Expenditure in Quality Control, Assurance and TQM” indicator from 2000 to 2002

The 61% increase between the cost of dedicated Quality employees in 2001 and its cost in 2002, clearly reflects the willingness of the company to improve its products and processes in order to improve the satisfaction of its clients.
7.3.1.2. Business Environment results

7.3.1.2.1. Improved safety

Although the production increased by more than 11% in 2002, the number of accidents noticeably reduced, as shown in the following table.

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of accidents</td>
<td>45</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>Accidents / 10,000 M3 produced</td>
<td>22.80</td>
<td>7.99</td>
<td>5.22</td>
</tr>
</tbody>
</table>

Table 48 “Safety level” indicators from 2000 to 2002

This result was mainly due to regular improvements in, and reviews of, the Safety System, started in 2001, and the increased empowerment of safety employees.

If the number of accidents decreased, their frequency was also favourably affected by the increase of the safety level in the company.
The main negative impact of the company’s production on the environment is related to the concrete wasted during the production process. In order to measure this impact, the company uses the cost of Rubbish Removal per M3 produced. As indicated below, the negative impact of the company production upon the environment was controlled and reduced.

![Cost of Rubbish Removal per M3]

**Figure 47 Cost of Rubbish Removal per volume produced, from 1999 to 2002**

This favourable trend was achieved through three main enablers:

- The quality of the products improved greatly during this period, resulting in a lower number of rejected panels, and among those initially rejected, a lower percentage of panels were beyond repair.

- An early detection of non-conformance during the production process, and thus a decrease of non-conforming final products.

- A policy of utilisation of scrapped panels as a flooring sub-base for the factory. Only rectangular shaped panels could be recycled using this technique.

**7.3.1.2.3 Increased Investment in state of the art facilities**

The introduction and utilisation of state-of-the-art facilities in the company has a major influence on the reputation of the company as a leader in precast manufacturing in the United Arab Emirates. Other Precast manufacturers will be influenced by the investment policy of the company, which in turn will influence the technological developments of its
It may be noted that investment in state-of-the-art facilities must be studied for effectiveness in the UAE context before a final decision is reached. In several cases, such studies revealed that a state-of-the-art investment, which was economically sound for European manufacturers, would result in a poor or negative return on investment in the United Arab Emirates. Such factors as the cost of manpower, the level of expertise of the workforce and the availability of technical assistance must be taken into consideration prior to the investment decision.

In 2002, the area available for production was limited to the Mussafah factory. In order to increase the production, it was necessary to develop the Hollowcore production, which is less labour-intensive than the Precast production, but requires state-of-the-art machinery from Europe or from the USA. Hollowcore production has the further advantage of requiring less production area, per M3 produced.

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investments in state-of-the-art facilities</td>
<td>188,828</td>
<td>1,805,635</td>
<td>1,093,261</td>
<td>2,228,000</td>
</tr>
</tbody>
</table>

Table 49 “Investments in state-of-the-art facilities” indicator, from 1999 to 2002

In 2002 the company was also preparing for the investments related to the Dubai and Shahama factory that would be operational in 2003. Feasibility studies related to the investments required for the Dubai and Shahama factory, took place mainly in 2002. 2002 was marked by an increase of 104% of the investments in state-of-the-art facilities, which will be confirmed and amplified in 2003.

7.3.1.2.4. *Increased donation to humanitarian causes*

The amount donated by the company in 2002, was greatly higher than in the previous years, following the policy of increased involvement with the community of the company.

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of donation given</td>
<td>5,000 Dhs</td>
<td>2,956 Dhs</td>
<td>59,350 Dhs</td>
</tr>
</tbody>
</table>

Table 50 “Amount of donation” indicator, from 2000 to 2002

This was aimed towards improving the image of the company, both internally and externally. Internally, employees were informed of the donations made by the company, reinforcing the employee perception as being part of a caring organisation.
In 2002, 85% of the workers and 91% of the staff were reporting being proud to work for Gulf Precast (based on analysis of the employee Satisfaction survey).

7.3.1.2.5 Increased interactions with community

In 2002, the company started recording the number of interactions it had with the community. This was not limited to donations, but included partnerships with universities to receive students for summer training, sponsorships in sport and cultural activities, active participation in seminars etc.

During the year 2002, 7 interactions were recorded, both with the local UAE community, the neighbouring Arab countries and the International community.

The “Interactions with community” indicator will be used to set improvement targets in the following years.

7.3.1.2.6 Increased relations with the Educational System

Educational support was identified by the management as an area of interaction with the community that should be particularly developed by the company, because of the possible advantages of collaboration with the education system, as detailed in section 7.2.11.1.

Different types of collaborations were developed:

- Providing end-of-term training to student.
- Student visits of the Factory ground (generally proposed to young students).
- Presentations on the Company Managerial System to visiting students.
- Financial donations to schools.
- Partnerships with University directed at student recruitment.
- Partnerships with Universities directed at Research & Development.

Measuring those multiple types of interactions is difficult. It was decided to use the “Expenditure on educational support” indicator, in order to monitor the trend of company’s interactions. The figure itself (6,587 Dhs in 2002), was a poor indication of the efforts deployed in order to intensify the relations with the Educational system.
7.3.1.3. People results

7.3.1.3.1. Increased Training

Although some of the indicators chosen by the company to measure its training efforts show a downward trend, this is mainly due to important training on Hollowcore production by the end of 2002 and the beginning of 2003, described earlier in this chapter. As the fees for this training were paid in 2003, all related data were recorded on the 2003 training records.

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training expenditure</td>
<td>19,100</td>
<td>20,600</td>
<td>26,780</td>
</tr>
<tr>
<td>Training hours</td>
<td>620</td>
<td>11,690</td>
<td>8,435</td>
</tr>
<tr>
<td>Expenditure on managerial/supervisory training</td>
<td>8,500</td>
<td>11,100</td>
<td>25,080</td>
</tr>
<tr>
<td>Hours of managerial/supervisory training</td>
<td>172</td>
<td>463</td>
<td>534</td>
</tr>
</tbody>
</table>

Table 51 “Training” indicators from 2000 to 2002

As reviewed earlier, a number of low-cost training initiatives had been introduced in the company, which explains that the training hours are high while the training expenses are low. However, low-cost training techniques often proved to be as effective as external training.

Apart from the Hollowcore training, which was provided from Managerial level to worker level, and recorded in the 2003 training figures, most of the training expenses are related to managerial/supervisory training. This reflects the fact that internal resources were not available to provide those training at low cost.

The 2003 figures will reflect the intense Hollowcore training, both in hours of training and in training expenses.

The focus of the company on training had a positive impact on the employee satisfaction. In many instances, training and promotions were closely linked. Employees receiving training are also developing a perception of being cared for.

7.3.1.3.2. Decreased employee turnover

Employee satisfaction is also measured by the company using employee turnover figures and employee stability figures.
Daniele Seraphim – Ph.D.

Table 52 “Employee turnover” and “Employee stability” indicators from 2000 to 2002

Among these indicators, it may be noted that the Staff turnover is the most volatile one, as it is sensitive to the number of employees leaving the company, due to the small relative population. The increase of Staff turnover in 2001, reflects both employees leaving the company because they doubt that the company may not recover from its financial lost of 2000 (announced beginning of 2001) and because of difficulty of adjustment to the new top management. In 2002, the staff turnover recovery reflected a stronger belief in the company potential, and a better adjustment to the top management leadership technique.

The same evolution may be noted in the worker turnover indicator, although less strongly, as this indicator is less volatile due to the larger number of workers employed.

Stability indicators are calculated on the average duration of employment in the company.

The slight decrease in staff stability was due to the increase in turnover. However, the lower figure of staff stability in 2002 is mainly due to the high number of newly hired staff in 2002, in preparation for the production in the Dubai and Shahama factories. 21 staff were newly hired in 2001. 30 staff were hired in 2002, progressing from 21% of newly hired staff in 2001 upon the total number of staff, to 25% in 2002.

The worker stability index continued to increase, even though an increased number of workers were recruited (573 newly hired worker in 2001, and 602 in 2003), the percentage of newly hired workers stayed almost identical. This reflects the difficulty the company faced in hiring new workers, due to the immigration laws of the country. Workers required for new factories joined the company in 2003 (393 newly hired workers in 2003, with 41% over the total number of workers), after a year of administrative struggle. Thus, the positive trend of worker turnover percentage and the constant percentage of newly hired workers in 2002, explains the progressing worker stability in 2002.
Increased number of employee contributions recognised

While in 2001 16 employees were recognised from their innovative suggestions or for their outstanding work, 32 were recognised in 2002.

It should be noted that employees who received an annual bonus or an increase of salary, are not included in this figure.

This trend, which is planned to continue in the following years, reflects the willingness of the management to promote participation with innovative ideas and to recognise outstanding work. Rewarding employees is one of the techniques used to encourage employees in this sense. The revised appraisal system that includes the adherence of the employee to the core values of the company (Initiative / Innovative Ideas; Participation in GPCC life etc) is also useful to achieve this goal.

Increased productivity

The productivity greatly improved in 2002. In 2001, 10.73 direct hours were required to produce 1 M3 of Hollowcore, and 27.47 hours per M3 of Precast. In 2002, those figures reduced to 9.07 and 25.72 respectively.

This positive trend is the result of an increased employee satisfaction, of a better control upon productivity by product, and of improvements introduced in the production processes.

Increased Job Satisfaction

Staff Job Satisfaction was calculated for the first time in 2001 through a survey. As the results were helpful in order to identify areas for improvement, it was decided to repeat this in 2002, and to extend the survey to workers.

The staff Job Satisfaction progressed from 72.46% in 2001 to 74.19% in 2002. For worker satisfaction, a percentage of 71.76 was obtained in 2002.

Those figures of over 70% of satisfaction is to be compared with the results of the Camp Satisfaction survey performed in 2002, which showed a satisfaction of only 31%, well below average. It may be noted that important efforts will be made by the management in order to improve worker satisfaction with the living conditions in the camps.
7.3.1.4. **Key performance results**

7.3.1.4.1. **Increased Investments**

The policy of development of the company was supported by heavy investments, as shown by the indicators below.

In 2002, the investments were mainly directed at increasing the production capacity of Hollowcore in the Mussafah factory, which has the double advantage of being a high productivity product and requiring a small production area in comparison with traditional Precast.

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure on development</td>
<td>2,661,738</td>
<td>3,980,870</td>
<td>5,640,252</td>
</tr>
<tr>
<td>Nbr of feasibility studies accepted</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment based on feasibility studies</td>
<td></td>
<td>4,725,000</td>
<td></td>
</tr>
</tbody>
</table>

Table 53 “Expenditure on development” and “Investment based on feasibility studies” indicators from 2000 to 2002

![Expenditure on Development](image)

Figure 48 Graphical representation of expenditure on development, from 2000 to 2002

The slight acceleration in the pace of investment noted in 2002, further accelerates in 2003 with the investments for the Dubai and Shahama factories.

It may be noted that the main part of the 2002 investment was covered by detailed feasibility studies.

7.3.1.4.2. **Increased Production**

In 2002, although the added production capacity of Dubai and Shahama factories were not yet available, the production increased, mainly through the increase of the productivity. This was possible through the utilisation of the Mussafah factory to near full capacity around the year, and through the increased production of the high-productivity Hollowcore product, which can be produced on a reduced area.
Table 54 “Volume produced” indicator from 1999 to 2002

![M3 produced graph]

The quantity of product produced in 2002 is 279% higher than in 1999.

7.3.1.4.3. Increased Profitability.

If investments and production increased in 2002, the main characteristic of the period is the increased profitability, as shown by the following figures.

Table 55 Key Performance Indicators from 1999 to 2002

<table>
<thead>
<tr>
<th>Key Performance Indicators / Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Profit</td>
<td>8,131,516</td>
<td>13,602,715</td>
<td>10,071,392</td>
<td></td>
</tr>
<tr>
<td>Net Profit</td>
<td>2,107,490</td>
<td>-4,562,763</td>
<td>3,519,095</td>
<td></td>
</tr>
<tr>
<td>Labour cost</td>
<td>2,114,12</td>
<td>1,481,021</td>
<td>7,259,698</td>
<td></td>
</tr>
<tr>
<td>Material costs</td>
<td>41,724,301</td>
<td>39,803,389</td>
<td>36,598,026</td>
<td></td>
</tr>
<tr>
<td>Production costs</td>
<td>2,114,12</td>
<td>1,481,021</td>
<td>7,259,698</td>
<td></td>
</tr>
<tr>
<td>Overheads</td>
<td>2,114,12</td>
<td>1,481,021</td>
<td>7,259,698</td>
<td></td>
</tr>
<tr>
<td>Labour cost / M3</td>
<td>428.18</td>
<td>209.88</td>
<td>157.80</td>
<td></td>
</tr>
<tr>
<td>Material costs / M3</td>
<td>688.72</td>
<td>418.24</td>
<td>304.26</td>
<td></td>
</tr>
<tr>
<td>Production costs / M3</td>
<td>428.18</td>
<td>209.88</td>
<td>157.80</td>
<td></td>
</tr>
<tr>
<td>Overheads / M3</td>
<td>246.97</td>
<td>130.67</td>
<td>135.78</td>
<td></td>
</tr>
</tbody>
</table>

Although the gross profit decreased in 2002, the net profit reached a record value of above 3.5 million, confirming the financial recovery of 2001.

Labour cost lowered to 157.8 Dhs per cubic meter produced, confirming the gain of productivity. Material costs and Production costs per M3 reduced as a result of the diminution of wastage, and improved cost control.
Daniele Seraphim – Ph.D.

The only indicator which did not progress was the Overheads per M3. Part of this increase is due to the hiring of additional staff (25% of newly hired staff in 2002), in view of production starting in the Dubai and Shahama factories.

The decrease of costs, per M3 produced, resulted in increased profitability, with a Net Profit above Dhs 3.5 million, for the first time in the company’s history.

7.3.1.5. Improvements of the period, classified according to the EFQM Model

Figure 50 Improvements introduced during the second period, classified according to the EFQM Model
# Improvements of the Quality Integration Period

## Leadership
- 7.2.3.1 Review of Quality Policy
- 7.2.8.5 Awards for Employees of the year
- 7.2.8.6 Immediate recognition of exceptional work
- 7.2.12.4 Clarification of Contractual Specification

## People
- 7.2.5.1 Coaching
- 7.2.5.2 In-house Training
- 7.2.5.3 On-the-job training
- 7.2.5.4 Training by Suppliers
- 7.2.6.7 Recruitment tests
- 7.2.8.1 Salaries paid on time
- 7.2.8.2 Appraisal and bonus sharing
- 7.2.8.3 Awards for Employees of the year
- 7.2.8.4 Immediate recognition of exceptional work
- 7.2.8.5 Medical clinic in the labour camps
- 7.2.8.6 Providing social activities for the labourers
- 7.2.8.7 Suggestion Competition
- 7.2.9.1 Improved communication through door boards in the camps

## Policy & Strategy
- 7.2.3.1 Review of Quality Policy
- 7.2.3.2 Quality Documentation reflecting the actual situation of the Company
- 7.2.3.3 Updates on the Quality System using feedback on audits
- 7.2.3.4 Non-Conformances are openly discussed as well as actions to prevent
- 7.2.3.5 Review of the Quality Policy
- 7.2.3.6 Improvements in Planning Activities
- 7.2.3.7 From Quality Control to Prevention
- 7.2.3.8 Hollow Core Quality Improvement
- 7.2.3.9 Made in factory productivity
- 7.2.3.10 Cost of repair analyses
- 7.2.3.11 Housekeeping evaluation

## Partnerships & Resources
- 7.2.4.3 Participation in construction exhibition
- 7.2.4.4 Creating Brochures and flyers for specific Products
- 7.2.4.5 Creating a promotional 3D film of a virtual visit to a villa
- 7.2.5.1 Coaching
- 7.2.5.2 In-house Training
- 7.2.5.3 On-the-job training
- 7.2.5.4 Training by Suppliers
- 7.2.6.7 Recruitment tests
- 7.2.8.1 Salaries paid on time
- 7.2.8.2 Appraisal and bonus sharing
- 7.2.8.3 Awards for Employees of the year
- 7.2.8.4 Immediate recognition of exceptional work
- 7.2.8.5 Medical clinic in the labour camps
- 7.2.8.6 Providing social activities for the labourers
- 7.2.8.7 Suggestion Competition
- 7.2.9.1 Improved communication through door boards in the camps

## Processes
- 7.2.1 Selecting Key performance indicators
- 7.2.4.6 Creating a presentation film of the Company
- 7.2.21.4 Initiate research & development in partnership with the university
- 7.2.24.4 Creating Brochures and flyers for specific Products
- 7.2.24.5 Creating a promotional 3D film of a virtual visit to a villa

## Customer Results
- 7.3.1.1.1 Increased Market Share
- 7.3.1.1.2 Increased Customer satisfaction
- 7.3.1.1.3 Increased Success rate when quoting
- 7.3.1.1.4 Increased expenditure in QC, QA & TQM

## People Results
- 7.3.1.1.1 Increased Training
- 7.3.1.1.2 Decreased employee turnover
- 7.3.1.1.3 Increased number of employee recognised
- 7.3.1.1.4 Increased Productivity
- 7.3.1.1.5 Increased Job satisfaction

## Key Performance Results
- 7.3.1.4.1 Increased Investments
- 7.3.1.4.2 Increased Production
- 7.3.1.4.3 Increased Profitability

## People Results
- 7.3.1.1.1 Increased Training
- 7.3.1.1.2 Decreased employee turnover
- 7.3.1.1.3 Increased number of employee recognised
- 7.3.1.1.4 Increased Productivity
- 7.3.1.1.5 Increased Job satisfaction

## Key Performance Results
- 7.3.1.4.1 Increased Investments
- 7.3.1.4.2 Increased Production
- 7.3.1.4.3 Increased Profitability
7.3.2. The external audit perspective

By the end of 2002, the SKIA informed the company of its scores on two categories: Business Results and Action Planning. However, no new scores were provided on the other categories (Strategy, Customer & Market Focus, Business Environment, Leadership, Human Resources, Process Management and Use of Information). Thus, the external audit perspective for the second phase is partial only.

The scores obtained by the end of 2002 in the Business Results and Action Planning categories must be compared with the ones of 2000, as no intermediate scores were provided. Thus they represent the progress of the company, as assessed by the SKIA, over both the first and the second period.

7.3.2.1. SKIA evaluation of the company

<table>
<thead>
<tr>
<th>Categories</th>
<th>2000 Company score</th>
<th>2001-2002 Company score</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Results</td>
<td>57</td>
<td>92</td>
<td>+35</td>
</tr>
<tr>
<td>Action Planning</td>
<td>70</td>
<td>88</td>
<td>+18</td>
</tr>
</tbody>
</table>

Table 56 Comparison between SKIA scores in the Business Results and Action Planning categories, from 2000 to 2002

7.3.2.2. Business Results category

The SKIA reported major improvements of the organisation in the Business Results category (an improvement of 35 points). This can be linked to two different issues:

1. That the company was able to provide the SKIA with detailed measures of its performance in the four results areas considered: Customer results; Key performance results; People Results; and Business Environment. This achievement is directly linked to the improvements in measuring system introduced by the organisation during the second phase:
   - Defining Key Performance Indicators (see paragraph 7.2.1)
   - Improved performance measures of main processes (see paragraph 7.2.6)

2. That the indicators provided were showing significant improvements in the company’s performance. Both the progress on the score (an improvement of 35
points), and the score itself (92%), are indicative of improvements in all four areas. This matches the company internal assessment, which showed significant progresses on Key Performance Indicators:

- Customer Results (see paragraph 7.3.1.1)
- Key Performance Results (see paragraph 7.3.1.4)
- People Results (see paragraph 7.3.1.3)
- Business Environment (see paragraph 7.3.1.2)

![Figure 51 Some Performance Indicators – Percentage of Progress from 2000 to 2002](image)

### 7.3.2.3. Action Planning category

The SKIA also reported strong improvements in the Action Planning category (18 points more), although less so than the Business Results one.

This success is directly linked to the 18 planed actions set in 2001 (see paragraph 6.2.2.15). The company was able to demonstrate to the SKIA a substantial achievement rate on these (71% by the end of 2001), as well as a continuity of purpose, as several of the achieved improvements had been documented in the ISO procedures of the company, and those not yet achieved, either selected as strategic objectives or as a continuous improvement objective for 2002.

It recognised the ability of the company to select relevant improvement initiatives and to carry them out successfully.
7.4. Review of priorities initially set

7.4.1. Cultural change

7.4.1.1. Communication system

Several initiatives had been taken during the second phase to improve the communication system: Non-conformances were openly discussed as well as actions to prevent recurrence (see paragraph 7.2.3.4); The 360 degree leadership evaluation was used as an opportunity for communication between the Top Management and other Managers (see paragraph 7.2.7); Inter-departmental communication was improved (see paragraph 7.2.9.3); Door boards were placed in the camps (see paragraph 7.2.9.1); An Open-Door policy was officially formulated (see paragraph 7.2.9.2); Job satisfaction and Camp satisfaction surveys were collected and analysed (see paragraphs 7.2.8.3 and 7.2.8.4).

Unlike the first period, communication efforts were not limited to a Top-Down approach, but also included Bottom-Up initiatives such as the open door policy, and workers’ job satisfaction and camp satisfaction evaluation.

Lateral communication also received a great deal of attention, with open discussions on non-conformances and direct inter-departmental communication.

Overall, the communication system of the company at the end of the second period was clearly showing some improvements.

7.4.1.2. Employee participation, involvement and empowerment

Several initiatives were also taken to improve employee participation, involvement and empowerment: Suggestion Competition (see paragraph 7.2.8.9); The Quality System was routinely updated taking into consideration employees’ audit feedbacks (see paragraph 7.2.3.3); Employees were involved in solidarity among employees and cause-related initiatives (see paragraphs 7.2.8.12 and 7.2.11.4).

During the second phase, workers’ participation and involvement were actively encouraged. The Suggestion Competition was both more successful and generated less managerial resistance.
Participation was more spontaneous than during the first period, and recourse to "forced participation" was less frequent (although surveys questionnaires still included the mention that an acknowledgement of the document or a reply was mandatory).

Overall, employee participation and involvement progressed during this second period. However, empowerment remained limited to the higher hierarchical levels.

### 7.4.1.3. Team working

Only three initiatives were taken during the second period to improve team working:

- Coaching (see paragraph 7.2.5.1);
- Interdepartmental communication and reflections upon non-conformances (see paragraphs 7.2.9.3 and 7.2.3.4).

Coaching, although associating employees of different hierarchical levels in a team, was not designed to modify hierarchical powers. Interdepartmental communication and reflections upon non-conformances cannot entirely qualify as team working, as they do not imply a sense of belonging to a team.

Thus, little has been performed during this second period to create an effective team working culture.

### 7.4.1.4. Working environment and conditions

A high number of initiatives were taken during the second period to improve working environment and conditions:

- More training given to employees (see paragraph 7.2.5.1);
- Salaries paid on time (see paragraph 7.2.8.1);
- Appraisal and bonus sharing (see paragraph 7.2.8.2);
- Award for employee of the year (see paragraph 7.2.8.5);
- Immediate recognition of exceptional work (see paragraph 7.2.8.6);
- Taking into consideration employees’ Job Satisfaction (see paragraph 7.2.8.3);
- Safety training for site management (see paragraph 7.2.8.10);
- Housekeeping evaluation (see paragraph 7.2.6.5);
- Hiring policy giving priority to employees’ family (see paragraph 7.2.8.11);
- Taking into consideration employees’ camp satisfaction (see paragraph 7.2.8.4);
- Providing social activities for the labourers (see paragraph 7.2.8.8);
- Medical clinic in the labour camp (see paragraph 7.2.8.7)

Clearly, the company positioned itself as a caring organisation which takes account of the well-being of its workforce. Initiatives are both of a masculine tendency (such as salaries paid on time, bonus sharing and appraisal) or a more feminine one (such as increasing camp satisfaction or providing social activities for the workers). The managerial resistance
noted during the first period was reduced, as the concept that employees’ well-being is part of the company’s responsibilities was gaining ground.

7.4.1.5. **Awareness and concern for the needs of the society**

A number of initiatives took place during the second phase to improve the organisational concern for the needs of the society: Student summer training (see paragraph 7.2.11.1); Cooperation with the United Nation training institute (see paragraph 7.2.11.2); Research and Development in partnership with the University (see paragraph 7.2.11.4); Increased donation to humanitarian causes (see paragraph 7.3.1.2.4)

These initiatives reflected the fact that the company was starting to realise that it does not operate in isolation, and that it requires interactions with the society in which it resides.

This is a slow but clear improvement when compared to the first period.

7.4.1.6. **Overall review of initiatives for cultural change**

Overall, during this second period, the company started to modify some aspects of its culture. It was clearly more caring, and valued communication although it still faced difficulties in this regard with the lowest levels of the hierarchy. It promoted employees’ involvement and participation although empowerment was still mainly limited to the highest levels of the hierarchy. It also started to be concerned with the society in which it operates. However, no real progress had been made on team working so far.

This overview matches the company’s perception in this regard, as demonstrated by the progresses noted in the People and Business Environment performance indicators. The excellent grade and progress noted by the SKIA in Business Results (in which two of the four elements are People results and Business Environment results) confirmed this internal assessment.

Employee perception of a change in culture will be reviewed in paragraph 9.2.1.
7.4.2. Improvements in the measuring system

During the second phase, the company greatly improved its measuring system: It had defined key performance indicators (see paragraph 7.2.1); For each main process it had improved its performance knowledge (see paragraph 7.2.6); It used surveys to measure Job Satisfaction, Camp Satisfaction and Customer Satisfaction (see paragraphs 7.2.8.3, 7.2.8.4 and 7.2.12.2), and it had started to work on an IT integration project (see paragraph 7.2.6.9).

The improved measuring system allowed the company to review its progresses more objectively, relating them to the effects of initiatives introduced, through a number of Key Performances Indicators. The organisation perceived this improvement as of critical importance. The view of the SKIA in this regard matched that of the company, as demonstrated by the grade obtained in the “Business Results” category, which not only took into consideration the progresses on performance indicators, but also the existence and relevance of these indicators.

7.4.3. An effective ISO Quality System

During the second phase, the company had carried out a complete review of its ISO Quality system: Review of Quality Policy (see paragraph 7.2.3.1); Quality documentation updated to reflect the actual situation of the company (see paragraph 7.2.3.2); Dynamic update of the documentation using audits’ feedback (see paragraph 7.2.3.3); Open
discussions of non-conformances (see paragraph 7.2.3.4); Use of NCR statistics to identify negative trends (see paragraph 7.2.12.1).

At the end of the second period, the company was confident that its ISO Quality System no longer held it back, but was a positive factor that should assist its TQM implementation process. (The effectiveness of its Quality System was externally confirmed during the third period by the ease with which the company obtained the ISO 9001:2000 certification.)

### 7.4.4. Improved customer's image

Finally, the organisation wished to improve its customer’s image. This objective was intended to be tackled from two angles: Improve the Marketing and improve the Quality of the production.

From the Marketing point of view, several initiatives were taken during the second period: Creation of a WEB site (see paragraph 7.2.4.1); Review of tender documents (see paragraph 7.2.4.2); Participation in construction exhibitions (see paragraphs 7.2.4.3); Creation of brochures and flyers (see paragraph 7.2.4.4); Promotional films (see paragraphs 7.2.4.5 and 7.2.4.6).

In order to improve the quality of the production, the following initiatives were taken: Hollowcore quality improvement (see paragraph 7.2.12.3); A move from Quality Control towards Quality defect Prevention (see paragraph 7.2.13); Non-conformance statistics to identify negative trends (see paragraph 7.2.12.1); and a Customer Satisfaction Survey to understand better the needs, requirements and satisfaction of the clients.

The success of these initiatives can internally be measured by customer performance indicators. According to these indicators, the company progressed significantly during the second period.
Reflection on company’s objectives

Most of the internal indicators showed that the company’s performance had significantly improved during the second phase. This was confirmed by the important progress of the organisation in the “Business Results” category of the SKIA. This substantiates the achievement of the company’s first objective that was foreseen at the end of the first period. Implementing TQM principles has raised the performance of the company and brought it out of its crisis situation.

Although at the end of the first period it was not yet possible to assess whether the implementation of TQM principles had raised the satisfaction of all stakeholders, as targeted by the second objective, the second period provides more ground for a positive answer. According to internal performance indicators, Customer satisfaction had been raised (see paragraph 7.3.1.1), Employee satisfaction had been raised (see paragraph 7.3.1.3), Shareholders satisfaction had been raised (see paragraph 7.3.1.4.3), Society satisfaction had been raised (see paragraph 7.3.1.2), and even Supplier satisfaction had been raised (see paragraph 7.2.10). Although such a detailed analysis was not provided by the SKIA, the score obtained by the company in the “Business Results” category also confirms this improvement.

As in the first phase, most of the improvement initiatives of the second phase were based on the recommendations and guidance of the SKIA. It is undeniable that the company had significantly progressed in its TQM implementation process, which lends credence to the
success of the third objective which was to use the recommendations provided by a TQM governmental award body in order to supplement its limited TQM knowledge.

Finally, in regard to the fourth objective which is to overcome or minimise implementation difficulties linked to the specific culture of a company, the company’s decision to try to modify, to some extent, its initial culture in order to ease the TQM implementation process was, at least partially, successful (see paragraph 7.4.1). Acting on the knowledge that the company might face difficulties in respect to five CSF due to its cultural specificity, the organisation took measures that minimised implementation difficulties. Therefore, the analysis of this second phase suggests the achievement of the fourth objective, but will have to be further confirmed in the third phase.
8. CASE STUDY 3: 2003 onwards - Refinements in the Quality System

From 2003 onwards, the elements set in place in the two previous periods were further developed and improved. The Refinements phase is characterised by a willingness to verify that the improvements introduced or refined are of “world-class” standard, by checking the recommendations given and, comparing with experiences described in specialist Literature.

Two new production centres started their operation in 2003: Shahama factory from January 2003 onwards, and Dubai factory, from March 2003 onwards. By mid 2004 the Shahama production centre had closed, while two additional centres were set up in Mussafah and Dubai by the end of 2004.

8.1. Initial Priorities

During the second period, the company derived confidence in its ability to modify the organisation’s culture in order to facilitate TQM implementation. However, cultural modifications are slow, and some aspects had yet to be satisfactorily improved (such as team working). A priority for the third period was to pursue the organisation’s efforts for a cultural change, concentrating on CSF which had not received much attention.

At the end of the second period, the company and the researcher were of the opinion that most of the main improvements highlighted by the SKIA had been introduced, and that it required additional guidance to that obtained from the award body. Although the knowledge provided by the SKIA was useful, it needed to be supplemented. The researcher proposed to check the TQM literature to this end, and this proposal was readily accepted.

The company also decided to review in detail its processes for improvements. It was decided that this review should not be limited to managerial processes, as in the first and second phase, but should include the manufacturing processes. The organisation also wanted to strengthen its links with its key partners.

Finally, the company wished to review the coherence of its whole system, to fine-tune some of the improvements previously introduced, and to verify and enhance the alignment of the improvements introduced over all three periods.
8.2. **Detailed description of TQM implementations**

8.2.1. **TQM Gap Analysis based on TQM literature review**

Until 2003, most of the areas that required improvements were identified through gap analysis, using the TQM model proposed by the Sheikh Khalifa Industry Award, as basis for comparison. This was useful, as it not only pointed out areas of deficiencies or that were under-developed but also provided, through the scores obtained, a guide for prioritisation.

However, from 2003 onwards, as the company successively reduced the gaps with the SKIA expectations, the tool was loosing its sharpness, and the company had already introduced most of the improvements that could easily be inferred through SKIA Gap Analysis.

Thus, it was important for the company to progress further, and to self-assess its TQM performance against world-wide best practices, in order to uncover additional possibilities of improvement.

This was done through an intensive TQM literature review performed by the researcher.

During the literature review, possible areas for improvements were noted. The top management was then presented both with the suggestion for improvement, and with the corresponding literature selection, highlighting what could be gained by such amelioration.

The TQM literature review was also used to facilitate the spread of TQM knowledge throughout the company (as described in the paragraph relative to the Continuous Learning scheme, paragraph 8.2.13.4)

8.2.2. **Additional data available**

8.2.2.1. **A full order book**

By end of 2002, the company was able to predict with reasonable accuracy, what its production level in 2003 should be, based on a full order book for the year. It may be noted that it was the first time in the company history that a one-year forecast was possible. It was the combined result of the growing company’s market image, and of a favourable trend in the construction industry of the United Arab Emirates. This positive market trend
should be compared with the economic depression that hit many countries world-wide, following the 11th of September 2001 events.

The commercial department was able to provide an "expected sales" analysis covering the year 2003, taking into consideration the current production capacity of the Factory, as well as its targeted increase, if any. If the sales prediction was met, the company should then work at full capacity all year round.

This ability to anticipate the forthcoming one-year sales would still be possible by the end of 2003, and be used, when the company started working on its 2004 Strategic Plan.

8.2.2.2. Detailed accounting previsions for the year

8.2.2.2.1. Based on the sales previsions and on the strategic plan

The Commercial Department provides to the Financial Department a monthly breakdown of the one-year sales forecast. The forecast of monthly quantity to be produced is detailed on a project by project basis.

The Estimating department provides the detailed cost estimation for each of the Projects concerned.

Based on these data, as well as on the previous year performance, the Financial Department prepares a detailed one-year financial forecast.

Main material purchases required to achieve the sales forecast are detailed project by project and month by month. Other minor material costs are either estimated month by month without the project breakdown, or estimated for the whole year, depending on the financial importance of the material.

The cost of the man-power required to reach the intended production level is broken down on a monthly basis.

Overhead costs are estimated on previous values, estimated production growth, and broad objectives provided by the Top Management. They are later reviewed once Strategic Objectives have been validated, in order to take into considerations investments that were still unclear at the beginning of the Strategic Planning process.
Sales are evaluated according to contract prices and predicted contract production requirements, month by month and project by project.

Estimated profits for the year are calculated according to the above elements.

It may be noted that a final review on the financial budget is carried out once the Strategic Plan validated, to take into consideration the detailed strategic objectives. These strategic objectives are not known when the draft of the financial budget is established.

8.2.2.2 Monthly analyses of actual figures against budgeted ones

On a monthly basis, the Financial Department prepares comparisons between actual costs/incomes and budgeted costs/incomes. When necessary, detailed financial analyses, on a project by project basis are provided to the Top Management.

The Top Management presents the updated results to the Operation Support Team (committee of all process owners), during quarterly meetings, highlighting areas under budget and areas of discrepancies.

8.2.2.3 Corrective actions

Although comparisons between budgeted and actual costs/incomes are highly useful to pinpoint areas of deviation, they cannot, by themselves, provide reasons for deviations.

Once a deviation is highlighted, the Financial Department interrogates both the actual data and the budgeted data in order to identify if it is the result of a badly estimated budget, an uncontrolled process, or an unforeseen difficulty. Past performance is often used as reference during this analysis.

If it appears that the discrepancy is due to an uncontrolled process or an unforeseen difficulty, the Financial Department tries to isolate the issue by successively reducing the scope of the study. Once the issue is identified as clearly as possible, the analysis is handed over to the Top Management.

The Top Management meets the corresponding process owner(s), and asks him to perform a detailed analysis of the reasons pertaining to the discrepancy. The analyses provided may not be financial ones.
If the reasons behind the discrepancy cannot be identified by the process owner(s), a multi-disciplinary team may be assigned the study.

**8.2.2.4. Sustainability of Accounting forecasts and reviews**

In order to make sure that yearly financial forecasts are performed regularly, and that comparisons between budgeted figures and actual ones are provided on a monthly basis, the process of financial Accounting forecast and reviews has been added to the Quality System Documentation.

Thus, the company uses the regular internal and external audits in order to sustain the improvements introduced in the Quality System.

**8.2.2.3. Employee survey**

The gap analysis with the SKIA, allowed the company to identify that there was room for an additional employee survey, which would not be directed towards Job Satisfaction alone.

A literature review was performed by the researcher, and an employee survey presented by Dahlgaard and Dahlgaard (2002) in their article “From defect reduction to reduction of waste and customer/stakeholder satisfaction (understanding the new TQM metrology)”, was proposed as a base to this survey.

A proposal of employee survey was sent to the Executive Manager and the HR Manager for review. Several modifications were introduced, and the validated survey contains the following statements to be graded on a scale from 1 to 5 (I strongly disagree => I strongly agree).

### Top Management practices
- I have a good knowledge of the Company's mission and vision
- I have clear information about positive and negative results of the company
- The company Management is open and trustworthy
- The company provides the necessary frameworks for employee well-being (physical, psychological and spiritual)

### Middle Management practices
- I have clear information about my departmental goals
- Staff of my department are involved in departmental planning
- I receive regular positive and negative feedback from the Department Management
- My Department Management is recognising and motivating its people
- My Department Management treats its people fairly and trustworthy
- My Department Management is competent and inspires leadership
- My Department Management is providing the necessary education and training to its people
Colleagues' practices
There is a trustworthy and respectful relationship between my colleagues and me.
I receive regular positive and negative feedback from them.
The communication is open between my colleagues and me.
We are sharing joy and sorrow.
I work with inspired and competent colleagues.
My colleagues are responsible and competent.
We are helping and supporting each other.

My own practices
Arriving regularly on time to my workplace and to scheduled meetings is of high priority to me.
I understand perfectly the work I am requested to perform.
I am producing the highest possible quantity of work, according to my current knowledge/experience.
I am producing the highest possible quality of work, according to my current knowledge/experience.
I am doing my best to participate in social activities proposed by the company.
One of my priorities is to assess possible work innovations/ameliorations and to suggest those to my superiors.
I communicate effectively, both verbally and in writing, using graphical representation whenever adapted.
I spend time in learning activities, in order to keep abreast of technological/managerial innovations.
Getting my work done on time if of the highest priority to me and I do not hesitate to work extra-hours if necessary.

Daily working conditions.
My targets and definition of tasks are clear.
My time frameworks are clear.
I benefit from a good physical environment.

Document 3 Employee survey

In 2004, this survey was issued to staff, as a pilot study. From 2005 onwards, it will be extended to all employees.

It provided additional data on the level of communication within the company, as well as the level of adherence to the core values of the company.

The newly introduced employee survey is also used to measure communication gaps in the company, and set objectives for improved participation and empowerment.

8.2.3. Improving the company's Strategy

8.2.3.1. Defined processes for Strategic Plan Review, deployment and follow up

8.2.3.1.1. The Strategic Plan Review process
Strategic Plan review process

- Mission & Vision review
- Strengths and Weaknesses Analyses
- Opportunities and Threats Analyses
- List of processes review
- Draft of Strategic Plan
- Draft review
- Strategic Plan update

- Internal Measures of People Satisfaction
  - Employee Turnover
  - Absenteeism
  - Employee recognition
  - Productivity
  - Training analyses

- Internal Measures of Customer Satisfaction
  - Customer Loyalty
  - Non-conformance analysis
  - Success rate when quoting
  - Market Share

- Internal Measures of Society Satisfaction
  - Nbr of interactions with community
  - Amount of donations given
  - Investments in state-of-the-art facilities
  - Accident frequency rate

- Key Performance Results
  - Production
  - Order Book
  - Gross/Net profit
  - Material/Manpower/Overheads Costs
  - Progresses on Strategic Plan
  - Expenditure on development

- Forecasts
  - Sales Forecast
  - Projects' Estimation
  - Financial Forecasts

- People Perception of Satisfaction
  - Job Satisfaction Survey
  - Camp Satisfaction Survey
  - Employee Survey

- Customer Perception of Satisfaction (through Survey)
  - Overall Satisfaction
  - Processes Satisfaction
  - Problem Prevention index
  - Problem Solving index

- Society Perception of Satisfaction
  - Nbr of thank you letters received
  - TQM awards received
  - ISO certifications
  - Recognitions by International bodies

- Benchmarking data
  - Customer Perception of Competition (Survey)
  - Suppliers Feasibility Studies
  - Cooperation with competitors
  - Technical and TQM research
  - Competitor pricing policy

- Researches
  - TQM researches
  - Technical researches
  - Feasibility studies
  - Market Trend

- Equipment & Infrastructure review
- Investment Plan
- HR Gap analysis and Plan
- Critical success factors review and Plan

Figure 54 Strategic Plan review process from 2003 onwards
The researcher summarised the Strategic Plan review process of the organisation, using the above-mentioned graphical representation.

**Mission & Vision review**

The review of the Mission & Vision statements remains the first step on the Strategic Planning process as it is of main importance for the Strategic Plan to be aligned with the Mission and Vision of the company.

Modification proposals from the Senior Management and Top Management validation continue to be the basis of this review.

**Senior Staff SWOT analyses**

SWOT analyses are performed by the senior staff of the company, and sent to the Top Management for review.

Senior Staff base their SWOT on their in-depth knowledge of their specialist processes, and on their perception of the performance of the company. A number of communication channels have been developed in order for Senior Staff to have a detailed perception of the company’s actual position. They attend a number of managerial committees, they receive the updated status of progresses on the Strategic Objectives and the status on KPIs as reported in the Balanced Scorecard.

Strengths and Weaknesses are divided in two parts: The strengths and weaknesses of the department under the responsibility of the Senior Staff, and the ones of the company at large.

SWOT analyses are collected and studied by the researcher. A list of common items is established, reflecting the shared views of the management.

From 2004 onwards, a meeting is then being held between the Senior Staff and the Top Management, in order to review and comment the list of shared items regarding the company at large.

When required, individual meetings are scheduled between the Top Management, the researcher and the Senior Staff employees, in order to discuss the strengths, weaknesses and improvements required in their department.
When drafting the Strategic Plans, results of SWOT analyses are extensively used.

**List of process reviews**

A list of strategic processes to be considered is established by the researcher on the basis of the last Strategic Plan update. It is reviewed by the Top Management. It may be noted that a modification in the Mission and Vision will often result in the modification of the list of main processes, and that SWOT analyses meetings also have a major influence on this list.

The list is then sent to the members of the Organisation Support Team (all Senior Staff and a number of Junior Staff), for review and comments. Depending on the feedback received, a final list is established.

The list of strategic processes is used as a structure for the new Strategic Plan.

**Draft of the Strategic Plan**

The researcher drafts the Strategic objectives process by process, highlighting key ones, and proposing a target date for realisation.

For each process, according to the objectives defined, the following elements are defined:

- Risks
- Critical Success factors
- Contingency plans
- Human resources requirements
- Building / facilities required
- Responsibility

**Draft review**

The draft of the Strategic Plan is reviewed and modified by the Top Management, and then sent to all process owners for review and comments. Employees of the departments must be consulted during this review.

For Departments with a high number of employees, the Top Management encourages the Managers to form study teams that review the proposed strategic objectives.

Proposals for modifications are then sent to the Top Management.
After study of the proposals of modifications, the researcher reviews them with the Top
Management, and the final version of the Strategic Plan is established, which is sent to all
the members of the Organisation Support Team (all Senior Staff and a number of Junior
Staff), who are asked to circulate it among their staff.

A number of additional studies are then performed.

- Equipment & Infrastructure review

According to building / facilities requirements defined in the Strategic Plan, and to the
strategic objectives themselves, an Equipment & Infrastructure review is performed.

This study takes into consideration the following elements:

- Objectives
- Function
- Performance
- Availability
- Cost
- Safety
- Environmental issues
- Ergonomics
- Facilities
- Services

- Investment Plan

The Financial Department prepares an Investment Plan taking into consideration the
building / facilities requirements defined in the Strategic Plan and the Equipment &
Infrastructure review.

Sources of finance are identified.

- Critical success factor review and plan

A list of Critical Success Factors (CSF) listed in the Strategic Plan is established. When
required, action plans are put in place in order to meet their objectives.

It may be noted that strategic objectives corresponding to Critical Success Factors are
generally already defined in the Strategic Plan itself.

- HR Gap Analysis and Plan

Depending on the Human Resources requirements identified in the Strategic Plan, and the
Critical Success Factors related to Human Resources, all HR requirements are detailed. In
coordination with the Heads of Department and the HR Department, a gap analysis is performed, and plans developed in order to meet the additional identified requirements.

It is of major importance for the company to define those plans well in advance, as the recruitment process, particularly for workers, takes time in the Emirates, due to work visa regulations.

8.2.3.1.2. An increased Employee Participation in the elaboration of Strategic Objectives

Employee participation in the elaboration of the Strategic Plan is of prime importance to the company, as it ensures that set strategic objectives are "owned" by process owners and employees. Also, it increases the chances of individual efforts being aligned with the Strategy of the company.

The review process reflects the importance of Employee participation.

- Senior Staff participation

Senior Staff review the mission and vision statement, and can propose modifications. This is of importance, as both the Strategic Plan and its deployment must be aligned on the mission and vision statement.

Senior Staff perform SWOT analyses, using their in-depth knowledge of their processes, and data they regularly receive regarding the progress of the company. They also apply their understanding of the precast market to identify threats and opportunities.

Along with other members of the Operations Support Team, they review the list of processes, which becomes the structure of the strategic plan.

They review the draft of the strategic plan, are responsible for forming group studies, forward the comments of their departments to the Top Management, and are consulted during the HR Gap analysis study.

- Other Operations Support Team (OST) members

Apart from the Senior Staff, members of the OST include Junior Staff who have been selected because they might hold a managerial position in the company in the near future.
It is important for them to be updated about the company management, and to start participating in the elaboration of the Strategic Plan.

They participate in the review of the list of processes, receive a personal copy of the draft of the Strategic Plan, and are asked to participate in its review.

- Other employees

Some of their suggestions, received through the suggestion competition, are selected as strategic objectives.

They are consulted on, or may be asked to participate in, the review of the Strategic Plan draft, through their Heads of Department.

8.2.3.2. The inputs to the Strategic Plan

Apart from the review of the mission and vision, which is not only an input to the Strategic Plan but also the first step of the strategic plan review process, a number of other inputs are used by Senior Staff to perform their SWOT analyses.

They concern primarily the satisfaction of the stakeholders: Customers, People, Society and Shareholders (through Key Financial Indicators). They consider both company based measures of their satisfaction, and their intuitive satisfaction perception.

Benchmark data collected by the company is used both to identify strengths and weaknesses, and to identify opportunities and threats.

Forecasts and research are also used to identify opportunities and threats.

The active participation of all senior staff, as well as following meetings on the SWOT analyses, ensure that main strengths, weaknesses, opportunities and threats are identified.

8.2.3.2.1. Perception of Customer Satisfaction

Until 2003, Customer Satisfaction and areas for improvement were mainly assessed through the important number of direct contacts maintained with the company’s clients. Many issues analysed in the SWOT reflect the Senior Staff intuitive perception of the level of Customer Satisfaction.
Measurable internal indicators of customer satisfaction are also used, in addition to these non-quantifiable internal perceptions. Among those indicators, customer loyalty, product non-conformance analyses, success rate when quoting, and market share of the company are employed.

From 2004 onwards, in addition to internal measures, customer perception obtained through Customer Satisfaction Survey (CSS) is used to measure their satisfaction, highlight areas for improvement and set strategic objectives. As detailed later in paragraph 8.2.10, CSS indicators are detailed by process and service, as base for the analysis of company strengths and weaknesses as perceived by its customers.

Senior Staff are informed of the perception of Customer Satisfaction, through several means:

- Many Senior Staff have direct contacts with the clients, and deal regularly with their requests. Thus, they possess qualitative information about client satisfaction.

- Senior Staff receive, every six months, a progress report on the Strategic Plan. Many of the strategic objectives are related to customer satisfaction.

- They also receive every three months, an update of the Balanced Scorecard. One of the perspectives on this document deals with “Customer and Community perspective”. Under the “External Customer Satisfaction” goals, several measures are assessed relative to internal measures and customer perception. For example, the following indicators were available on the December 2003 balanced scorecard:

  - Customer Satisfaction Index
  - Problem Prevention Index
  - Achievement of timescales
  - Standard of communication
  - Customer Satisfaction with Factory
  - Customer loyalty
8.2.2.2. **Perception of Employee Satisfaction**

Analyses of employee Job Satisfaction and Camp Satisfaction have been available since 2002 (2001 for Staff Job Satisfaction). From 2004, an additional employee satisfaction survey, complementary of the above, was sent to all staff and analysed (see paragraph 8.2.2.3).

The analyses of those three surveys are used to evaluate the people’s perception of their satisfaction.

In addition to these employees’ perceptions of their satisfaction, a number of internal measures are also used to assess it. Among those measurable indicators, employee turnover, absenteeism, productivity and Training level are routinely analysed and used when setting up strategic objectives to improve employee satisfaction.

Senior Staff deal daily with employees of their department, and therefore have a good qualitative knowledge of the current level of satisfaction.

Using the progress reports on the Strategic Plan objectives and the balanced scorecard updates, (“Customer & Community perspective”, “Internal customer satisfaction items” and “Innovation & Learning perspective”, “Continuous Learning” and “Teamwork” items). Senior Staff can grasp quantitative data on, and the evolution of, Employee Satisfaction.

8.2.2.3. **Perception of Society Satisfaction**

Some measures of society perception are also reported on the balanced scorecard. They are grouped under three goals “Community satisfaction”, “Safety” and “Environment”. It may be noted that the indicators relative to the “Safety” goal is relative both to people and society satisfaction. Both internal measures and society perception indicators are used.

The progress reported on the Strategic Objectives every six months also provide Senior Staff with information on the community satisfaction progress.

Heads of departments are directly involved in some of the interactions with the community, such as receiving students for summer or mid-term training, presenting their departments to visiting groups of students, collecting employee donations to humanitarian causes, active participation in ISO certifications and TQM awards etc… Therefore, they
have a good empiric evaluation of society perception, and they reflect it in their SWOT analyses.

8.2.3.2.4. Actual performance of the company

Unless the company has a good knowledge of its present position, plans for the future would have a limited chance of being achieved. The company is using several tools in order to assess its current position.

Progress on the Strategic Plan is reviewed every six months, highlighting the level of attainment on strategic objectives. The previous Strategic Plan review is of major importance to the company, as each partially achieved objective is considered as a possible entry in the new Strategic Plan.

The company uses Key Performance Indicators, grouped on a balanced scorecard, to assess its progress. The balanced scorecard indicators are updated every three months, and sent to all process owners. Thus, every process owner has a good perception of the performance of the company at large, and uses this knowledge in his SWOT analysis.

Each process owner has a measuring system in place for grasping the performance of his process(es). Using this measuring system, he provides Key Performance Indicators that will be used in the Balanced Scorecard. Thus, while advising the Top Management of the strengths and weaknesses in his department, he has measured data to substantiate his analysis.

8.2.3.2.5. Benchmarking data

Competitor pricing policy analyses remain a major input to the Strategic Plan, as they provide knowledge about the market, its evolution, the respective position of each Precast subcontractor and possible threats in this market.

From 2003 onwards, additional benchmarking data against world-class Precast providers is bestowed by the company’s suppliers. In joint feasibility studies performed with the suppliers, the actual production technology of the company and its actual performance are compared with world-class production technology and the performance obtained by the factories that are using them.
From 2004 onwards, other benchmarking data obtained through Customer Satisfaction Surveys become a main input to the Strategic Plan. This customer perception on the Precast Subcontractors in the United Arab Emirates, provides useful information to the company, in particular regarding areas for improvement (see paragraph 8.2.10.4).

In addition, from 2004 onwards, the Company developed some cooperative relations with its main competitors in the U.A.E. This was possible because of the favourable market trend, which allowed the organisations to consider that their growth was limited more by their production capacity than by the presence of competitors. In such a favourable market, it made sense to share knowledge in order for both organisations to progress. Respective factory ground visits were organised, and contact between the two companies intensified. It became possible to call the competitor company when faced with a problem, and ask if they faced the same issue, and if they managed to solve it satisfactorily. This additional knowledge of the company’s main competitor performance and production techniques was also used as an input to the Strategic Plan.

Technical and TQM research allows the company to compare itself with best-in-class internationally. Those benchmarking researches allow the company to identify areas for improvement, and to set strategic objectives accordingly.

8.2.3.2.6. A Strategic Plan based on forecasts

From 2003, sales and financial forecasts for the year-to-come become a major input to the Strategic Plan. They also provide a guide line with which the actual performance is compared.

From 2004 onwards, the cost of investments was added to the financial forecasts. Before the Strategic Plan is validated, it takes into consideration the broad objectives of the Top Management. Once the Strategic Objectives are defined, it is reviewed to integrate detailed strategic objectives for the year. Therefore, the cost of investments can be considered both as an input and an output of the Strategic Plan.

As the company gained expertise in forecasting its financial results, discrepancies tended to diminish, and the company gained confidence in the usefulness of this tool.
Accurate forecast pointing out where the company might be heading, is a tool of major importance in order to set strategic objectives, according to the requirements pertaining to those forecasts.

8.2.3.2.7. Researches as a major input to the Strategic Plan

From 2003 onwards, any major investment has to be backed up by a feasibility study.

Feasibility studies may be provided by a Department, by a multi-disciplinary study team, or by a joint study between a supplier and the company. Those last two options are increasingly used by the company, as they provide additional advantages over a study by a given department:

A multi-disciplinary study team provides a wider sphere of knowledge than a departmental study. Employees with high technical knowledge but poor written English communication skills can contribute, when associated with employees with good written communication skills. Multi-disciplinary teams provide opportunities to work with employees with whom relations were previously limited and who are often from different hierarchical levels. This team work reinforces the cooperative spirit, trust and links within the company. It may be noted that study teams often look for additional expertise outside the team, such as other employees, suppliers or even competitors.

Joint studies between a supplier and the company proved to be very effective, as the supplier brings into the team his level of expertise, gained by having provided such technical advices to a number of Precast manufacturers around the world. The company provides information about the specificity of the U.A.E. environment.

TQM and Technological researches highlight possible strategic objectives for further growth. Those objectives must then be assessed according to the specific situation of the company. Some of them might be the starting point of a feasibility study.

Market trend analyses provide knowledge about the evolution of the Precast market, product by product, allowing to detect trends at an early stage, and to adjust the strategic objectives accordingly.
8.2.3.3. The Strategic Plan deployment and progress review

Strategic Plan deployment and progress review

Mission & Vision review

Strategic Plan update

Process owners select objectives for Continual Improvement

Balanced Scorecards objectives (KPI) and targets are reviewed according to strategic & CI objectives

Process owners improve their process

Progress on Strategic Objectives is recorded and reviewed every 6 months.

Progress on Balanced Scorecard indicators (KPI) is recorded and reviewed every 3 months.

Process owners perform SWOT analyses

Legend

- Defining and aligning objectives
- Improving
- Measurement and learning

Figure 55 Strategic Plan deployment and progress review from 2003 onwards
Based on the Strategic Plan deployment and progress review used by the organisation, the researcher prepared the above graphical representation.

8.2.3.3.1. The Strategic Plan is deployed

The company ensures that the strategic objectives are aligned with the mission and vision, by initiating the strategic plan review process with a re-examination of the mission and vision statements.

Ownership of strategic objectives is clear, as process owners have actively participated in the elaboration of the Strategic Plan, and as responsibility for strategic objectives are defined in the Plan itself.

As it may be difficult to progress on all objectives at the same time, process owners are encouraged to select one or several objectives, reviewing their progress, and selecting new ones when targets are achieved.

Continual improvement objectives are defined by the process owners. They must be specific, measurable, attainable, realistic and time-constrained. A form is used to define the objective and report progress.

Once defined, the Continual Improvement objective is sent to the Executive Manager, who checks its alignment with the company's policy and strategy.

Objectives for continual improvements as well as strategic objectives which have been defined in a quantified way are used to select Key Performance Indicators with their corresponding targets, which are reported in the Balanced Scorecard.

Process owners are responsible to measure the progress of their process(es), according to the Continual Improvement(s) defined. At a pre-agreed frequency (defined on the CI form), the current reading is sent to the Executive Manager for review. If deemed necessary, Action Plans may be defined to achieve the objective.

8.2.3.3.2. Progresses on Strategic objectives are reviewed

Once every three months, the balanced scorecard is updated by the researcher. A review is performed, and the Executive Manager and process owners initiate corrective actions, if necessary.
Once every six months, progresses on strategic objectives are updated by the researcher and reviewed. Improvement meetings are generally scheduled following this review, and action plans are drawn when necessary.

The progress reports on the Strategic Plan and on the balanced scorecard are important elements taken into consideration by the process owners when performing SWOT analyses, a key element of the Strategic Plan review process.

8.2.3. Sustaining introduced improvements

In 2003 and the beginning of 2004, improvements have been introduced in the Strategic Plan review process, in its deployment process, as well as in the progress review process. They were tested and further improved when necessary. The system proved efficient, and provided the company with tools helping to set objectives, monitor progress, and to learn from this monitoring.

Continued improvements were reported and measured in the majority of the company’s processes.

It was therefore of critical importance to sustain these strategic process improvements over-time and to prevent regression.

In order to sustain improvements identified in the Strategic Plan review process, in the Strategic Plan deployment and in its progress review, an ISO procedure was established by the researcher, describing in detail these processes.

Regular audits, both internal and external, ensure that the improvements are sustained.

8.2.4. Reviewing the processes for improvement using flow-charting

8.2.4.1. Rationale of the process flow-charting review

The researcher proposed the flow-charting of the company’s main processes in order to identify areas for improvement.

She performed a TQM literature review in order to identify best practices. A number of articles of interest were collected:

Relevant articles were presented to the Top Management. It was decided that the approach used should be as simple as possible, should not involve any important investment such as specialised software, and that the form of the charts should be readable and easily understandable. The researcher was assigned the responsibility of heading and supervising the study.

It was decided to restrict the project to the Departments holding the main processes of the company. The following Departments were selected:

- Commercial & Estimation
- Planning
- Purchasing
- Design Department
- Factory Production
- Site Erection

The chart proposed, see below, presents the process adopted by the company. The Site Works process is taken, in the next paragraphs, as an example of obtained documents.

Figure 56 Flowcharting process
Flowcharting process

1. Ask the Head of Department to select a study team.
2. Meet the team and present objectives and scope of the flow-chart review.
3. Identify the process(es) in which the Department is involved.
4. Define the boundaries of the process.
5. Multi-department process? 
   - YES: Form a multi-department study team.
   - NO: Flowchart successive steps of the process.
6. Verify if steps are missing, or unnecessary, and if simplifications are possible.
7. Possible improvements?
   - YES: Study request modification.
   - NO: Identify interactions for other processes.
8. Send flowchart for review to interacting process owners.
9. Request for modification?
   - NO: Rate satisfaction of the process owners with inputs, resources & controls.
   - YES: Study possible improvements to increase satisfaction with inputs, resources & controls.
10. Establish table of process interactions.
11. Compare obtained flow-chart with ISO procedures.
12. Modifications required in ISO procedure?
   - NO: Request ISO Procedure modification.
   - YES: Modifications required in flowchart.
13. Detailed study of each step.
14. From the detail study of the steps, extract inputs, resources, controls & outputs.
15. Rate satisfaction of the process owners with inputs, resources & controls.
16. Study possible improvements to increase satisfaction with inputs, resources and controls.
17. Establish table of process interactions.

Legend:
- Operations
- Controls
- Communication

Company Level | Process Level
Department(s) Level | Step Level
8.2.4.2. Process identification

Once the departments which are part of the intended flowcharting study are identified, the team in charge of the study headed by the researcher, asks each Head of Department to form a small study team, ideally of three employees.

During the first meeting, the purpose of the study (flow-charting main processes), the Departments involved, and the objectives are reviewed. The proposed objectives are defined as being the following:

- Flowcharting the process should help identify possible weaknesses, and unnecessary steps.
- It will help concerned departments to present easily their process to others: Other departments, new employees etc…
- It will help the company to identify interactions between the different processes, and possible improvements in these interactions.
- By rating inputs, resources and controls, process owners may pinpoint areas for improvements, and low rating items can be discussed during inter-departmental meetings in which possible improvements can be examined.

The first step of the study process was to identify the process(es) owned by the department. This identification, however, was not as simple as it may seem. In several cases, the team had to start by answering the following questions?

➢ What products or services are produced by your department? (outputs)
➢ What do you need in order to produce them? (inputs & resources)
➢ How do you produce them? (main steps of the process)

In some cases, the team had to consider whether the identified outputs were all related to one process or to several processes. For example, should the team consider that moulds and precast panels are the output of the “Factory Production” process, or that moulds are the output of the “Mould Production” process, while “Precast panels” are the output of the “Casting” process. In this particular case, the decision to consider two different processes was easily taken. However, it took the team longer to decide whether “Precast panels” and
“Hollowcore slabs” were the output of the “Casting” process, or if each one were the output of the “Precast casting” and “Hollowcore casting” processes respectively.

The difficulty was even greater when a process was shared by several Departments. For example, it took the study team some time to grasp that the numerous interactions of the “Estimation” process between the Estimation Department and both the Commercial Department and the Planning Department, were not interactions as such, but were reflecting the fact that part of the “Estimation” process is performed by the Commercial Department and part by the Planning Department.

In such a case, the study team was widened in order to include members of all departments participating in the process.

It was then important to define precisely the boundaries of the process. Example: “We will consider that the Estimation process starts when the company receives an enquiry, and ends when it receives the letter of intent from the client.”

8.2.4.3. Defining and flow-charting process steps

Figure 57 Example of process flowchart
The example of process flowchart proposed in the previous page, represents the “Site works” process. The symbols used are the ones recommended by the American Institute of Engineering, and were chosen because they are well-known and easy to understand.

The main difficulty of this stage was to decide how detailed the process description should be. In several instances, the team had to revise its work, once it found out that the process had been too detailed, and that it was starting to be difficult to grasp its logic. In other cases, the process was too summarised, with lack of details.

Once the team was in agreement with the flowchart, a typed copy was sent to all team members for review, and several days elapsed before the team met again. This allowed the members to reflect on the work done, and to gain an overall view, which proved useful.

The resulting process flowchart was also compared with the one described in print in the ISO procedures. During the following meeting, discrepancies were reviewed. In most cases, they required either a flowchart modification or an ISO procedure modification. Leaving the verification against ISO procedure so late in the flowchart process, was a deliberate choice of the review team, in order for the flowchart not to be influenced by the procedures, but to reflect reality.

Until this stage, the aim of the team had been to describe the process as it was performed in the company. It was now time to review this process with a critical mind, identify unnecessary or missing steps, and possible simplifications.

As a process does not work in isolation, several interactions with other processes were generally identified in the flowchart. It was important to verify that corresponding process owners agreed with those interactions. A copy of the flowchart was sent to all corresponding process owners, identifying clearly areas of interaction, and requesting their comments/validation.

8.2.4.4. **Detailing each step**

Once the flowchart validated, each step was studied. The following elements were considered:

- Is it a key step?
- Who is responsible for it?
- What are the required information / equipments /facilities in order to perform it?
- What are the required inputs in order to perform it?
Daniele Seraphim – Ph.D.

- Who are the suppliers?
- Who are the customers?
- What are the customers’ requirements?
- What are the outputs?
- What is the method of measurement?

For example, here are the details of the first steps of the “Site works” process.

<table>
<thead>
<tr>
<th>Step No.</th>
<th>Description</th>
<th>Key</th>
<th>Responsibility</th>
<th>Required Information/Equipment Facilities</th>
<th>Input</th>
<th>Suppliers</th>
<th>Customers</th>
<th>Customer Requirements</th>
<th>Output</th>
<th>Method of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW 1</td>
<td>Receive copy of Letter of Intent</td>
<td>N</td>
<td>Planning Dept.</td>
<td>Copy of Letter of Intent</td>
<td>Planning Dept.</td>
<td>Projects Manager</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 2</td>
<td>Briefing meeting</td>
<td>Y</td>
<td>Executive Manager</td>
<td>GPC quotation, Consultant drgs, Specifications, Planning</td>
<td>Commercial info</td>
<td>TC Manager, Planning Manager, Heads of Dept</td>
<td>Give full info for project</td>
<td>Comments from Heads of Dept, Clarification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 3</td>
<td>Is contract signed?</td>
<td>Y</td>
<td>Planning Dept.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 4</td>
<td>Instruction to start from EM?</td>
<td>N</td>
<td>Executive Manager</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Instruction from EM to start site work without contracts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 6</td>
<td>Assign project to Engineers/Supervisors</td>
<td>Y</td>
<td>Projects Manager</td>
<td>Contract Letter of Intent</td>
<td>Planning Dept.</td>
<td>Projects Manager</td>
<td>Engineers/Supervisors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 7</td>
<td>Planning for Manpower requirement</td>
<td>Y</td>
<td>Engineers/Supervisors</td>
<td>Contract Letter of Intent</td>
<td>Planning for Manpower</td>
<td>Engineers/Supervisors</td>
<td>Required quantity of Manpower (RT Form)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 8</td>
<td>Is Manpower in dept. sufficient?</td>
<td>N</td>
<td>Projects Manager</td>
<td>Allocation status of Manpower throughout all sites</td>
<td>Planning for required Manpower</td>
<td>Engineers/Supervisors</td>
<td>Required quantity of Manpower (RT Form)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 9</td>
<td>Send RT Form to EM and Planning</td>
<td>N</td>
<td>Projects Manager</td>
<td>RT Form</td>
<td>-Projects M -Engineers/Supervisors</td>
<td>-Executive Manager -Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW 10</td>
<td>Are payment conditions met?</td>
<td>Y</td>
<td>Financial Manager</td>
<td>Info from Financial Dept</td>
<td>Financial Dept</td>
<td>Projects Manager</td>
<td>Timely communication</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 57 Example of steps detailing for flowcharting

8.2.4.5. List of inputs, resources, controls and outputs

From the detailed information of each step, it was possible to extract the inputs, resources, controls and outputs.

In some cases, a preliminary list had been established during the first meeting, as a help to identify processes. In such a case, this preliminary list and the list obtained through step detailing were compared.

In all cases, the obtained lists were assessed, as a missing element in one of these lists would mean missing steps in the flowcharts.
### Process Analyse - Inputs, Resources, Controls & Outputs

**Process SW: Site Works**

<table>
<thead>
<tr>
<th>Input to the process</th>
<th>Resources</th>
<th>Controls of the process</th>
<th>Output to the process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precast Panels</td>
<td>Drawings</td>
<td>PCI Codes</td>
<td>End Product</td>
</tr>
<tr>
<td>Site Material</td>
<td>Transportation</td>
<td>Contract &amp; Project Specifications</td>
<td>GRF</td>
</tr>
<tr>
<td>GD Information drgs</td>
<td>Cranes</td>
<td>Method Statement</td>
<td>R1 Form</td>
</tr>
<tr>
<td>Instruction from EM to start site work without contracts</td>
<td>Erection Teams</td>
<td>Planning</td>
<td>Site Progress Report</td>
</tr>
<tr>
<td>Foremen</td>
<td>DN</td>
<td>General Site Sequence</td>
<td></td>
</tr>
<tr>
<td>Engineers/Supervsors</td>
<td>Material Inspection Form</td>
<td>Detailed Site Sequence</td>
<td></td>
</tr>
<tr>
<td>Projects Manager</td>
<td>Factory Casting Programme</td>
<td>GRN</td>
<td></td>
</tr>
<tr>
<td>Copy of letter of intent</td>
<td>Factory Delivery Programme</td>
<td>Site Information</td>
<td></td>
</tr>
<tr>
<td>QS invoices</td>
<td></td>
<td></td>
<td>NCR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Monthly Progress of work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 58 Example of Inputs, Resources, Controls and Outputs defined for each process as part of the flowcharting activities

#### 8.2.4.6. Rating the satisfaction with inputs, resources and controls.

Initially, the team decided to rate inputs and resources [outputs were considered to be better rated by the customers (internal or external)], and as rating controls did not seem to add value to the study.

However, it appeared that it was important to rate controls. In some cases, a poor control may mean a poor process. For example, the design team reported that control of the design against British Standards was not entirely satisfactory, as the standards available in the company were outdated. The improvement action related to this example was easily implemented: purchase a copy of the latest BS.

The rating was done in two parts, first the importance of the item, and then the satisfaction attainment for the item. Items having a high importance and a low satisfaction were examined first for improvement.

Issues pertaining to a low satisfaction were described and reported in the table, as well as remarks for improvement. It may be noted that in most of the cases, nothing could be done by the process owners to improve on low satisfaction items, as those items were relative to other departments.

The following table reflects the rating on inputs, resources and controls of the “Site works” process.
**Process Analyze - Importance and Satisfaction of Inputs, Resources and Controls**

Department: Site Works

Please evaluate the following items:

very low 1>2>3>4>5 very high

<table>
<thead>
<tr>
<th>Items</th>
<th>Importance</th>
<th>Satisfaction</th>
<th>Issue</th>
<th>Remarks for improvement</th>
<th>received from</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inputs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Precast Panels</td>
<td>5</td>
<td>3</td>
<td>Quality of received panels</td>
<td>- Increase QC manpower in terms of quantity &amp; qualification</td>
<td>Factory</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delivery progress (particularly for precast panels)</td>
<td>- Change Factory defective tower cranes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Resources should match production</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Factory Sequence should abide by site sequence</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Additional supervisors to check seq &amp; take action accordingly</td>
<td></td>
</tr>
<tr>
<td>Site Material</td>
<td>5</td>
<td>3</td>
<td>Problem of quality</td>
<td>- Purchasers should take quality more in consideration than the price</td>
<td>Suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Small delay in material delivery</td>
<td>- A maximum period between making GRF &amp; receiving material should be fixed</td>
<td></td>
</tr>
<tr>
<td>QD Information drgs</td>
<td>5</td>
<td>4</td>
<td>Sometimes fixing QD requires to be more clear</td>
<td></td>
<td>Tech Dept</td>
</tr>
<tr>
<td>Instruction from EM to start site work without contracts</td>
<td>5</td>
<td>4</td>
<td>Customer reliability should be taken more into consideration</td>
<td></td>
<td>EM</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drawings</td>
<td>5</td>
<td>4</td>
<td>Discrepancies in drgs</td>
<td>- Inform Tech Dept about discord in drgs</td>
<td>Tech Dept</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Remaining scope of work is unclear</td>
<td>- Need info on remaining scope of work from Tech.Dept at each AFC reception</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>5</td>
<td>4</td>
<td>Delay in trailers delivery</td>
<td>More specified planning for transportation (specified arrival times for trailers)</td>
<td>Factory</td>
</tr>
<tr>
<td>Cranes</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
<td>Suppliers</td>
</tr>
<tr>
<td>Erection Teams</td>
<td>5</td>
<td>3</td>
<td>Not enough manpower</td>
<td></td>
<td>Site</td>
</tr>
<tr>
<td>Foremen</td>
<td>5</td>
<td>4</td>
<td>A few foremen have medium qualification</td>
<td></td>
<td>Site</td>
</tr>
<tr>
<td>Engineers/Supervisors</td>
<td>5</td>
<td>4</td>
<td>Lack of continuous planning &amp; proper reporting</td>
<td>Self-motivation &amp; increased direction from Projects Manager</td>
<td>Site</td>
</tr>
<tr>
<td>Projects Manager</td>
<td>5</td>
<td>4</td>
<td>Overloaded Projects Manager which sometimes creates delays in action</td>
<td></td>
<td>Site</td>
</tr>
<tr>
<td>Copy of letter of intent</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
<td>Planning Dept</td>
</tr>
<tr>
<td>QS invoices</td>
<td>5</td>
<td>3</td>
<td>Invoices have to be done accurately and according to the contract</td>
<td>QS has to check the contract requirements and abide by its terms before preparing the invoice</td>
<td>QS</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCI Codes</td>
<td>4</td>
<td>2</td>
<td>Engineers/Supervisors are not aware of PCI Codes</td>
<td>- PCI training on codes for production &amp; erection</td>
<td>PCI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Send memo to Eng./Sup. &amp; Foremen asking them if they want to receive a copy</td>
<td></td>
</tr>
<tr>
<td>Contract &amp; Project Specifications</td>
<td>5</td>
<td>3</td>
<td>Eng./Sup. not aware of specifications (have access to them)</td>
<td>Update procedures by specifying that Eng./Sup must read &amp; be familiar with spec</td>
<td>Client/Planning Dept</td>
</tr>
<tr>
<td>Method Statement</td>
<td>4</td>
<td>3</td>
<td>No Method Statement available for all projects</td>
<td>Projects Manager send copy of Meth Statem. to Eng./Sup</td>
<td>QC</td>
</tr>
<tr>
<td>Planning</td>
<td>5</td>
<td>4</td>
<td>No delivery planning</td>
<td>Inform planning of internal customer requirements</td>
<td>Planning Dept</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Project planning not detailed enough</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- No monthly integrated resource planning for projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No feedback on monitoring about faci. &amp; site works vs. initial planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DN</td>
<td>5</td>
<td>4</td>
<td>Some minor mistakes in DNs</td>
<td>More checking</td>
<td>Factory Supplier</td>
</tr>
<tr>
<td>Material Inspection Form</td>
<td>5</td>
<td>3</td>
<td>Not reliable</td>
<td>Increase QC manpower in terms of quantity &amp; qualification</td>
<td>QC</td>
</tr>
<tr>
<td>Factory Casting Programme</td>
<td>5</td>
<td>3</td>
<td>No dates on Factory Casting Programme</td>
<td></td>
<td>Factory</td>
</tr>
<tr>
<td>Factory Delivery Programme</td>
<td>5</td>
<td>1</td>
<td>Does not exist in written form &amp; verbal information is not accurate</td>
<td>Develop Factory Delivery Programme</td>
<td>Factory</td>
</tr>
</tbody>
</table>

Table 59 Example of Importance and Satisfaction rating of Inputs, Resources and Controls performed as part of flowcharting activities
8.2.4.7. **Study of possible satisfaction improvements**

The next step taken by the flowcharting teams was to participate in a joint meeting in which any item with a low satisfaction result may be reviewed for improvement.

As all teams participate in the flowcharting and rating of their own process, all attendants were aware that the exercise was not meant to accuse other departments of not doing their job properly, but rather to improve the overall internal satisfaction within the company, thus improving the customer satisfaction.

In many cases, improvements made in one department generated only a slight inconvenience (if any) for that department, but improved greatly the satisfaction of others. As each department benefited from improvements introduced in other processes, process owners agreed that overall, the review had been beneficial to their department.

8.2.4.8. **Table of interactions between processes**

From the flowcharts, a table of interactions was established. Each interaction referred both to the process(es) step(s), and to the ISO procedure in which it was described.

The example below presents a small extract from the table of interactions: the interactions of the “Site Works” process with the clients and the Design process.

<table>
<thead>
<tr>
<th>Send to, Receive from, Clarify with, Inform whom, Request from etc.</th>
<th>Client</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Works</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S49</td>
<td>Send Progress payment</td>
<td>QP11</td>
</tr>
<tr>
<td>S49a</td>
<td>Handing Over</td>
<td>QP11</td>
</tr>
<tr>
<td>S46a</td>
<td>Receive instruction for maintenance</td>
<td>QP17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 60 Example of interactions between two processes

8.2.5. **Departments process control and measurement**

8.2.5.1. **Departmental statistical evaluations**

Prior to 2003, most of the statistic analyses were performed by the IT Department (headed by the researcher), as it was the only department having the required knowledge. However, this was reducing the control of the departments over their processes. For example, if a process owner detected a possible disturbance in its process, and wanted to verify the possible impact on statistical data, it was often not possible for the IT department to
produce an additional statistical report before the next set date, as it would delay the analyses in other departments.

Therefore, the researcher and the Top Management decided that the Departments themselves should acquire the knowledge required in order to produce statistical analyses about their processes.

The knowledge necessary was identified as being the following:

- How to select data from the Database.
- How to export data from the Database to a spreadsheet.
- How to use the statistical functions of a spreadsheet.
- How to create and use Pivot Tables.
- How to present data graphically.

Heads of Department were requested to select computer literate employees, who would be trained on those techniques.

The following methodology was chosen: During the first month, selected employees were shown by the IT employees how the analyses were performed. During the second month, the selected employees performed the analyses, under the supervision on the IT employees. From then onwards, analyses were performed in the department. At first, analyses were sent to the IT department for checking. Once a department managed to perform successfully two analyses in a row, the double checking system was discontinued, and the IT department was contacted only when support and advice were required.

During this whole process, analyses were reviewed for improvement, using the suggestions from the employees of the departments.

8.2.5.2. Increased utilisation of contract work

Contract work consists of agreeing beforehand with a team of workers, the number of hours that will be paid for performing a given task, independently of the actual time it will take to perform it. It is a condition of the agreement that the quality of the work has to be satisfactory.

This technique was already used by the company for some years, mainly when time was an issue. An improved statistical control by the departments, allowed them to generalise this
practice. Statistic analyses were used both to verify what was the ‘normal’ number of hours required to perform a given task, and to subsequently verify that the productivity was positively affected by the utilisation of ‘contract work’ agreements.

Thus, it allowed the process owners to increase their control over their process, and it increased the employee satisfaction by allowing them to better their salaries through increased productivity.

It may be noted that contract work was always performed on a voluntary basis, and not imposed to the workers, and that the number of target hours for payment was partly negotiable.

8.2.5.3. Measuring the performance of the processes

In 2002, the company improved its measuring of its main processes and, from 2003 onwards, all processes had a measuring system in place.

When no measuring system was available, the process owner and the researcher discussed several possible assessment criteria.

This task proved particularly difficult for processes for which outcomes were services and not products, and when several departments were involved in the processes.

As an example, measuring the performance of the Planning process proved particularly difficult. The outputs of the process are project plans, proposed by the Planning Department. The performance of these plans depends greatly on the work of other departments, but also on the client himself. For example, if the excavation work is not performed on time, the company cannot place the concrete panels, and the project plan is not respected.

In such cases, internal satisfaction with the process was used as a measuring system of the process. In the above example, the design, factory and site erection Departments were asked to rate their satisfaction with each project plan provided by the planning department, and the average obtained was used to measure the performance of the Planning process.

For each measuring system chosen, it was verified that the process owners had the possibility to influence at least partially the measures.
By June 2003, a measuring system was in place for all processes of the company.

8.2.5.4. Sustainability of performance measurement system

In order to make sure that process owners did not revert to their previous habits, the necessity of defining a measuring system for each process, of taking regular readings using this system, and of taking corrective measures when necessary, was described in the ISO Procedures.

Thus, during internal audits, each process owner is to be able to answer the following items satisfactorily:

- How do you measure the performance of your process?
- Please provide the last obtained readings.
- How do you identify trends in your performance?
- What action do you take if you identify a negative trend?

8.2.6. Aligning Human Resources with the company's Quality System

Total Quality Management principles cannot be fully implemented unless all Human Resources, at all levels, are aiming towards continual improvements, which must be aligned with the policy and strategy of the company. It is therefore of major importance that employees are aware of the policy and strategy and that all efforts are streamlined towards the defined objectives, using the core values defined by the company.

8.2.6.1. Measuring adherence to core values

Once the company has defined its core values, all human resources must be informed of these values, and adherence must be measured. As described in paragraph 6.2.2.16.2, the company decided to include core value rating within its annual appraisal system, making sure that all Human Resources clearly understand what is expected from them, and how the company perceives their current adherence level.

Once the annual appraisals are completed, both work satisfaction level and adherence to core values level are entered into a computer database, for each employee.

Using these data, the company measures the average level of adherence to core values within the company, as well as the results obtained by departments and branches.
It may be noted that from the first measure of adherence to core values in 2001, yearly progress was recorded, thus providing a basis for assessing the effectiveness of including adherence to core value in the appraisal system as a deployment tool. In 2001, the obtained percentage of adherence to core values was 77.83%, 78.69% in 2002 and 81.38% in 2003.

### 8.2.6.2. Annual review of the organisation chart

The organisation chart of the company was fully reviewed by the Top Management in 2001, following the modification of the company’s Top Management. In 2003, it appeared that due to the fast growth of the company, the 2001 organisation chart no longer matched the organisation structure, creating tensions and difficulties for employees whose position was not clearly defined.

It was thus important to update the chart, and to make sure that the review would be performed annually from then onwards, in order reflect the company’s growth.

A second complete review of the organisation chart was performed by the end of 2003, using the inputs of the Heads of Departments. Each of them was asked to draw the chart of his department as currently applied, and to highlight possible deficiencies and improvements. The Top Management collected the obtained charts, and individual meetings with Heads of Departments and employees whose positions required further clarification were scheduled.

The Top Management reviewed the obtained organisation charts for overall coherence, and drafts of Departments charts and the overall chart were distributed for review.

During the next Management Review meeting, the overall organisation chart was discussed, fine tuned and validated. It was then included in the Quality System documentation of the company.

The necessity of performing an Organisation Chart review at least once per year was included in the ISO procedures of the company, sustaining the review process over time.

### 8.2.6.3. Annual review of Job Descriptions

Following the Organisation Chart review, a job description is defined for all new and modified positions. Avoiding overlapping and gaps proved to be of major importance in order for employees to work efficiently.
Overlapping of responsibilities either results in double work or non-performance of tasks and in all cases in tensions between the two positions involved. Gaps in responsibilities result in process discontinuity and perturbations.

It may be noted that non-performance of main tasks due either to overlapping or to gaps in responsibilities is often detected at an early stage, as involved processes cannot be performed properly. The situation which provokes a profound disruption is often settled at an early stage, even if formal recognition of responsibility may take some time.

When tasks are minor ones, detection of non-performance may take longer. Those tasks are often at the border of several responsibilities. During suggestion competitions, such minor non-performed tasks were detected. For example, the responsibility to collect supporting timber for delivered panels was clarified following an employee suggestion: In order to deliver panels at site, timber supporting systems are often fixed on the trailers. If the site is not ready for erection, panels may be stored at site using the transporting support system. The responsibility to collect the supporting systems from the sites, once the panels are erected, was not clearly defined, and in many instances, supporting systems were thrown away by the main contractor. As supporting systems are of low value in comparison with the panels themselves, and as the situation was occurring only when the site was not ready for erection, the situation went undetected for several years. Once highlighted, it was solved by defining that it is the responsibility of the sites supervisor to send a trailer once a week to all active sites in order to collect unused supporting systems.

Tasks performed by several positions may also be carried out for a long period of time, creating a loss of added value and incoherence in the system. Detecting such overlapping is not always easy. Two tools proved efficient for such detection: The creation of a centralised database revealed double entries of data by different departments that had been undetected for several years; During the flow-charting of the processes, the responsibility for each step was defined, highlighting several double work activities.

The best way to prevent such situations is to clearly define responsibilities, aiming towards detecting gaps and overlapping, and to verify responsibilities defined in the procedures and in the process flow-charts against job descriptions at regular intervals.
Job description review is performed in consultation with employees holding the position. Display boards are used in order to post any modification, and ISO procedures and process flow-charts are updated.

The systematic review of Job Descriptions following the organisation chart review was notified in the ISO procedures.

**Human Resources Plan review process**

- Company wide Strategic Plan Review process
  - Strategic Objectives
  - Preliminary HR requirements by process

- Departments' Analyses
  - Current Human Resources availability
  - Human resources requirements by months and
    - Gap Analysis by months and qualification.

- HR Department Analyses
  - Review of Departmental Gap Analyses
  - Company wide Gap Analysis
    - Human Resources Transfer Plan
    - Human Resources Training Plan
    - Human Resources Recruitment Plan

**Figure 58 Human Resources Plan review process**

8.2.6.4. **HR Gap analysis and HR recruitment Plan**

During the Strategic Plan review process, main requirements in term of Human Resources are identified for each process.
Once the Strategic Plan is validated, each Department is asked to perform a Human Resources gap analysis. According to the strategic objectives defined, they detail their needs, according to the foreseen monthly production, in terms of skills/qualification requirements. In comparison with their current Human Resources availability, they prepare a detailed gap analysis. In most of the cases, due to the growth strategy of the company, gap analyses identify new requirements rather than excess availability. However, if the later is the case, human resources in excess in one department are either transferred to another department or trained to acquire other required qualifications. Due to both the growth strategy of the company and the difficulty in hiring new employees, no employee layoffs due to economic reasons have been necessary over the last ten years, including during the period of financial difficulties in 2000.

The Human Resources Department collects and studies the departmental gap analyses. When deemed necessary, a review is performed with Heads of Departments to verify the proposed figures.

Departmental Gap analyses are then compiled in a company-wide gap analysis. The resulting requirements are reviewed and validated by the Top Management.

According to this analysis, three plans are drawn.

- The Human Resources transfer Plan, highlights internal reallocation of employees, from Departments identifying an excess of Human Resources, to Departments having additional requirements. It may happen that no such plan is required.

- The Human Resources training Plan identifies training to be performed in order to acquire new qualification or knowledge. In some cases, the Human Resource department compares the cost of training against the estimated cost of hiring an employee experienced in the required position.

- The last plan defined by the Human Resources department is the hiring plan. Due to the length of the hiring process in the United Arab Emirates, this plan is of major importance to the company. Without such a plan, shortage of manpower would severely affect the performance level, and prevent the company to fulfil its strategic objectives. Unlike transfers and training, hiring decisions cannot be implemented as a short term emergency response.
8.2.6.5. Generalisation of Recruitment test

In order to sustain its growth, the company relies heavily on hiring new employees. Thus, in 2003, 434 additional employees were hired, which represented a 40% increase over the total number of employees. Due to the length and difficulties of the hiring process, it is rare that employees are not offered a position after their testing period of one month.

In such a situation, selecting the proper employees for the intended positions is of major importance. The company decided to rely less on hiring meetings, and more on practical tests. Whenever possible, those tests are performed in the country of origin of the prospective employee, in order to provide visas only to satisfactory candidates.

Each department was asked to prepare hiring tests for the main trades required, and to keep them up-to-date. Candidates who successfully pass the tests, are granted several meetings in order to verify that they can easily adapt to the core values of the company.

In the case of new graduates, the company is looking more for candidates with potential for future managerial positions, than for in-depth experience and knowledge. Those would-be employees are tested on several competences, and meeting, or being close to passing grades on several positions are more valued than a passing grade in one position. Extensive interviews are also used to determine possible adherence to the core values of the company.

If the candidates are not residing in the United Arab Emirates at the time of the interviews, an extensive briefing is performed about the living conditions in the UAE and in the company. Films on the company life and living conditions are used to that effect. The aim of this briefing is to avoid hiring employees who may not adapt easily to those living conditions, and would decide to return to their country of origin after a few months, necessitating restarting the visa request process.

8.2.6.6. Increased multi-departmental team working

The company decided to increase multi-departmental team work, in order to increase the employee perception of the company’s goals over departmental goals.

It was noted that the objectives of departmental improvement and performance had, in some cases, a negative impact on the company’s improvement and performance.
As an example, the objective of performance of site erection would induce the Construction Department to refuse systematically any panel storage on site if those panels could not be erected immediately, in order to eliminate double handling of those panels (crane work to store the panels and later to erect the panels, against a unique crane work to erect the panels). However, in cases of high production increase, limited factory storage and temporary obstacles on some sites, the Factory objectives of performance will drive the factory not to reduce its production, and thus to increase the stocks. If this situation persists for some time, the storage situation in the factory would degrade and quality problems would emerge. In such a situation, the overall performance of the company could improve if some sites could absorb some of the factory’s excessive storage, as the loss of product quality of factory production is higher than the cost of double handling on site. However, as Sites have stringent objectives for productivity improvement, this solution will be strongly resisted by the Construction Department.

As a second example, a project’s site erection was not under the responsibility of the Construction Department, due to its distant location. As this site was performing badly, the Construction Department was asked to release some of its experienced staff to be assigned to the poor performing project. As this would reduce the overall performance of the Department, the request was strongly resisted. The badly performing site was then placed under the responsibility of the Construction Department, which immediately decided to reinforce the site team with experienced erection employees.

Due to stringent objectives of performance imposed on processes, the occurrence of this type of situation increased, which negatively affected the overall performance of the company.

It was therefore important to increase inter-departmental team work, in order to improve the perception that overall performance should be of higher priority than short-term departmental performance, and that in the long run, departmental performance would benefit from such a company-wide view. The perception of ‘us’ being the company at large must precede the perception of ‘us’ as a department in case of conflicting interests.

Such modification of perception needs to be driven by the Top Management, who in effect used the following methodology:
1. Arbitration by Top Management, with in-depth clarification of the reasons behind such arbitration.

2. Creation of cross-departmental committees. When arbitration is required, Top Management intervention during committee meetings.

3. Progressive handing over of arbitration work to the committees.

Using such practice, the culture of the company evolved, conflicts of interest were minimised and solved at an early stage, preventing problem occurrence.

**8.2.6.7. Sustaining the improvements**

In order to sustain the improvements introduced in view of aligning Human Resources with the company's policy and strategy, the ISO procedures were modified, ensuring regular audits both internal and external.

- The annual appraisal system is fully documented, including adherence to core values.

- The annual review of the organisation chart as well as the Job Descriptions’ review are described as compulsory.

- Human Resources Gap Analysis using strategic objectives defined and consequential recruitment plan are described as a required analysis of the Strategic Plan review process.

- The availability of up-to-date recruitment tests is verified during audits.

Using this technique, the company ensures that the system cannot revert to previous work habits, and that improvements are sustained.

**8.2.7. Aligning Equipment and Infrastructure with the company's Quality System**

**8.2.7.1. Increased research on state-of-the art facilities**

The company is constantly seeking facilities that may improve its product range, the quality of its production or its productivity. The fast growing pace of the company has a positive impact in this regard.
In order to find out what are the state-of-the-art facilities available world-wide, several research channels have been set in place:

- Through membership in PCI (Precast and Prestressed Concrete institute - USA) and GRCA (GRC association - UK), the company receives regular updates about the latest technology available.

- Key employees participate in seminars world-wide, in which the latest technology is presented, and during which contacts are made with innovative suppliers and competitors.

- Employees visit construction exhibitions world-wide. This proves effective, as several new technologies were introduced through this means (GRC, Stamped concrete, etc), and catalogues of available facilities are collected. When a specific need arises, employees often refer back to these catalogues, to retrieve the references corresponding to the techniques they saw during the exhibition.

- Through contacts with key suppliers, the company performs visit tours of innovative factories abroad, to evaluate technological innovations that have been successfully introduced. This is facilitated by the fact that those companies are willing to demonstrate their production techniques, as there is no competition possible between a concrete factory in Europe for example, and one in the UAE, because of the high transportation costs.

Although the company is willing to invest in state-of-the-art facilities, and often does so, once an opportunity is uncovered, further studies are required to make sure that the foreseen option is the best possible one, and that it will be effective in the UAE context.

8.2.7.2. Increasingly basing investments on feasibility studies

Feasibility studies are compulsory for any major investment, as is specified in the ISO procedures.

Investment alternatives are studied, detailing relative costs and advantages. Return on investment calculations are provided, as well as recommendations to the top management.

Feasibility studies may be performed by a Department, by a multi-disciplinary study team, or in joint cooperation with a supplier.
They might be related to a new production facility (Examples: New Mussafah factory – 2003; Extension of Shahama factory – 2002; Purchase of Shahama factory – 2001; New Dubai factory – 2001), to a production technique (Examples: Study of a magnetic system for fixing side shutters – 2004; Study of vertical utilisation of Hollowcore slabs – 2001), to a strategic investment (Example: Purchase/Rental of transportation facilities – 2001), or to a new product (Example: adding Post-tensioning products to the proposed range of products - 2004).

Among the above-mentioned studies, several investment options were rejected, as the study demonstrated a poor or negative return on investment.

8.2.7.3. Analysis of cost of Equipment breakdown

Although the company is willing to introduce state-of-the-art facilities, when deemed economical through study, it also has to consider its older equipment.

In this regard, the company is a combination of state-of-the-art facilities, introduced in order to underpin its growth, and older facilities, as some of the production centres started production twenty years ago. Some of the equipment (such as cranes), dating from the creation of the company, are still in working condition, although their manufacturers do not produce them any longer.

It is therefore of importance for the company, to track the cost of equipment breakdown, particularly for old equipment.

Cost of equipment breakdown can be split in three parts:

- Cost of spare parts required to repair the equipment
- Cost of manpower required to repair the equipment
- Cost of work disruption

Among those three costs, the first two are easy to measure. From 2003 onwards, for any corrective and preventive maintenance, parts and human resource costs have to be recorded in the ‘history card’ of the equipment.

The last cost is harder to measure. However, it is often a major one.
Although it is very rare that production stops altogether because of equipment breakdown, as alternatives are in place for all critical piece of equipment, the work might be disrupted by the breakdown.

For example, in the case of a batching plant break-down, the alternative might be to bring the concrete to the moulds from one of the other batching plants, using two successive cranes to transport the bucket containing the concrete. In such a case, the workers have to wait longer for the concrete to be available, and the productivity is affected.

The possibility of evaluating the cost of such a disruption by comparing “normal day” productivity and the actual productivity for that day was studied. It appeared however, that many factors may influence the daily productivity, and that it is impossible to isolate the disruption caused by the equipment breakdown.

It was decided, from 2004 onwards, that the factory management would estimate the disruption using a five point scale, in which 1 would be a very minor disruption, and 5 a complete work stop. This evaluation would be done on a daily basis, for each piece of equipment disrupting normal factory operations.

By considering both the cost of maintenance based on spare part and manpower costs, and the evaluated disruption, the top management can decide if specific equipment items need to be replaced.

8.2.7.4. Depreciation system based on whole life costing

From an accounting point of view, the depreciation system used is based on the whole life costing of the equipment purchased.

It may be noted that the company limits the depreciation period to a maximum of five years. This might seem short for major equipment such as batching plants or cranes, but this managerial decision was based on the risks associated with operating in the United Arab Emirates.

Thus, much of the company’s equipment, which is in good condition, and has a positive sale value, is reported as a 1 Dirham value asset in the company’s accounts.
As part of the strategic plan process, a review of the infrastructures of the company, in terms of objectives, function, performance, availability, cost, safety, environmental issues, ergonomics, facilities and services is performed after the Strategic Plan is validated.

A list of infrastructures used by the company is compiled. It consists of the Head Office facilities and a number of Factories and Camps, either owned or rented by the company, as well as "would-be" facilities, for which a study is on-going. For example, the following Infrastructures were identified during the 2004 Strategic Plan review process.

<table>
<thead>
<tr>
<th>INFRASTRUCTURE</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Office in Abu Dhabi</td>
<td>Currently in use.</td>
</tr>
<tr>
<td></td>
<td>Expected date of transfer: Dec 2004</td>
</tr>
<tr>
<td>Mussafah Factory</td>
<td>Currently in use.</td>
</tr>
<tr>
<td></td>
<td>Expected date of partial transfer: Sep 2004</td>
</tr>
<tr>
<td>Shahama Factory</td>
<td>Currently in use.</td>
</tr>
<tr>
<td></td>
<td>Possible handing over by: Aug 2004</td>
</tr>
<tr>
<td>Dubai Factory</td>
<td>Currently in use.</td>
</tr>
<tr>
<td></td>
<td>Extension under study.</td>
</tr>
<tr>
<td></td>
<td>Expected date of extension availability: Oct 2004</td>
</tr>
<tr>
<td>New Mussafah Factory</td>
<td>Design phase</td>
</tr>
<tr>
<td></td>
<td>Expected date of availability: Sep 2004</td>
</tr>
<tr>
<td>Head Office in New Mussafah</td>
<td>Design phase</td>
</tr>
<tr>
<td>Factory</td>
<td>Expected date of availability: Dec 2004</td>
</tr>
<tr>
<td>Old Mussafah Camp</td>
<td>Currently in use.</td>
</tr>
<tr>
<td>New Mussafah Camp</td>
<td>Currently in use.</td>
</tr>
<tr>
<td>Shahama Camp</td>
<td>Currently in use.</td>
</tr>
<tr>
<td></td>
<td>Possible handing over by: Aug 2004</td>
</tr>
<tr>
<td>Dubai Camp</td>
<td>Currently in use.</td>
</tr>
</tbody>
</table>

Table 61 2004 Infrastructure Ergonomic Review

Elements concerning those infrastructures are generally available, either from the previous years studies, or with the design team. They are collected and updated, taking into consideration the modifications that occurred during the year, as well as the increase or reduction of manpower using them. For example, sanitary facilities that were deemed adequate for 500 workers may no longer be so for 750.

Also taken into consideration is the expected date of discontinuity of use of the facility. For example, although the study conducted in the beginning of 2004 highlighted the lack of sufficient space of the Abu Dhabi Head Office, the decision of hiring new grounds was not
made, taking into consideration the planned relocation by December 2004 of the Head Office in the New Mussafah area.

This infrastructure study takes into consideration the strategic objectives defined, and proposes recommendations to the Top Management.

8.2.8. Continual improvement objectives

8.2.8.1. Aims of continual improvement objectives

In order to remain competitive, the company must continually improve each of its processes. The two following elements are required in order to achieve this.

- A measuring system of process performance, in place throughout the company, to enable all process owners to monitor the progression of their process.

- Defined strategic objectives for each process, and defined responsibility for their achievement

As detailed earlier, those two elements were in place in the company from 2003 onwards.

It was decided that the objectives for continual improvement should be selected by the process owners, in line with the policy and the strategy of the company. However, the proposed objectives are reviewed and validated by the Top Management.

It was also decided that regular readings on the progresses towards the target, should be sent to the Top Management for review.

The criteria specified by the ISO 9001:2000 standards were used: Objectives should be specific, measurable, attainable, realistic and time-constrained.

Finally, it was decided to limit the requirements for objective setting, in a first phase, to heads of departments and heads of section. In a second phase, the concept would be further deployed to all foremen. A possible third phase will be considered if the second phase is successful, during which individuals may choose to select objectives for continual improvement.
A deployment in three phases (first heads of departments and heads of sections, later foremen, then individuals), was thought to be necessary for the following reasons:

- Heads of Departments/Sections are the easiest communication point for foremen and employees of the department. Therefore, they should first be very clear about the way the system is working, before being able to assist their foremen and employees.

- Follow up on First phase objectives is performed at Head Office level. However, follow-up of the second and third phase will be done at the Department level, which will require both a good understanding and the willingness to make the system work, which has to be generated during the first phase.

- There, no language difficulties were expected and in fact faced during the first phase. However, language barriers will have to be overcome during the second and third phase.

The first phase took place in 2003. By June, all process owners had defined at least one objective for continual improvement. A pilot study for the second phase has been initiated in 2004, with defined objectives for each foreman of the Shahama Factory, and a strategic objective to extend it to all foremen is targeted for 2005. The pilot study of individual continual improvement objectives is targeted for 2005, and its deployment for 2006.
The Support and Development Department, headed by the researcher, was in charge of assisting process owners in defining Continual Improvement objectives.
This assistance started with an in-depth explanation of the concept of continual improvement, and of the required characteristics of objectives (specific, measurable, attainable, realistic and time-constrained).

The SD Department prepared a list of possible CI objectives by process, based on the strategic objectives defined for the process and on the measuring system in place for this process. This list was submitted to the Top Management for review and validation, and sent to process owners. It was clearly specified that the list was indicative only, and that other CI objectives could be proposed by process owners.

When process owners selected objectives outside the list, a review and validation was performed by the Top Management, who verified that the objectives were in line with the policy and strategy of the company.

When none of the proposed objectives were to the satisfaction of the process owner, and when objectives could not easily be defined, the Support and Development Manager and the process owner discussed the issue together, and defined one or several objectives.

In most of the cases, a measuring system corresponding to the chosen objective was already in place in the process to measure progress. However, additional measuring methods had to be established in some cases.

An initial measure was then taken, and, depending on the value obtained, the process owner defined the following elements.

• Targeted value
• Targeted date
• Frequency of the progress measurements

Those elements were reviewed and validated by the Top Management, closing the CI objective definition process. By June 2003 at least one objective was defined for each company process.
8.2.8.3. Alignment within the Quality System

The alignment of CI Objectives was determined by either a direct selection of the objectives among the strategic objectives, or as an enabler to reach one or several objectives.

As an example of direct objective, a Factory Manager decided to select as one of his CI objective an increase of production which was defined in the Strategic Plan.

As an example of an enabler to reach a strategic objective, the Planning Manager selected the satisfaction of other departments with the Project Plans prepared by his Department. This objective would enable the Department to achieve the Strategic Objective of providing feasible plans for projects.

The Top Management controls and validates both the objectives and the targeted values and dates, checking that objectives are in line, both with the policy, and the strategy of the company.

After the annual review of the Strategic Plan, a list of possible measurable objectives relative to the strategic objectives defined is elaborated by the researcher and reviewed by the Top Management. Among the objectives selected as Key Performance Indicators by the Top Management, some are proposed to process owners as continual improvement objectives.

8.2.8.4. Follow up and review

The frequency of the progress measurement is defined for the associated objective. It may vary from once a month to once a year.

Based upon this specified frequency, process owner sends the current reading both to the Support and Development Department and to the Top Management. When required, the Support and Development department sends reminders.

On receipt of the reading, the Support and Development Department verifies that the reading is progressing towards the targeted value, and that the targeted date is likely to be met.
If such is not the case, the researcher contacts the process owner to check whether the issue is temporary only, or if there is an underlying difficulty in meeting the target. If the later is the case, two different kinds of reasons are examined.

1. The objective itself is not well defined: Generally, either the set target is so stringent that it renders the objective unattainable, or the process owner has too little control over the objective. For example, the control of the Factory Management upon the productivity is high when the contracts to be performed are numerous. If the quantity to be produced falls below a certain level, the Factory Management, at best, can limit the decrease of productivity, but not increase it. In such a case, another objective should be selected.

2. Although the objective is well defined, the process owner is unclear about what should be done in order to reach the targeted value.

In the first case, the Support and Development department and the process owner define a new attainable target or a new objective. The issue is discussed with the Top Management, who reviews and validates the new objective.

In the second case, the Support and Development Department alerts the Top Management, who schedules a study meeting with the process owners.

8.2.8.5. Defining Action Plans

Action Plans may be defined in order to meet a CI objective or a Strategic Objective. They can be either proposed by process owners, or elaborated in cooperation with the Top Management and the researcher when required.

Unlike CI Objectives, which concentrate on regular measures and progresses, an action plan concentrates on tasks to be performed and target dates for the tasks. The aim is that by performing those tasks, the CI objective or the Strategic Objective will be met.

Responsibilities for the tasks are clearly defined, and most of them are usually under the responsibility of the process owner who is the project coordinator. This may not be the case for all tasks, therefore, the defined Action Plans are sent for comments to all employees who have responsibilities for these tasks.

Formal validation by the Executive Manager of any defined Action Plan is required.
The Support and Development department collects all validated Action Plans, and checks their progress every three months with the Action Plan project coordinators. If progress is not satisfactory, the SD department verifies if the issues are temporary only, or if an underlying difficulty has arisen. If required, a meeting with the Top Management is scheduled, and the Action Plan is revised.

8.2.8.6. Sustained improvement

An ISO Procedure was set in place in order to describe in detail the system for ‘Continual Improvement’ objective setting, and follow up.

During internal and external audits, auditors routinely verify that each process owner has at least one ongoing objective defined, that regular readings are performed, and that corrective actions have been taken when measures were not in line with the targeted value. They also check that process owners have sufficient influence upon the objective.

Every three months, the Support and Development department verifies progresses on all CI Objectives and all Action Plans.

The SD Department calculates regularly two factors, the first being the percentage of achieved CI Objectives, and the second the number of CI Objectives currently running. Continual Improvement objectives have been defined for those two factors.

8.2.9. A managerial tool to grasp the Company’s overall performance: Balanced Scorecard

8.2.9.1. Rationale of the approach

The concept of Balanced Scorecard was first encountered by the researcher when performing a Literature review into Total Quality Management tools used world-wide. As the concept seemed interesting, an in-depth literature review was performed. The following articles were selected as a basis for a proposal to the Top Management.

The Top Management reviewed the articles and agreed that the concept should be tried. Although the system is criticised by some authors, it is widely used in some countries, (according to Marr and Neely (2003) over 50 percent of the large US firms had adopted BSC by the end of 2000, and 43 percent of the firms not using it are planning to use it) proving that many companies have found its utilisation useful. It may be noted however, that it was rarely used in 2003 in the United Arab Emirates, as neither the auditors from the Sheikh Khalifa Industry award nor the ISO auditors reported any other industrial company having introduced it at that time.

According to the preliminary study, a minimal implementation of the system could be introduced easily, as the company was TQM oriented and had already developed measuring systems for the four proposed perspectives, and as regular readings were often readily available through the Continual Improvement system. The tool appeared complementary to those already introduced, such as Strategic Planning and Continual Improvement objectives.

The decision to introduce the system was thus based on following elements:

- The system was generally reported as effective through literature review.
- It was widely used in developed countries, although not in the UAE.
- It was believed that its introduction could be straightforward.
It was decided that the adaptation of the Balanced Scorecard system to the company should have the following characteristics:

- Should not involve any heavy investment (such as a specialised software).
- Should be updated easily (not more than two man-days) every three months.
- Main data should be grouped on a single sheet of paper (A3 size).
- Should be easily readable.
- Should provide the possibility to retrieve detailed information on all provided indicators.

The company’s Balanced Scorecard system should provide the following information at a glance:

- Current position of the company
- Progress trend of the company’s position
- Balanced view of this progress
- Targeted improvements
- Ability of the company’s system to meet the targeted improvements

Thus, the balanced scorecard system should be the “dashboard” of the company, allowing decision makers to grasp easily the performance of the system, and of its constitutive elements, in order to direct their efforts meaningfully.

The Balanced Scorecard concept highlighted through literature review is the following: Key Performance Indicators of the company should be defined and grouped under four perspectives, in order to verify that the company’s growth is achieved in a balanced way, e.g. on all four perspectives simultaneously.

If such is not the case, a lack of balance in the system progress will result in a lack of sustained performance of the company.

It is thought to overcome the predominant importance of Financial results in analysing a company’s performance. For example, a company showing a good financial performance and a poor customer satisfaction performance, should soon face difficulties if the balance is
not corrected. In order to assess the health of the company, four perspectives should be considered:

- Financial and Commercial Perspective (How do we look to shareholders?)
- Process Excellence Perspective (What must we excel at?)
- Customer and Community Perspective (How do customers see us?)
- Innovation & Learning Perspective (How can we continue to improve and create value?)

The concept is that those four perspectives influence each other, and that a poor result in one of them will have repercussions in the others. Thus, a company must make sure that its progress is balanced, in order to foster long term growth.

In order to check that progress is balanced, Key Performance Indicators should be defined for each perspective, and regular readings should be taken and analysed.

8.2.9.4. Alignment within the Quality System

The researcher, based on the study of how the organisation aligned the newly introduced Balanced Scorecard concept within its Quality System, proposes the following graphical representation.
Alignment of the Balanced Scorecard system within the Quality System of the company.

Figure 60 Alignment of the Balanced Scorecard system within the Quality System of the company.
There are three interlinked types of objectives defined by the company:

- **Strategic Objectives**

  Part of the input to the Strategic Objectives is the current situation of the company, which is established from current measurements on the Balanced Scorecard Key Performance Indicators and measures of process performance.

- **Continual Improvements Objectives**

  The Continual Improvements Objectives are selected either directly from Strategic Objectives or among enablers to Strategic Objectives. The existence of a corresponding measuring system is required (in some cases, the measuring system will be developed in order to define a CI Objective).

- **Objectives on Balanced Scorecard Key Performance Indicators**

  Some of the Balanced Scorecard Objectives are Continual Improvements objectives selected by process owners (although not all CI Objectives are used in the Balanced Scorecard), and some are Strategic Objectives.

There are four types of interlinked performance measures

- **Process performance measures**

  These are measures performed by process owners to assess the performance of their process. They are calculated through the process performance measuring system which must be in place, and regular measures are compulsory. Depending on the process, there might be one type of measure, or numerous types of measures. Among the elements measured, at least one is selected as a Continual Improvement objective, and there may be none, or several, included as Key Performance Indicators used in the Balanced Scorecard.

- **Progresses on Strategic Objectives**

  Progresses on Strategic Objectives are generally reported in a qualitative way, such as “Achieved”; “In progress”; “Not started” etc. The current status is reported by the process owners. In some cases, readings on process performance are used to determine the appropriate status. For example, current status on a strategic objective such as “Set in place
Daniele Seraphim – Ph.D.

a fully equipped Training Centre”, does not require a specific measuring system, while status on “Increase by 20% the production of Hollowcore” requires a corresponding measuring system.

- Measures on Continual Improvement Objectives

These are reported at predefined intervals by process owners. A corresponding measuring system must be in place. If a process owner wishes to select an objective for continual improvement for which a measuring system is not yet defined, the measuring system must be set in place first. Such a situation generally occurs when the measures indicate that the previous CI is achieved. Thus, if measures on CI Objectives are dependant on the measuring system, the system is also developed to set CI Objectives.

- Measures of Key Performance Indicators of the Balanced Scorecard.

Every three months, the Balanced Scorecard is updated by the researcher. Some Indicators are measured on a monthly basis, and some on a yearly basis, thus the update of the Balanced Scorecard consists of verifying if there are new measures available for some indicators, and if such is the case, to update them.

Balanced Scorecards measures are drawn either from CI Objectives measures (in which case a simple consultation of the CI forms is enough), or through other Process Performance measures (in which case process owners may have to be consulted, although KPI are generally dispatched regularly).

8.2.9.5. Review process

The review of the Balanced Scorecard is performed every three months in two stages by the Support & Development department. The first stage consists of updating the readings on Key Performance Indicators. The second stage consists of updating targeted values, targeted dates and Indicators themselves if required.

8.2.9.5.1. Updating readings on Key Performance Indicators.

The update is performed in three steps.

1. Update of the current measures
Daniele Seraphim – Ph.D.

Around half of the Indicators of the BSC are selected as CI Objectives by process owners (for example, 26 of the 54 KPI in March 2004 were CI Objectives). Updating these indicators consists generally of a simple reading of the corresponding CI forms.

Among the other indicators, many are published at regular intervals and readily available. In a few cases, process owners are contacted and are providing the current measure.

It may be noted that all indicators may not be updated every three months. For example “External perception index of Customer Satisfaction” is measured through customer survey performed once a year, and thus updated once every four reviews.

2. Progress towards targeted value

A targeted value and targeted date are defined for each KPI. Historic data as well as a graphical representation of those data is available for each indicator. The new current reading is added to those historic data, and the graphical representation updated.

If the target date is reached, Indicators are classified as “achieved”, “nearly achieved” and “not achieved”.

If the target date is not reached, the trend is analysed and Indicators are classified as “will probably be achieved”, “may not be achieved” and “will probably not be achieved”.

In the Balanced Scorecard, a blue colour-code is used for “achieved” or “will probably be achieved” indicators, green for “nearly achieved” or “may not be achieved” ones, and red for “not achieved” and “will probably not be achieved” ones.

3. Current trend

In some cases, the progress towards targeted value classification does not reflect the trend of the indicators. An indicator may be classified as “will probably not be achieved” (red colour-code) and still progress favourably, although not as fast as targeted.

For each indicator, an ascending arrow placed next to the indicator represents a positive trend, and a descending arrow a negative trend.

On average, a total of four man-hours is spent by the Support and Development department to complete this first phase of the review.
The updated balanced scorecard is submitted to the top management, who releases its
distribution to all Heads of Department.

\[ \text{8.2.9.5.2. Updating targets and indicators} \]

Targets are generally updated in consequence of the following events:

1. When the target date is reached, it must be updated. (The targeted value may or
   may not be updated.)

2. When targeted value is reached, the targeted value may be updated. (The target date
   may or may not be updated.)

3. When new strategic objectives are defined, targeted values and dates may be
   reviewed. This is generally the case after a Strategic Plan review. In such a case, all
   indicators are checked and, if required, modified and aligned with the newly
   reviewed strategy.

Indicators themselves are updated as a consequence of two events:

I. An indicator may become obsolete once the targeted value is reached. For example
   the indicator “Regular analyses of sites/foremen productivity” may have a targeted
   value of “6 by semester”. Once this target reached and sustained, the indicator should
   be removed from the Key Performance Indicators.

II. When new strategic objectives are defined, some indicators are removed and some
    added. Following the review of the Strategic Plan, all KPI are examined and aligned
    with the newly reviewed strategy.

The Support and Development department performs preliminary work, highlighting
indicators susceptible to require a modification of target date or value, as well as indicators
susceptible to be removed and or added.

During a review meeting with the Top Management, indicators are updated.

In average, a total of two man-hours is spent by the Support and Development department,
and half an hour by the Top Management, to complete this second phase of the review.
when the balanced scorecard review does not correspond to a Strategic Plan review. When
it does, the SD department will require four hours of updating work, and two hours by the Top Management.

8.2.9.6. Example of Balanced Scorecard

The following represents the March 2004 Balanced Scorecard as sent to Heads of Departments (after phase I update, and before phase II update). The scorecard is printed in an A3 format.

Figure 61 Example of Balanced Scorecard

The detail of one of the four perspectives is as follows:

<table>
<thead>
<tr>
<th>GOALS</th>
<th>MEASURES</th>
<th>Target</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continual improvement</td>
<td>Nbr of improvement Action Plans</td>
<td>30</td>
<td>May-04</td>
</tr>
<tr>
<td></td>
<td>Goal achievement Index</td>
<td>84% Dec-05</td>
<td>74% Mar-04</td>
</tr>
<tr>
<td>Continual Learning</td>
<td>Hours of training</td>
<td>48,000</td>
<td>2004</td>
</tr>
<tr>
<td></td>
<td>Investment in training &amp; education</td>
<td>130,000</td>
<td>2004</td>
</tr>
<tr>
<td></td>
<td>Magazine reading</td>
<td>260</td>
<td>Dec-05</td>
</tr>
<tr>
<td></td>
<td>Answers on continual learning articles</td>
<td>60</td>
<td>Jun-04</td>
</tr>
<tr>
<td>Teamwork</td>
<td>Nbr of committees</td>
<td>12</td>
<td>Jun-04</td>
</tr>
<tr>
<td></td>
<td>Employee involvement</td>
<td>40</td>
<td>2004</td>
</tr>
<tr>
<td>Innovation</td>
<td>Nbr of feasibility studies</td>
<td>6</td>
<td>2004</td>
</tr>
</tbody>
</table>

Table 62 Detailed example of one of the four Balanced Scorecard perspectives

For each of the indicators, historic data are provided, along with a graphical representation. The following example shows the historic data for the “Camp Satisfaction Index” indicator.
Camp Satisfaction Index

<table>
<thead>
<tr>
<th>Date</th>
<th>Average Satisfaction</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>June-02</td>
<td>28.75</td>
<td>Reading</td>
</tr>
<tr>
<td>December-02</td>
<td>32.79</td>
<td>Reading</td>
</tr>
<tr>
<td>June-03</td>
<td>37.92</td>
<td>Reading</td>
</tr>
<tr>
<td>December-03</td>
<td>41.75</td>
<td>Reading</td>
</tr>
<tr>
<td>December-04</td>
<td>50</td>
<td>Target</td>
</tr>
</tbody>
</table>

Figure 62 Example of a Balanced Scorecard indicator: The camp satisfaction index

8.2.9.7. BSC implementation: success and advantages.

There are several advantages to the implementation of the Balanced Scorecard system. During the initial elaboration, it proved a powerful means of learning and of assessing the effectiveness of the measuring system, which lead to major strategic improvements. Later on it was used to ensure the alignment of the company with its strategy, to measure its success, and to provide input knowledge during Strategy reviews. It was also found a powerful communication means.

8.2.9.7.1. Assessing the adequacy of the measuring system to the Strategy

The learning process during the initial elaboration of the Balanced Scorecard started with the shocking realisation that for around half of the Strategic Objectives defined, no performance indicators were ready available.

Interviews with concerned process owners revealed that in most of the cases they were aware that the strategic objectives had been set and that they were clear about their responsibility in regards to them. Process owners often stated that they had started working
towards their achievement, and recognised that they could at best have only a rough unmeasured estimation of their success so far.

When asked why they did not set in place corresponding measuring systems, two answers were offered: No one told them that they had to, and they did not know how and what to measure.

This highlighted an important dysfunction in the strategic deployment process, as progress on half of the strategic objectives was impeded by the lack of corresponding measuring system. This learning triggered both immediate and long-term actions.

Among the immediate actions, one department was put in charge of providing support to process owners in regards to performance measurement improvements, and process owners were informed that they were not only responsible for implementing strategic objectives, but also for providing measured assessment of their success. While some indicators could be defined easily, and measurement obtained within the coming months, challenging improvements in the measuring system were selected as strategic objectives during the next strategy review.

8.2.9.7.2. Assessing and improving the balance of the Strategy

The Strategic Plan of the company under study had been elaborated taking into consideration the recommendations of a local TQM award body. Therefore, the Management assumed that it was balanced. However, once the draft of the first elaboration completed, it appeared that such was not the case.

While indicators on several perspectives had to be trimmed in order to retain only key ones, one of the four perspectives was nearly bare of indicators: The innovation and learning perspective, which had been next to forgotten during the previous review of the Strategic Plan, while the emphasis was placed on managerial and process improvements.

Several indicators of innovation and learning activities were immediately elaborated, initial measures taken and target sets. During the following review of the Strategic Plan, it was verified that objectives in regard to innovation and learning were set.
Daniele Seraphim - Ph.D.

Thus, although the initial Balanced Scorecard was built according to the Strategy defined by the company, the initial elaboration of the Balanced Scorecard influenced in return the Strategy of the organisation.

8.2.9.7.3. Aligning the Quality System with the Strategy

As shown in Figure 60, the implementation of the BSC system in the company under study has been a major element of success in the overall alignment of the Quality System with the Strategy. It has also provided an important link between Strategic Objectives and Continuous Improvement objectives.

The company had a previous history of an ineffective ISO system, in which records were maintained for the sake of the certification body, often without link to its actual operations. Although, when first selected by the process owners, the alignment of continuous improvement objectives with the policy and strategy of the company was verified, the management dreaded that their connection to the strategy may be in time forgotten, and that process owners may regard them as an unrelated ISO requirement, particularly as it was difficult for the Top Management to follow and comment on the progress of each of them regularly.

Placing Continuous Improvement objectives on the Balanced Scorecard is stating that they are the road towards Strategy achievement, and their high degree of visibility and review ensures that this Strategic focus is not lost.

8.2.9.7.4. Improving the communication and knowledge

The adoption of the Balanced Scorecard system has greatly improved the communication system of the organisation, as the summarising of all KPIs, their progresses and the achievement of planned targets on a single sheet of paper, could be widely spread among employees.

The overall performance of the company and as well as its trend became easy to grasp, and is proving a good support of discussion during managerial meetings.

The increased knowledge it provides is also widely used by the company during Strategy review period, particularly to analyse strengths and weaknesses of the organisation.
The implementation has been possible with a minimum of time and financial investment, as the company had opted for an initial implementation that was reflecting the current performance of its measuring system, and a progressive improvement based on the lessons learned through that initial implementation.

8.2.10. Customer Satisfaction Survey

In January 2003, the company started to mail Customer Satisfaction Forms to its customers. Very few answers were received, for the following reasons.

- The form was exhaustive and required at least fifteen minutes to complete.
- Many companies were switching from the ISO 9001:1994 version to the 2000 version, and companies were inundated with requests for satisfaction rating.

In order to overcome this issue, the company decided to contact its clients by phone, asking them as a favour to complete the questionnaire.

By June 2003, 12 answers were collected, and the first analysis was performed.

8.2.10.1. First measured indicators of customer satisfaction

The answers collected were fed in a database, and averages computed. The followings ratings were obtained:
A. General Information / demographics

1. How many years have you been doing business with Gulf Precast?
   - 15.38% 1-3 years
   - 30.77% 4-7 years
   - 46.15% 8-15 years
   - 7.69% 16+ years

2. Which of the following best describes your business?
   - 92.31% Main Contractor
   - 7.69% Private Owner

3. How many employees are working for your firm?
   - 7.69% 51-200
   - 7.69% 201-500
   - 84.62% 501+

B. Sales / Delivery / Quality Issues

<table>
<thead>
<tr>
<th></th>
<th>Importance</th>
<th>GPCC Satisfaction</th>
<th>Other Main Supplier Satisfaction</th>
<th>GPCC Weighted Average</th>
<th>Other Main Supplier Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SALES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courtesy of the Commercial Team</td>
<td>90.77</td>
<td>83.64</td>
<td>50.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionalism and efficiency of Commercials</td>
<td>93.33</td>
<td>78.18</td>
<td>68.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of products</td>
<td>98.33</td>
<td>85.45</td>
<td>80.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response to requests for quotations</td>
<td>100.00</td>
<td>78.18</td>
<td>74.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prompt resolution of problems</td>
<td>93.33</td>
<td>72.73</td>
<td>68.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response to special product request</td>
<td>88.33</td>
<td>70.00</td>
<td>68.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of literature</td>
<td>83.33</td>
<td>76.00</td>
<td>70.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response to rush orders</td>
<td>95.38</td>
<td>72.73</td>
<td>62.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DESIGN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courtesy of Design Team</td>
<td>83.64</td>
<td>78.18</td>
<td>71.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionalism and efficiency of Design Team</td>
<td>94.55</td>
<td>81.82</td>
<td>77.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy of drawings / calculations</td>
<td>98.18</td>
<td>83.64</td>
<td>80.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response to request for design modifications</td>
<td>94.00</td>
<td>82.00</td>
<td>73.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FACTORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courtesy of Factory Team</td>
<td>87.27</td>
<td>72.00</td>
<td>72.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionalism and efficiency of Factory Team</td>
<td>98.00</td>
<td>74.00</td>
<td>76.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed and quality of Manufacturing</td>
<td>94.00</td>
<td>70.00</td>
<td>64.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance of Premises</td>
<td>84.00</td>
<td>70.00</td>
<td>76.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance of equipment</td>
<td>76.00</td>
<td>70.00</td>
<td>80.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SITE CONSTRUCTION / DELIVERY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Courtesy of Site Team</td>
<td>89.23</td>
<td>74.55</td>
<td>53.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionalism and efficiency of Site Team</td>
<td>94.55</td>
<td>74.55</td>
<td>63.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliveries arrive on schedule</td>
<td>94.55</td>
<td>67.27</td>
<td>63.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed and quality of erection work</td>
<td>85.45</td>
<td>76.00</td>
<td>72.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project completed within schedule</td>
<td>94.55</td>
<td>72.00</td>
<td>72.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>QUALITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product appearance</td>
<td>92.73</td>
<td>71.32</td>
<td>64.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product manufactured to specifications</td>
<td>94.55</td>
<td>74.95</td>
<td>67.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consistency of Quality</td>
<td>90.00</td>
<td>71.32</td>
<td>67.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GENERAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product price for the value received</td>
<td>92.00</td>
<td>71.61</td>
<td>64.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invoice accuracy</td>
<td>87.27</td>
<td>80.00</td>
<td>93.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range of products offered</td>
<td>80.00</td>
<td>82.86</td>
<td>93.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Responsiveness to suggestions</td>
<td>82.00</td>
<td>68.06</td>
<td>41.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### C. Miscellaneous

1. **Have you contacted Gulf Precast with a problem/complaint within the last year?**
   - Yes for 42.86%

2. **Please respond “Yes” or “No” to all questions in the first column, then answer the second column if a problem existed in that area.**

<table>
<thead>
<tr>
<th>Area</th>
<th>Percentage of Yes</th>
<th>If there was a problem, was it handled to your satisfaction?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was there a problem in the area of sales/estimating?</td>
<td>21.43%</td>
<td>50.00</td>
</tr>
<tr>
<td>Was there a problem in the area of design/drawings?</td>
<td>23.08%</td>
<td>66.67</td>
</tr>
<tr>
<td>Was there a problem in the manufacturing?</td>
<td>15.38%</td>
<td>100.00</td>
</tr>
<tr>
<td>Was there a problem in the area of delivery?</td>
<td>35.71%</td>
<td>100.00</td>
</tr>
<tr>
<td>Was there a problem in the area of site erection?</td>
<td>25.00%</td>
<td>100.00</td>
</tr>
<tr>
<td>Was there a problem in the area of quality?</td>
<td>30.77%</td>
<td>100.00</td>
</tr>
<tr>
<td>Was there a problem in the area of order invoicing?</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Was there a problem with the project completion schedule?</td>
<td>38.46%</td>
<td>66.67</td>
</tr>
</tbody>
</table>

Overall, were you satisfied with the resolution of your problem? 62.50%

3. **While deciding on a Precast Supplier, how do you rate the importance of the following elements?**

<table>
<thead>
<tr>
<th>Element</th>
<th>Percentage of importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>77.36%</td>
</tr>
<tr>
<td>Quality</td>
<td>83.36%</td>
</tr>
<tr>
<td>Completion on time</td>
<td>91.61%</td>
</tr>
</tbody>
</table>

### D. Overall Satisfaction

1. **Overall, how satisfied are you with each of the following precast concrete suppliers?**

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Percentage of satisfaction</th>
<th>Evaluations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Gulf Precast</td>
<td>68.00</td>
<td>13 evaluations</td>
</tr>
<tr>
<td>2  Jumal Majid</td>
<td>67.00</td>
<td>1 evaluation</td>
</tr>
<tr>
<td>3  Al Otaiba and Garg</td>
<td>66.67</td>
<td>3 evaluations</td>
</tr>
<tr>
<td>4  United Precast Concrete</td>
<td>64.29</td>
<td>7 evaluations</td>
</tr>
<tr>
<td>5  Al Mureikhi</td>
<td>61.17</td>
<td>6 evaluations</td>
</tr>
<tr>
<td>6  Fibrex</td>
<td>53.57</td>
<td>7 evaluations</td>
</tr>
<tr>
<td>7  Square</td>
<td>53.40</td>
<td>5 evaluations</td>
</tr>
<tr>
<td>8  Emirates Precast</td>
<td>33.33</td>
<td>3 evaluations</td>
</tr>
<tr>
<td>9  Other</td>
<td>25.00</td>
<td>2 evaluations</td>
</tr>
</tbody>
</table>

2. **Is Gulf Precast your “preferred” precast concrete supplier?**
   - 82.14% of preference

3. **How did you first learn about Gulf Precast?**
   - 7% Word of mouth
   - 15% Company rep. called on us
   - 15% Others:
     - Client
     - Old Contact with Mr. Elias
   - 7% Advertising
   - 7% Gulf Precast was specified
     - Known in market for long time
     - Our Manager knows Mr. Elias personally

4. **Would you purchase from Gulf Precast again if you needed their product(s)?**
   - 92.86% of intention of further purchase

5. **Would you recommend Gulf Precast to someone who needs a precast concrete product?**
   - 71.43% of readiness to recommend Gulf Precast
1. What is the primary reason you do business with Gulf Precast?

<table>
<thead>
<tr>
<th>Commercial Reasons</th>
<th>Production Reasons</th>
<th>Other Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connections</td>
<td>Good results</td>
<td>Price factor, Nature of work</td>
</tr>
<tr>
<td>Old contacts with Mr. Elias</td>
<td>They are professionals</td>
<td>Location of Construction Sites</td>
</tr>
<tr>
<td>Professional</td>
<td>Quality &amp; efficiency of the work</td>
<td></td>
</tr>
<tr>
<td>Professionalism &quot;Previously&quot;</td>
<td>Speed</td>
<td></td>
</tr>
<tr>
<td>Commercial &amp; Quality Combination</td>
<td>Quality and price</td>
<td></td>
</tr>
</tbody>
</table>

2. What is one thing Gulf Precast can do to improve itself?

<table>
<thead>
<tr>
<th>Time related answers</th>
<th>Other answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve on Precast schedules</td>
<td>General Improvement in all aspects</td>
</tr>
<tr>
<td>Better Commitments to time</td>
<td>Pursue with quality</td>
</tr>
<tr>
<td>Speed</td>
<td>Price wise</td>
</tr>
<tr>
<td>Less claims. More care on requirements of client (Delivery)</td>
<td></td>
</tr>
</tbody>
</table>

3. Do you have any additional comments regarding Gulf Precast or your needs that you wish to share?

- Gulf Precast was previously more professional, better commitment to time
- Try to improve in general and also better performance in site
- Try to be economical
- We are fully satisfied

Document 4 Average customer satisfaction obtained through satisfaction survey – June 2003

8.2.10.2. First analysis of measured indicators

The information obtained proved highly informative, both to assess the customer perception of the company, and to provide benchmarking data. The following knowledge about customer perception could be extracted from scores obtained.

8.2.10.2.1. Main findings of the analysis

A. The company should improve its completion on time

Completion on time is of main importance to the company’s Clients (before Quality and Price consideration) (See Section C3).

On this issue, the company performed badly, with a problem on completion schedule in the previous year for 38% of its Clients and on delivery for 36% of them (See Section C2).

57% of the suggestions for improvement are related to schedules and deliveries (See Section D7).

There is a 27 and 24 points gap between importance and satisfaction on “Deliveries arrive on schedule” and “Speed and quality of Manufacturing” respectively (although the
company is still performing above “Other Main Precast Supplier” on those 2 issues). (See Section B)

B. The company should improve the satisfaction with the Factory

The satisfaction rate for the Factory items is low, and the competition is performing better on this issue.

The main difference between the company and its competitors is relative to “Appearance of equipment”, with a 10 points gap with “Other Main Precast Supplier”, closely followed by “Appearance of Premises”. “Professionalism and efficiency of Factory Team” is rated 2 points below competition, and “Courtesy of Factory Team” rated equivalent. (See Section B Factory)

C. The company should concentrate on Problem Prevention rather than Problem Solving

Although it appears that the company is doing well in problem solving, it has a high percentage of initial problems (43% of our clients faced a problem during the last year).

Problems mainly arise on meeting Project completion time, Delivery and Quality. (See Section C2)

D. Benchmark against other Precast Suppliers: The company should increase the gap.

Although the company has the highest satisfaction rating (68%) (See Section D1), it is important to remember that this rating is obtained among the company’s own clients. It is more than probable that if the same question was asked to the clients of a competitor, his rating would be higher than the one reported in the present analysis.

Taking into consideration the fact that those ratings are received from the company’s own clients, the gap with competitors rating should be increased if the company wishes to be number one not only among its own clients, but also among all potential clients.
E. The company’s competitors are offering a better range of products.

There is more than 10 points difference in satisfaction between the company’s range of products and competitors’ range of product. However, the range of product is not of main importance to clients.

8.2.10.2.2 Actions taken following the analysis

Taking into consideration the main findings of this first analysis, several new Performance Indicators were set, and improvement objectives reported in the Balanced Scorecard:

- Customer Satisfaction index
- Problem Prevention index
- Achievement of timescales
- Standard of communication
- Factory Satisfaction

All these indicators were set in the “Customer & Community perspective”, among the “External Customer Satisfaction” goal.

Action Plans were defined in order to reach the set objectives.

8.2.10.3 Improvement in the collection process

The 2003 collection of Customer Satisfaction answers highlighted the difficulty of obtaining postal answers. The number of answers received through this technique was so low that it had to be complemented by a telephone follow up.

Analysing this difficulty, the company examined two possible solutions:

- The survey could be simplified, in order for the answering process to take a maximum of five minutes, increasing the willingness of clients to complete it.
- The collection process itself could be reviewed for improvement.

As the knowledge obtained through the company’s detailed questionnaire were thought highly valuable, the company decided that simplifying the questionnaire would significantly reduce its usefulness. Thus, it was decided to improve the collection process.
It was thought that collection through direct meeting with the clients would have the following advantages:

- As questionnaires would be filled on the spot, the number of answers collected should be higher.
- Additional data could be collected. For example, during client rating of “satisfaction with other main precast supplier”, the name of the competitor that the client had in mind could be noted.
- Qualitative data could be collected as well as quantitative data. Before meeting the client, the commercial team could consult both qualitative and quantitative data collected and prepare its argumentation in consequence.
- As the company would demonstrate its willingness to spend time in the collection process and to physically listen to clients’ remarks and grievances, the perception that the client’s opinion is valued should be improved.
- The company could take the opportunity of these meetings to pass on information about the company, and improve its image. For example, clients could be informed that a new state-of-the-art factory was under construction, or that the Planning team had been reinforced in order to better answer the customer needs of meeting timescales.

As the new collection process would take time, it was decided to allocate it to a marketing student as mid-term training duty.

Using this process, 54 answers were collected in March 2004, covering most of the clients with whom projects were performed either in 2003 or in 2002. All questionnaires were completed, and a high number of additional data were collected, including qualitative data. Several clients reported being impressed by the professionalism demonstrated.

Thus, all of the foreseen advantages could be met.

8.2.10.4. Improved analyses of satisfaction and benchmarking information

Using the additional data collected, a number of further analyses could be performed in addition to the ones made in 2003:
Daniele Seraphim – Ph.D.

1. Comparison with the data collected in 2003, both for the average of all collected questionnaires and restricted to the clients who answered both surveys.

2. Comparison between scores obtained by the three factories of the company.

3. Detailed comparison with the scores obtained by the two main competitors of the company.

4. Comparison between scores given by clients located in the Abu Dhabi Emirate and those located in the Dubai Emirate.

5. Scores provided by clients who performed projects with the company in 2002, but did not do so in 2003.

6. Comparison of scores obtained from loyal clients (clients who performed four projects or more with the company), and of clients who performed less than 4 projects with the company.

7. Average scores obtained if clients for high value and long term work are weighed double or triple the grades of others.

8. Individual satisfaction percentage by client.

It may be noted that some of these analyses did not provide significant differences with the analysis of overall received answers. This is the case of the analyses 6 and 7 above mentioned, showing for example that loyal clients have the same satisfaction with the company as the average of all clients.

However, some of them provided important data:

Analysis 1 showed that the satisfaction with the company improved between data collected in 2003 and 2004, but that satisfaction with competitors improved even more. The satisfaction with the “Factory” process increased significantly.

Analysis 2 showed important differences of satisfaction between the company factories.

Analysis 3 showed that the two main competitors of the company are obtaining high satisfaction scores, although slightly lower than the company.
Analysis 4 showed that Dubai based clients are more demanding than Abu Dhabi ones.

Analysis 5 demonstrated that clients who did not perform projects with the company in 2003 had a satisfaction level ten points lower than the average for all clients, demonstrating that the company is losing some of its clients.

Details by processes and by elements were also available. For example, it showed that completion on time is still the major area of client dissatisfaction, although the company completed all its projects on time over the last two years. This was analysed as a wrong perception due to the fact that clients were worried by delays in the first phases of the projects, although those delays had been absorbed at a later stage. It was thus decided to concentrate on meeting all projects’ milestones, and to send a thank you letter at the end of all projects, stressing the completion on time, in order to change this perception.

Analyses of Customer Satisfaction Survey are distributed to all Heads of Department, and detailed results and additional comments by clients are available on request.

8.2.10.5. **Alignment with the Quality System**

From 2004 onwards, analyses of Customer Satisfaction Surveys were used as an important input to the Strategic Plan, and a significant number of strategic objectives were set with a view to improving the client satisfaction with the company.

Key Performance Indicators were selected among the critical readings, and objectives for improvement reported in the Balanced Scorecard of the company.

The process of collecting CSS, analysing them and using these analyses within the Quality System of the company, is fully described in the ISO Procedures, ensuring that these processes are sustained over time.

8.2.11. **Improved measurement of the cost of quality non-conformance**

8.2.11.1. **Improved assessment of Failure cost**

From June 2002 to June 2003, costs of failure were identified through the cost of rejected panels, valued using the cubic meter sale price of the project.

From June 2003 onwards, costs of repair have been added to costs of panel rejection, improving the measure.
It was estimated, however, that the cumulated cost of rejected panels and of repair costs were still providing a poor evaluation of the actual quality costs, for the following reasons:

- Departments were reluctant to admit non-conformances when the reasons for these non-conformances lay in their own department, and tended to perform repair work and even to scrap non-conforming panels without reporting them, thus limiting the value of the calculated cost of failure.

- In order to limit failure costs, a strict defect prevention and quality control system had been set in place by the company. The cost of quality measuring system however, was dedicated to the identification and reporting of failure costs, to the exclusion of prevention and appraisal costs.

In order to improve the reporting of failure costs, the Top Management reiterated regularly the necessity of reporting all non-conformances, even when the responsibilities lay within the department which detected it.

The procedure of non-conformance reporting required validation by the Head of the Department. It was modified so that any employee could report a non-conformance if the responsibility was thought to be within his own department.

The company decided to determine costs of quality prevention and appraisal.

8.2.11.2. Cost of quality prevention and appraisal

Calculating costs of prevention seemed from the start a very difficult task. Part of the responsibility of all employees is to routinely consider what could create quality issues and to take necessary steps to prevent them. For example, identifying areas of possible quality issue is an integral part of the duties of each draftsman, while designing the projects.

Separating quality prevention time from overall time seemed impossible. When asked to identify a proportion of their time spent in quality prevention, employees were confused.

Another difficulty consisted in separating quality prevention time from quality appraisal time for employees whose prime responsibility was to make sure that the products' quality is excellent. For example, a Quality Control employee spends part of his time in verifying the calibration of measuring equipment and in examining with foremen and workers possible difficulties and specificities of projects, which should be classified under quality
Daniele Seraphim – Ph.D.

prevention time, but also in testing the produced elements to verify their conformance, which is appraisal time. It seemed impossible to separate those two costs.

Thus, the company decided that quality prevention and appraisal costs could not be broken up, and that human resources costs would be considered only if the job description of the employee was mainly to prevent or appraise quality.

The company was aware that this definition of prevention/appraisal cost was limited, but it estimated that the analysis of the trend of this partial reading would still provide valuable information.

<table>
<thead>
<tr>
<th>Year/ Quality Cost</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of failure</td>
<td>210,644 Dhs</td>
<td>303,624 Dhs</td>
<td>491,219 Dhs</td>
<td>720,892 Dhs</td>
</tr>
<tr>
<td>Prevention &amp; appraisal cost</td>
<td>19,736 M3</td>
<td>37,540 M3</td>
<td>46,006 M3</td>
<td>90,555 M3</td>
</tr>
<tr>
<td>Production in M3</td>
<td>62,406 Dhs*</td>
<td>45,144 Dhs</td>
<td>720,892 Dhs</td>
<td></td>
</tr>
<tr>
<td>Cost of failure per M3</td>
<td>10.67 Dhs/M3</td>
<td>8.09 Dhs/M3</td>
<td>10.68 Dhs/M3</td>
<td>7.96 Dhs/M3</td>
</tr>
<tr>
<td>Cost of prevention &amp; appraisal per M3</td>
<td>1.36 Dhs/M3</td>
<td>0.50 Dhs/M3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Recorded amount has been multiplied by 2, as cost started to be reported in June 2002 only.

Table 63 Evolution of Quality Costs from 2000 to 2003

The data obtained showed that although the chosen calculated technique used for costs of prevention and appraisal is underestimated, this cost is still much higher than the measured cost of failure.

The company attributed this, to the poor reliability of the failure cost figures, due to the fact that hidden costs are not taken into consideration. Thus, it decided both to continue to invest in prevention and appraisal activities, and to go on recording failure costs, even though the company trusted they were underestimated, as the obtained measure was thought to be proportional to the actual failure cost. Thus, analyses such as trends over time and proportion by products or by causes were deemed to be reliable.

The overall trend of quality cost per M3 produced is decreasing over time.

8.2.12. **Follow-up committees are set in place**

8.2.12.1. **Characteristics of the committees**

The introduction of Continual Improvement objectives, “Process Excellence” Balanced Scorecard objectives and Strategic Objectives by processes, reinforced the control of the Top Management over the performance of the processes. In consequence, process owners
tend to focus on their processes in isolation, and the concept of the company as an interaction of processes, may be weakened.

Although it is important that each process is operated at its most efficient, in some cases, the company’s interest should override the process’s interest. In order for process owners to keep in mind that the main issue is the overall performance of the company, it is important to set in place structures that will break down the boundaries of processes, and keep communications flowing.

In order to do so, several committees were set in place, having the following characteristics:

- **Multi-disciplinary**

  The whole idea of committees is to bring to work together employees from different Departments and to exchange knowledge. The diversity of experience enriches the committee, by bringing together different points of view, and breaking down the modular process vision into a global company vision.

- **Multi-hierarchical**

  The members of most of the committees are selected from several hierarchical levels. This characteristic was decided upon in order bring to the committee an additional diversity, between employees holding managerial positions and employees involved directly in the production. This diversity of hierarchical level has proved very effective. However, experience has shown that the supervisors of team members must receive regular updates about the team progresses, in order to gain their collaboration, and give them the opportunity to bring to the team additional information if they feel it is required.

- **Based on a number of permanent members and temporary members.**

  Committees are generally formed around a number of permanent members, but may also invite other individuals to join the committee temporally. These individuals may be other company employees or even external partners of the company, such as suppliers or clients. For example, the HSE committee invites regularly the Factory Management or the Sites Management to its meetings, in order to study jointly a particular issue. The “Magnet
Study’ team invited several magnet suppliers to provide advices about the possibility of using magnets to hold the side shutters of the moulds.

➤ **Overall Management committees / specialised committees**

Some of the committees created are Overall Management committees, having for objective to take decisions or to provide knowledge about the Management of the company as a whole. Other committees are specialised in a given aspect of the company, such as the Training committee or the Health, Safety and Environment committee.

➤ **Permanent / Temporary committee**

While some of these committees are scheduled to meet at predefined intervals of time (some of these intervals are even specified in the ISO procedures) without interruption, others are temporary committees, meant to study a given issue, and to be dismantled after the final report. The committee created in order provide advice about whether or not to generalise the magnet system to hold the side shutters of the moulds, is an example of this later type. Once the committee provided its final recommendations, it was dissolved.

### 8.2.12.2. Examples of committees

The Business Direction Committee is constituted of the two shareholders and the Executive Manager. They examine the performance of the company, and decide on major financial orientations, such as heavy investments in facilities or products.

The Management review Committee is constituted of the Executive Manager, the Support and Development Manager and all major process owners. Meetings are held every three months, or if a particular issue arises, on request of the Support and Development Manager. Its objective is to examine the performance of the Quality System, and to initiate possible improvements.

During the meetings, a compulsory list of items have to be put on the agenda, as well as any concerns regarding the Quality System expressed since the last meeting.

The list of obligatory items comprises the following: Review of Quality Policy; Statistics of Non Conformances; Client Complaints; Perception of Client Satisfaction; Unclosed or non-agreed Non Conformance Reports; Internal Audit
Daniele Seraphim – Ph.D.

Reports; Review of Supplier Performance; Review of Training; Factory Suggestions; Site Suggestions; Process performance; Health, Safety and Environment; Follow up on previous items; Preventive Measures; Resource needs; Procedure and Manual Changes if any.

All decisions are documented, including responsibilities for implementation. The Support and Development department is in charge of following up on progresses through direct communication with the involved process owners, and the current status is examined during the next meeting.

The Operation Steering Committee meets every two weeks, or on request. Its aim is to examine the performance of on-going projects. The committee is headed by the Executive Manager, and its permanent members are the process owners directly involved in process execution, such as planning, quality control, design, factory manufacturing and site erection. Additional temporary members may join the team on request of the Executive Manager, in order to bring additional knowledge about a specific issue or a specific project.

The Operation Support Committee is constituted of all senior staff, along with a number of junior staff who have been selected for their potential to hold a managerial position in the near future, and is headed by the Executive Manager. It is a rather large committee, comprising around forty members. Its objective is to be informed of and to participate in the strategy of the company.

One week before the meeting, a request for agenda is sent to all members, who can freely propose items that will be discussed. The meeting begins by a presentation of the current performance of the company, given by the Executive Manager, followed by any other items proposed on the agenda.

Due to the important number of team members, any issue not directly related to the strategy or the management of the company is referred to dedicated meetings, and the responsibility of scheduling such specific meetings is immediately attributed by the Executive Manager.

The Operation Support Team members are largely involved and empowered to act on the strategy of the company. On a yearly basis, they are asked to propose...
modification to the Mission and Vision statements of the organisation, to review the list of processes and to propose modifications/additions/deletions on the draft of the Strategic Plan. They receive bi-annual progress reports on the Strategic Plan’s current status and an update of the balanced scorecard every three months.

The Healthy Safety and Environment (HSE) committee is a specialised committee, aiming to improve the HSE level in the company. It is constituted of a limited number of permanent members from the HSE department, Human Resources department and Support and Development department, and of guest members from other departments, selected by the permanent members in order to examine a number of HSE issues related to the department. The committee is multi-hierarchical, as guest members are selected among employees holding managerial positions and employees holding execution positions.

The meetings are conducted in two stages. During the first stage, the permanent members study HSE performance indicators as well as any HSE issue. During the second stage, the permanent and guest members study all items and statistics relevant to the department invited.

The role of the committee is to highlight HSE issues, and to propose possible solutions through brainstorming. Proposed improvements are then submitted in writing to the Executive Manager, who can validate them, request a complementary study or reject them. It may be noted that the Executive Manager is invited regularly as a guest member of the committee, in order to review any item for which no satisfactory solution has been found so far. All team members are informed of the decisions validated by the Executive Manager.

The Support and Development department is in charge of following up on implementation with all concerned process owners, and to report progresses during the next meeting.

The Training committee is another example of specialised committee. Its aim is to provide advice to the Top Management about training to be performed. It examines collected answers to the annual training survey; training requirements identified in the Strategic Plan; training requirements expressed by process owners during Management review meetings; effectiveness evaluations from past training; and
Daniele Seraphim – Ph.D.

proposes training recommendations to the Executive Manager. The committee is headed by the Human Resources Manager.

The Suggestion committee is composed of volunteer senior staff. Its aim is to review any improvement suggestion proposed by employees, select the valuable ones, propose either their implementation or their further study, and follow up on the implementation of these selected suggestions.

Suggestions are reaching the committee through several means. During a suggestion competition, a high number of suggestions are received, and the committee meets on a weekly basis. All around the year, suggestions are collected through suggestion boxes, or sent to the Support and Development department. In the employee surveys, free entry spaces are provided in order for employees to share any comments they wish. Any suggestion collected through this means is forwarded by the Human Resources department to the suggestion committee.

Selected suggestions are forwarded to the Executive Manager for possible reward.

During the elaboration of the draft strategic plan, all selected suggestions are considered, and the ones that may be selected as strategic objectives are proposed to the Executive Manager. When endorsed by him, they are part of the draft which is reviewed by all the operation support team members, and may be part of the strategic plan of the company. Thus, several strategic objectives of the 2004 Strategic Plan originated as a suggestion. A measuring system related to these objectives was often developed, and the corresponding Key Performance Indicators included in the Balanced Scorecard.

The marketing process of the organisation is not owned by a process owner, but by the Marketing committee, constituted of junior and senior staff from several departments. The aim of the team is to follow up on the implementation of the strategic plan for the marketing process, to evaluate the effectiveness of the tools developed, and to provide recommendations to the Top Management.

The Magnet Study committee is an example of a temporary committee, having the objective to provide the top management with recommendations on the generalisation of magnet utilisation for mould side shutters. Permanent members
Daniele Seraphim – Ph.D.

consisted of junior and senior staff from different administrative and production departments, and guest members from managers to floor workers, suppliers and even competitors. It collected data, performed tests and calculations, and presented its recommendations within six weeks, including return on investment calculations based on full life costing.

The Initial Project Review Committee performs a preliminary study of all new projects. Team members are process owners involved in the production process, such as planning, design, manufacturing, erection and quality control. When necessary, guest members may be requested to join the meeting, such as the purchase or financial process owners. It assigns responsibilities for the project execution, and reviews its specificity, highlighting any foreseen difficulties, and proposing preventive actions using a brainstorming technique. All agreed preventive measures are documented and followed up by the Quality control department.

There are many other committees, particularly of the temporary type, and the above mentioned should be considered as examples only.

8.2.12.3. Follow up on committee work

Experience proved that unless a follow up system is integrated within the committee operations, improvement decisions are most of the time ignored, for the following reasons.

➢ If the employee in charge of an implementation is a team member, the improvement requires work in addition to what he usefully performs. In many cases, unless he is reminded of his undertaking, he will forget about this extra duty.

➢ If the employee in charge of implementation is not a team member, the first step of the follow up process is to ensure the buy-up of the improvement by the proposed employee, as he was not part of the decision taking process. One way of doing it is to invite the employee to join the next meeting as a guest team member, and include him in the decision process. Another is to contact the employee, and try to convince him. In some cases, the committee has to consider selecting another employee. Once the employee agrees to implement the improvement, the following
step is to check with him at regular interval about the progress of the implementation.

➢ In order for an improvement to be sustained, it may need to be generalised, or to go through an approval process, or to be included in the documented quality system. If no follow up process is defined to make sure that the improvement is sustained, experience has proved that in-built work habits will rapidly take over again.

Thus, the company learned the hard way that a decision-making process is not effective, unless coupled with a follow up process. Therefore, in order for a committee to be successful, it must define the following elements:

- What are the objectives of the committee?
- Who are the committee members?
- What is the decision-taking process?
- What is the follow-up process?

8.2.13. Training

8.2.13.1. Evaluation of Training Effectiveness

The company decided to set in place a technique for evaluation of training effectiveness.

It was decided that all staff training should be evaluated for effectiveness, whether performed in a training institute or in-house. However, training with a total duration less than eight hours would not be evaluated as evaluation time would be disproportionate in comparison with the training time itself.

It was decided that the effectiveness of the training should be assessed using three different types of questionnaires:

- A questionnaire filled by the trainee directly after the training.
- A questionnaire filled by the trainee six months after the training.
- A questionnaire filled by the superior of the trainee six months after the training.
The reason for this evaluation through three questionnaires is that the evaluation should not only assess the interest of the course, but also its usefulness in day-to-day work, as well as the possibility of reinvesting the knowledge gained.

The Personal Department is in charge of distributing and collecting the questionnaires, and of providing statistics and analyses on the obtained data, in order to provide the following information:

- Are employees satisfied with the quality of the selected training?
- Is the training providing added value to the company?
- Are the expected benefits of the training achieved?
- Were employees attending the training properly selected?

The obtained information is used as an input to the Human Resources Plan of the next year, which is established after strategic objectives are set, in alignment with the Strategic Plan.

The necessity of performing regular analyses of training effectiveness is recorded in the ISO Procedures.

8.2.13.2. Inviting main suppliers and clients to training courses

The company is proposing In-house courses, mainly on two subjects: Total Quality Management concepts and tools and IT tools.

Buckingham and Coffman (1999) believe that human links created during learning experiences are particularly strong. The company decided, based on this opinion, to invite some of its main clients and main suppliers to join company employees during these training. The foreseen benefits were the following:

- Strengthen the links between the invited clients and suppliers and company employees.
- Create a mindset of collaboration and sharing downstream and upstream of the company.
Daniele Seraphim – Ph.D.

- Spread TQM knowledge in order to share a common vision and language.
- Impart the image of the company as innovative and caring.

The technique proved successful, and guest trainees performed several training sessions with the company, on subjects such as Six Sigma, Statistical Process Control, Taguchi methods (Taguchi, 1985), utilisation of Microsoft Access, Excel, Projects etc.

8.2.13.3. Magazine circulation

In order for employees to keep in touch with technical and managerial innovations, the company decided to subscribe to three types of magazines:

- Technical magazines about the Construction or the Precast industry.
- Managerial or TQM magazines.
- Magazines about the Gulf or UAE environment.

At first, magazines were circulated among Heads of Departments. Following a suggestion received during the suggestion competition, the circulation was extended to foremen.

An objective for Continual Improvement of regular increase of the number of magazines read by employees (each employee who reads a magazine signs a register), was defined, and reported in the Balanced Scorecard.

8.2.13.4. Continuous Learning scheme

The aim of the Continuous Learning scheme is to provide articles related to the work environment of the selected employees. The proposed articles are also displayed on the continuous learning scheme board.

At first, receiving employees were Heads of Departments and new graduates hired in view to holding managerial positions in the future. All foremen were later added to the list. The list is dynamic, as employees who do not rate the interest of four articles in a row are removed from the list after reminder, and as employees requesting a copy of an article displayed on the continuous learning board are automatically added to the list.
Receiving employees are asked to rate the interest of the article as well as its relevance to their work. They can also specify if they wish or not to receive further articles.

At first, articles were selected by the Support & Development department, but after a while, several departments proposed articles for dispatch.

As examples, the following articles were proposed:


An objective regarding the number of answers received from dispatched articles, is set in the Balanced Scorecard of the company, under the “Innovation and Learning” perspective.

8.2.13.5. Intensive Continuous Learning scheme

An intensive continuous Learning scheme had been created in order to provide priority training to young graduates perceived by the company as potential future Managers.
These employees have priority seats in all in-house courses.

They are members of the Continuous Learning Scheme.

They receive self-training courses, and their understanding is evaluated through their answer to self-assessment questions. Although answering self-training courses is time consuming, performed outside working hours and entirely voluntary (on average 8 hours of work every two months), 74% of the employees of the intensive continuous learning scheme return their answers regularly.

### 8.2.14. Partnerships

#### 8.2.14.1. Partnership as a Strategic Process

In 2004, the company identified the increase of partnership relations as a critical success factor for the growth of its TQM implementations.

The first decision in this sense was to modify the mission and vision statements of the company, adding the following sentence:

"To develop customer and supplier partnerships to enhance the ability of each partner to create value."

During the Strategic Plan review, it was decided to include a “Partnerships” process among the Support and Development processes. The following strategic objectives were defined in the 2004 Strategic Plan:

- Improve relations with key competitors, in order to obtain benchmark data.
- Develop formal partnerships with some key customers.
- Develop formal partnerships with some key suppliers.
- Prepare feasibility studies in partnership with suppliers.

Thus, the strategy of the company to develop partnerships was clearly aimed towards three types of stakeholders: Key competitors, key customers and key suppliers. Those objectives also indicate a difference with the previous period, during which partnerships were defined in an informal way. At present, the company is looking for formal partnerships with key customers and suppliers.
The company adopted the definition of partnership as a “mutually beneficial relation for added value in both organisations”.

In this context, the aim of developing partnership relations with key competitors was clearly indicated in the strategic objective itself: Obtain and provide benchmark data.

The aim of developing partnership with key customers was to move from a factual customer loyalty to a formal recognition, with written commitments from both parties, such as:

- During the tender stage of a construction project, the company will give preferential prices to its partner, which will be relatively lower than any other price given by the company to any other main contractor participating in the tender (and with whom the Company does not have a similar Partnership agreement).

- In case the main contractor participates in a tender that has a low interest to the company, the company will attempt to quote for the tender if the main contractor states the importance of the company doing so.

- During the execution stage of projects, the company overall schedule will consider in priority the requirements of the partner main contractor.

- The company will attempt to prevent any product quality issue, and in case such an issue arises, will strive to solve it at the satisfaction of the client partner at the earliest.

- Both organisations will set in place regular meetings aiming towards adjusting their respective strategies, in an atmosphere of cooperation. In case the strategy of one of the companies may affect adversely its partner, the latest will be informed at the earliest.

- Legal disputes will be undertaken only when all possible alternative solutions have been closely examined by both partners.
Both organisations will communicate openly, striving to minimise conflicts or to solve them at the earliest, looking for synergic solutions whenever possible.

The main contractor will give priority to the company over any other precast subcontractor pricing above or at the same rate than the company.

If the main contractor intends to select a lower pricing precast subcontractor, it will inform the company in advance, in order to afford it the possibility to adjust its quotation.

The main contractor will willingly provide any known and non-secret tender information to the company.

Partnerships with suppliers were intended in order to establish a formal quality supply chain, mutually beneficial to both partners, based on the following commitments, which are mainly the reverse of the ones undertaken with customer partners:

The company will give priority to the supplier over any other supplier pricing above or at the same rate than the company.

If the company intends to select a lower pricing supplier, it will inform the partner supplier in advance, in order to afford it the possibility to adjust its quotation.

Both organisations will set in place regular meetings aiming towards adjusting their respective strategies, in an atmosphere of cooperation. In case the strategy of one of the companies may affect adversely its partner, the latest will be informed at the earliest.

Legal disputes will be undertaken only when all possible alternative solutions have been closely examined by both partners.

Both organisations will communicate openly, striving to minimise conflicts or to solve them at the earliest, looking for synergic solutions whenever possible.

The supplier will give priority supply to the company, striving to achieve just-in-time deliveries. In case of possible shortage of goods or services, the supplier will inform the partner company at the earliest.
The supplier will attempt to prevent any product quality issue, and in case such an issue arises, will strive to solve it at the satisfaction of the company at the earliest.

The commitments were proposed to intended partners for discussion, review and modifications when required.

The effectiveness of developing formal partnerships instead of informal ones should be reviewed in a few years time, through opinion surveys and meetings with formal partners.

8.2.14.3. Partnership and feasibility studies

Informal partnerships were also established with some suppliers based on joint feasibility studies.

As the company developed, product diversification, new production techniques as well as new production facilities were introduced. In order to base its investment decisions on sound knowledge and data, the company proposed joint feasibility studies to selected suppliers or would-be suppliers, based on the following mutually beneficial elements:

- The Supplier provides knowledge about the different options possible, using its in-depth knowledge of the product/production techniques/production facilities used all over the world.
- The Supplier provides performance data based on its experience, for each of the proposed options.
- The Supplier and the company evaluate the options, taking into consideration the U.A.E. market context, as well as the strategy of the company.
- The company undertakes to select the supplier if one of the proposed options is selected.

This kind of partnership has proved very effective, as it involves in-depth work and communication between both companies, and often led to long term relationships between the two organisations. In many instances, suppliers having provided quality feasibility studies were consulted again when new opportunities for development aroused.

In order to build supplier partnership through a joint feasibility study, the following factors must be met:
1. The intended Supplier should be a world-wide recognised expert in the product/production technique/production facility. This required that the company performs a preliminary research for such possible suppliers, if not already known.

2. If the intended Supplier is not based in the Emirates, it implies that it would agree to send a study team to the Emirates, as it proved difficult to carry out the evaluation of the options taking into consideration the U.A.E. and market context without direct communication, and visual checks. In some cases, tests had to be carried out.

3. From the above, it follows that the possible investment should be interesting from the Supplier's point of view. This means that only important investment projects can benefit from such technique.

8.2.14.4. **Partnership and process improvement**

The company identified two possible ways of improving processes: Through improvement of inputs to the process; or through improvement of the process itself.

Improvement of inputs to a process may often lead to modifications of the process itself. For example, the use of self compacting concrete eliminates the requirement for vibration during the casting process.

Suppliers are often associated to improvement of inputs, when these inputs are external to the company.

Those joint studies, in partnership with key suppliers, are either triggered by the company, or by the suppliers themselves.

- In the first case, the company identifies possible improvement either through literature research, or in response to a customer request, for which no current satisfactory solution is available. The company contacts the relevant suppliers, and proposes a joint study.

- In the second case, a supplier identifies a possible improvement which generally has already been implemented successfully by another of its client.
The partnership generally consists of a number of joint tests, carried out either in the company premises or in the supplier premises, followed by a technical training provided by the supplier if the improvement is deemed satisfactory. Visits to the supplier’s premises to study the fabrication process or to one of the supplier’s clients to investigate process improvements realised, may also be part of the deal.

On the other hand, the company agrees to select the supplier, and in some cases, to provide him with data concerning the process improvement realised, that will be used by the supplier as a promotional reference.

The successful completion of such a joint project is often followed by a long term relationship between both organisations, during which the supplier will regularly propose innovative ideas, and the company will turn to it consistently when in need of technical advices. The partnership process is thus based on regular communication and trust between both organisations.

8.2.14.5. Examples of partnership

A few of the successful partnerships developed by the company will be described hereafter.

➢ The partnership with DBF was initiated during a visit of one of the senior managers of the company in an international construction exhibition. The French supplier was proposing a technique new to the company: Stamped Concrete. A delegation of the company was sent to train in France, and asked to evaluate the interest of the technique in the U.A.E. context.

As the purchase costs were high due to both the shipping costs and to the cost of the European manufactured material, the company proposed to its French would-be supplier to visit the U.A.E. in view of studying the possibility to locally produce its goods.

During the study, the company provided regular assistance to the DBF team, using its in-depth knowledge of the local market, while DBF provided further training.

The study demonstrated a possible material production at a quarter of the French production cost, and the French supplier decided to replace its French production
centre with a U.A.E. one, and to export its product to Europe, realising an important saving both in the Gulf market and in the European one.

The partnership was based on the assistance of the company for a successful transfer of production centre, and a preferential selling rate and technical advice of the former French company, ensuring the company a strong market position in the UAE for the new product.

The partnership with XTec, an internationally renowned producer of Hollowcore machinery, was also triggered by the company’s desire to include a new product among its range: Hollowcore slabs. After a preliminary study of possible suppliers world-wide, it appeared that the Finish supplier had an established reputation for quality, and was willing to establish a partnership with the company.

The first step in this sense was a joint feasibility study, followed by the purchase by the company of state-of-the-art machinery, and the assistance of a Finish team during material installation, commissioning and initial production.

As the productivity of the new product was high and as the local market was in demand, the company extended the production of Hollowcore both in quantity and in range, in close collaboration with its Finish partner.

However, the company noted variability of its Hollowcore products, resulting in product rejects and in some cases in customer complaints. In April 2003, the Hollowcore production was responsible for 93% of the noted product non-conformances, while the Hollowcore production was only 31% of the overall precast production at that time.

After in-depth consultation of its Finish partner, it was decided to send several experts for several months, and carry out a full study of the Hollowcore production processes, from the design stage, the manufacturing stage, the machinery maintenance and the on-site installation process. This was coupled with a high number of tests in order to take into consideration the U.A.E. environment, especially the heat factor, and by in-depth training, ranging from managers to workers. By December 2003, the Hollowcore production was responsible for only 11% of the...
product non-conformances (which themselves had significantly reduced), while its production was 24% of the overall precast production.

XTec was also a major participant to the feasibility study carried out for the installation of the new Mussafah factory. They provided not only technical advices, but also environmental ones, in particular related to water recycling during the Hollowcore production process.

➢ Cormix and MBT are both suppliers of concrete admixtures (although they are not competitors, as their products are different). Although they were privileged suppliers of the company for many years, a partnership relation started with those companies when the company requested them to provide training to their staff about the full range of their products and their respective advantages, following the realisation that the company was sticking to certain types of admixtures out of habit rather than as the result of the study of the specific product requirements and the range of admixtures available.

Following the training, tests were carried out both in the company’s premises and in the Suppliers’ laboratories, in order for the production managers to gain an in-depth knowledge about the technical details of the admixture range, their effects on the production process and on the final product, as well as their respective costs. This resulted for the company in both cost savings and quality improvements, as well as in the possibility to match better the requirements of the clients.

When an admixture is used for the first time, the suppliers are willingly sending a technical team to assist the company during the whole production process. On the other hand, the suppliers are assured a demand growth, resulting from the production growth of the company.

➢ Another type of partnership was the one established with the University of Lebanon. Against the enclosure of Precast manufacturing courses among their curriculum and preferential choice of talented graduates, the company undertook the duty to provide employment and residence to a number of Palestinian students every year.
Many other examples of successful partnerships established by the company could be related. However, all of them are based on the same principles:

- Value generation for both organisations.
- Regular and in-depth communication
- Knowledge sharing
- Trust from both sides

8.2.14.6. Respected payment agreements with Suppliers

A prerequisite to any supplier partnership is the respect of the payment agreements. The company could not establish any real partnership, until it was able to meet its payment undertakings, as trust cannot be built if one of the organisations feels cheated.

As the company recovered from its financial losses and evolved towards recovery and financial performance, one of its priorities was to improve and then meet consistently its payment agreements with its suppliers. No adding value partnership is possible until the company reaches this stage.

8.2.15. Emergence of Value Engineering and Partnering

8.2.15.1. Value Engineering

Value Management (or Value Engineering) has been defined by Barton (2000) as “a structured, facilitated, process in which decision-makers, stakeholders, technical specialists and others work collaboratively to bring about value-based outcomes in systems, processes, products and services”.

This concept has received a lot of attention world-wide, as a way to enhance client satisfaction, and lower construction costs. In recent years, this concept has started to emerge in the United Arab Emirates construction industry.

The company has been one of the first to partially adopt the Value Engineering concept, by proposing its application to several of its Clients, in the following way:

While studying the tender documents of a project, the company’s technical team may uncover that important savings could be gained by using an alternative construction technique, without modifying the architectural solution proposed, which is deemed to represent the client’s values. In such a case, the company may contact the contractor or the
would-be contractor of the project, and propose the alternative, which, if accepted, would have mutually beneficial effects on both organisations.

If the project is at the tender stage, the would-be contractor is contacted, and the alternative explained. He might propose this alternative to the client, increasing his chance of winning the tender, in which case he would select the company as precast subcontractor. In some cases, the company may be asked to present the alternative to the client in order to convince him that his values are not affected by the technical alternative proposed. As the agreement between the would-be contractor and the company is informal, it presupposes trust between those parties, often based on partnership relations.

If the project has already been attributed to a general contractor, the technical alternative proposed by the company has to be approved by the client. The company has often to demonstrate the buildability of the proposed solution, and its reputation for quality is often a strong argument to win the client over.

Several contracts have been recently executed (or will be executed shortly) by the company based on this partial implementation of the value engineering concept:

- In the “Beirut road tunnel at Dubai Airport extension” project, an alternative of pre-tensioned I-beam system has been proposed instead of the original box girder system to a would-be contractor. Based on this proposal, the main contractor was selected by the client. This project was signed in February 2003, and has been completed.

- In the “Al Wahda Mall” project, an alternative of Hollowcore and Post-tensioning has been proposed by the company to the selected main contractor, instead of the original in-situ solution, and accepted. This project was signed in June 2004, and is currently under construction.

- In the “Dubai Mall” project, the company has proposed a precast beams and Hollowcore solution instead of the in-situ post-tensioning original one, to the selected main contractor. This project should be signed in the coming weeks.

There is only one case, as on today, in which the Value Engineering initiative has been taken by the client, and in which the company has been asked to participate.
For the “Dubai Festival City” project, the client has hired a Value Engineering consultant, who has sent the initial design to several potential subcontractors (among which the company studied) asking them for alternative proposals without modification of the architectural aspect. This is the first UAE project involving precast elements, which will be carried out based on a complete implementation of Value Management principles. It has not been attributed yet.

Thus, it appears that the Value Engineering concept is starting to emerge in the Emirates, and might rapidly expand.

Three prerequisites are needed in order for the company to take advantage of this emergence:

- The company should possess the mind-set of studying projects from a critical point of view, enabling the unravelling of alternative value-adding solutions. In this, a TQM culture, which is based on continual search for improvement, is certainly an asset.

- The existence of trust between the main-contractor and the company, as value engineering agreements are based on gentlemen agreements. In this, the policy of partnership developed by the company will certainly prove useful.

- The ability to convince the client that the proposed alternative is a viable one. This is based on the reputation of the subcontractor. The company, with its reputation for Quality production and several TQM awards won, may be viewed as a reliable partner for Value Engineering agreements.

8.2.15.2. Partnering

The Construction Industry Institute in the United States defines partnering as “a long-term commitment between two or more organizations for the purposes of achieving specific business objectives by maximizing the effectiveness of each participant resources. This requires changing traditional relationships to a shared culture without regard to organizational boundaries. The relationship is based on trust, dedication to common goals, and an understanding of each other’s individual expectations and values.” (Chan et al., 2004)
The concept of Partnering is just starting to be used in the United Arab Emirates. The company has recently been involved in two such projects:

In the “Twin Towers Dubai” project, the partnering has been initiated by the individual developer, who set off a partnership between the client, the consultant and the main subcontractors. In contradiction with the general practice in the Emirates, the project was not tendered, but partners were selected for their foreseen ability to bring value to the project. Regular meetings are held to review and enhance the architectural concept selected, and should be maintained throughout the realisation phase. The partnering agreement is underway since June 2004, and the company has been selected for its TQM implementation records.

In the “Al Barari village” project, the developer is a company which has decided to use partnering from the conceptual phase onwards. The company has been selected as the structural subcontractor based on its TQM records, and is asked to propose several structural concepts for team review. The partnering agreement was passed in May 2004.

Although partnering for construction projects is only starting to emerge in the Emirates, it may soon be widely used in this booming market, if the first experiences are successful. It is therefore important for the company to be seen as a potential partner, and its records of successful TQM implementation are certainly useful in this regard.

**8.2.16. Benchmarking**

The cultural environment in the United Arab Emirates is very protective of data, which are viewed as confidential, not to be shared outside the organisation, and communicated in a restrictive and controlled way. Unlike in some western countries, government bodies are generally not eager to publish statistical data relative to industrial performance, which could be used as benchmarking comparisons, although a few such initiatives are starting nowadays.

In such an environment, the company faced difficulties in implementing benchmarking principles, and often had to gain comparative data through indirect ways.
8.2.16.1. Internal benchmarking

As the company developed several production facilities, internal benchmarking was increasingly used, such as comparisons between the productivity and the material consumption level per unit produced, in the different factories.

The growth of the measuring system was a favourable element for the increase of internal benchmarking. For example, detailed comparisons between projects' performance, as well as sites performance were routinely collected and analysed, providing data for best practices studies and critical success factors analyses.

Thus, internal benchmarking became extensively employed, and part of the analysing tools used routinely by the organisation to identify areas for improvement.

8.2.16.2. Using the Award

Feedbacks from the Sheikh Khalifa Industry award were always used by the company in order to find out areas for improvement. Categories obtaining low ratings were analysed in detail, and improvement objectives set.

From 2003 onwards however, results of all categories being above 70%, this methodology was not as effective any longer. The company decided to perform the gap analyses as an integral part of the self-assessment, even before receiving the feedback report. Thus, the approach of the organisation was no longer only reactive to the SKIA performance evaluation, but self-assessment against the SKIA criteria of excellence was started as soon as the participation documents were collected.

In this, the company benefited from the structure of the SKIA submission documents, which is designed to help organisations in their performance evaluation, providing them with valuable insight of the current TQM best practices, as well as with a powerful evaluation system, enabling easy benchmarking between the company practices and World Class factory ones.

For example, the gold level of the 2003 submission was proposing four categories of forty items each. The first item of the "Management responsibilities" category is relative to the development of mission and vision, and run as follows:

"1- Developing mission and vision."
The mission of a factory is why it exists, its function, and the vision is a description of how the factory wishes to be in the future. The managers, directors and owners of a factory are responsible for defining the mission and vision of the factory and ensuring their relevance to current conditions. In World Class factories this forms part of the strategic planning process.

It then proposes a benchmark that the organisation uses to evaluate its current level of performance, according to the item considered. For example, the benchmark regarding the "developing mission and vision" item runs as follows:

"Rate your factory’s performance against the following benchmarks:
1 No clear vision of where the company is going.
3 The leaders have discussed their vision for the factory, but nothing has been formalised.
5 The leaders have defined an initial mission and vision for the factory, but these have not been reviewed.
7 There is an audited, documented procedure for the development of a strategic plan each year. During this process the leaders of the factory review the mission and vision for the factory to ensure their current relevance."

Thus, the Sheikh Khalifa Industry award proposes an extremely powerful and easy to use benchmarking tool, which enables the organisation to self-evaluate its current level of performance against world-class factories.

The following methodology was used:

- The item considered is sent for self-assessment to 5 to 7 employees having a good knowledge of the subject examined, and including the Executive Manager and the researcher. Other participants are selected from different hierarchical level, provided they possess a good level of written English or written Arabic (all items are provided both in English and Arabic by the SKIA).

- Any item scoring 6 (intermediate level between the 5 and the 7 benchmarks) or 7 in average, and having two or less points of gap between the lower self-evaluation and the higher self-evaluation, is considered validated, and the average grade is selected as the company answer to the item.

- A meeting is held to consider any item that does not meet the above-mentioned criteria.

During review meetings, the following are considered, and a self-assessment gap analysis (SAGA) document updated.
For items having more than two points of difference in the self-evaluation, difference of evaluations is discussed. They may be due to a misunderstanding of the proposed benchmarks, or to a lack of communication. If the lack of communication is not anecdotal, but appears to reflect a possible gap in the communication system, the communication problem is noted on the SAGA document.

For items with a score below 6, the team considers whether it wishes or can improve its performance. It may happen that the company may not wish to improve on a particular item for the time being, estimating that the organisation is not yet ready for such improvement. It happened once that the company could not improve on the proposed item. This was the case of the "consideration of social accountability" item, referring to the adoption of the principles of the SA 8000 international standards for just and decent working conditions. Some of these principles are in direct contradiction with the UAE law, which, for example, requests that the employer should hold the passports of its employees. It was decided that nothing could be done in this regard, but that all organisations participating in the award would probably be in the same position.

When the team estimates that an improvement in the item can be beneficial and possible, a brief "on-the-spot" brainstorming session takes place, and possible improvements are noted in the SAGA documented. When no such improvement can be identified, the item is noted on the SAGA list, for further study.

Some of the items proposed by the SKIA contain corresponding measurements on top of the benchmarking assessment. For example, the "Strategy based on research" item contained the following measurements to be provided:

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget for product/process research</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenditure on product/process research</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget for market research</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenditure on market research</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 64 Example of measured results requested by the SKIA
Whenever the company faces difficulties to collect the required data, and if it appears valuable to measure such indicators, the corresponding improvement in the measuring system is added to the SAGA list.

Finally, when the feedback report from the SKIA is received, categories’ audit scores are compared with self-assessments scores. The self-assessment process adopted by the company specifies that in case of significant over-scoring during self-assessment in a category, all items of this category would be subject to a second critical self-assessment. However, this technique was not used, as during the last two participations in the SKIA, self-assessment and audit scores were very similar, proving the increased ability of the company to perform accurate self-assessment, as well as the effectiveness of the guidelines provided by the SKIA.

The Support and Development department, headed by the researcher, is then in charge of the follow up on items contained on the SAGA document.

Some entries on the list are immediately implemented. It happened several times during the SKIA audits of 2003, which took place a couple of months after the self-assessment, that the self-assessment score was below the audit score on some items, due to the implementation of improvement actions in the meantime.

When required, the SD department schedules study meetings in order to examine low-scoring items for which possible improvement actions were not identified during self-assessment.

During the strategic plan review process, all remaining items on the SAGA list are considered for selection as strategic objectives.

8.2.16.3. Using results of Customer Satisfaction Survey

As it proved difficult for the company to obtain benchmarking data through its competitors, the company decided to obtain them in an indirect way: through customer perception of competitors’ performance.

This technique has the disadvantage of being indirect, and relying on the measurement of a performance perception, rather than on the actual performance data. A second difficulty is that this tool does not allow the company to understand why one of the competitor’s
processes is performing better, from the client's point of view, than the one of the company's. It only provides the information that if it is performing better, there should be a way for the company to improve its process, but not how this could be done.

On the other hand, if one agrees with the TQM principle that what matters is customer satisfaction, measuring competitors' performance from the client's point of view does make sense, and may be of significant higher value than operational performance data.

The organisation tried to make the most out of the indirect way of measuring its performance with its competitors' through customer satisfaction measures.

- It did not only evaluate general performance, as perceived by customers, of its competitors, but isolated each process satisfaction measure as well as process items, in order to increase its knowledge of possible gaps.

- It did not only collect data about competitors' performance as an aggregate of all other precast manufacturers, but obtained named comparisons. As the company anticipated that clients may be reluctant to specify with which precast subcontractor the comparison was done, the name of the competitor was obtained verbally during interviews, and no specific identification (on process-based perception) was required on the form itself. It may be noted that this method proved effective, as very few clients refused to specify the competitor with whom they were performing performance comparison, once at ease with the collecting person, selected for its independence.

- In order to cross-check the obtained process performance measures, an additional question relative to the overall satisfaction of named competitors, was placed in the second part of the questionnaire. This proved effective, as the customer requirements are different depending on the Emirate considered. It appeared that Abu Dhabi based clients were ranking higher their satisfaction with the company than Dubai ones. This difference is mainly due to the difference of expectations of clients, depending on the Emirates. Dubai clients are expecting excellence, while Abu Dhabi clients are expecting satisfactory products. Thus, a competitor operating mainly in the Abu Dhabi market, receives higher scores in process performance then he would receive if his clients were Dubai based.
8.2.16.4. **Using Partnership with Suppliers**

During feasibility studies, supplier partners are providing information about world-wide plant performance, depending on the technology used. This helps the company compare its present level of performance, and identify possible gaps.

Partner suppliers also organise visits of European precast production centres, during which product manufacturing processes are compared with the organisation’s ones. Guest companies are often willing to share data, as the organisation is not perceived as a competitor (due to high transport costs of concrete products). If these visits provide valuable information about the performance of precast competitors overseas, they cannot, however, lead to in-depth process benchmarking.

Suppliers are also suggesting innovative techniques and material successfully used by local competitors, along with corresponding data when available. In specific cases, tests are performed jointly in order to measure possible improvements that may be gained by the technique/material utilisation.

8.2.16.5. **Using Partnership with Competitor**

Although it proved difficult to obtain direct information about competitors’ performance, the strong expansion of the market demand promoted less adversarial relations with main competitors, from 2003 onwards. Although data exchange stayed scarce, factory visits were scheduled, and requests for information favourably received on specific technique or process.

However, communication stays limited to specific subjects, and local competitors’ organisations are not yet ready to freely compare detailed performance data about their main processes, that could be the basis for an effective benchmarking exercise.

8.2.17. **Improving the Marketing**

The geographical extension of the company’s customers to Dubai, the Northern Emirates and occasionally to neighbouring countries, as well as the entry in the Main Contractor market of new potential customers attracted by the booming construction environment in the UAE, drove the company to improve its marketing tools.
8.2.17.1. Creation of a Company Brochure

During the Quality integration phase, the company developed a few flyers and product brochures, with the help of students performing their summer training, in order create rapidly a partial promotional documentation which was severely missing from the company's marketing tools, while approaching new potential customers.

During the Quality refinement phase, the strategic objective of acquiring professional prestigious product brochures was acted upon. After in-depth study of brochures proposed by its main competitors, the company hired on a temporary basis a professional marketing engineer, in charge of designing the brochures. The obtained marketing material were reviewed and validated by the marketing committee.

These quality brochures proved to be effective in attracting new customers and promoting the organisation's image of a main competitor in the UAE precast manufacturing market.

8.2.17.2. Creation of a promotional film on the company, integrating the following techniques: Film, 2D and 3D incrustations

The company decided also to develop a promotional film of the company, using two dimensional and three dimensional incrustation techniques. The aim of this marketing tool was to promote the following aspects of the organisation:

- **High customer focus:** The film relates the journey of a customer wishing to construct a villa, and visiting the company in order to obtain advices. After study of different possibilities corresponding to practical requirements and the desired values uncovered through in-depth communication between the commercial and technical team and the customer, the client selects the concept of his dream villa. The project realisation is then followed from its design stage, to the construction and erection process, with constant communication and cooperation with the client, who is delighted to acquire the villa of his dream. Throughout the film, the customer receives a warm welcome from all company employees.

- **Quality focus:** From the design to the handing over, the emphasis of the film is on quality production. High quality standards and controls are highlighted, as well as prestigious TQM awards obtained by the company.
The organisation as a major Precast Manufacturer in the UAE: The film highlights the size of the company, from the design team of more than twenty engineers, to the extensive production grounds.

State of the art technology: This element is brought forward both by the technical quality of the film itself, using two and three dimensional incrustations, and by the state-of-the-art technology available in the company, both in design and in production.

Due to the multi-lingual environment of the company, no voices are audible in the film. Ideas are expressed through the film, the two dimensional pictures and the three dimensional animations. The customer is represented as a UAE national, wearing traditional clothing. The diversity of nationalities in the organisation is apparent, with European, UAE national, Arabs and Asians employees.

8.2.17.3. Three dimensional computer generated mock-up of proposed final products

The company uncovered through communication with its clients, that apart from technical drawings, many customers desire to have a three-dimensional representation of what the final product will look like, once completed. The municipality also favours such representations, and both the client and municipality approval prove to be quicker when a three-dimensional representation is provided.

Using such tools, the customer is also able to verify that his aesthetic values have been correctly understood by the company, and early adjustments are possible if such is not the case, reducing the chances of the client being disappointed at handing over.

Two possible techniques can be used in order to provide such three-dimensional representations: Models and three-dimensional films. The company favoured the latest technique, as well as representations using the “3D Studio Max” software over the “Autocad 3D” software, for the quality of the obtained representation, based on the assumptions that first impressions are important, and that the use of a state-of-the-art technique should have a favourable influence on the customer’s purchase decision.
Such technique is used when the organisation is either the main contractor of the project, or a major subcontractor. When operating as a minor subcontractor, the responsibility of a three dimensional representation is generally undertaken by the main contractor.

8.2.17.4. Analysis of Market Trends using the Market Research Database

During the Quality integration phase, market data started to be collected on tenders in which the company did not participate, and the collection process extended outside the Abu Dhabi traditional market, to Dubai and the Northern Emirates.

The following data are collected and fed into a database:

- Tender information, such as the date of the tender, the main contractors participating with the winner’s name highlighted, the quantity and type of products involved (only those relevant to the company), the intended duration of the project, its location etc.

- Precast Subcontractor information, such as who quoted for precast elements, at which price, the detailed pricing per product etc.

Using these data, the following analyses are performed:

- Competitor Analyses:

  - For each product, percentage above or under the company’s quotation, over the last year. Example for the Precast product.
- For each product, the quoted price of precast manufacturer per unit, over the last year. Example for the Precast product:

- By trimester and location, the amount of contracts signed by each precast manufacturer. Example for the Abu Dhabi market:

Figures 63 Examples of graphical representations of competitor analyses, compiled from 2003 onwards

4. Market share analyses

- The overall UAE market share of precast manufacturers over the last year, based on the value of signed contracts.
Daniele Seraphim – Ph.D.

The market share of precast manufacturers over the last year, based on the value of signed contracts, by location. Example for the Abu Dhabi market:

- The market shares evolution over the past years.
Analyses by products, according to contract value signed over the last year, are available for the UAE market, as well as by locations:

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Total</th>
<th>Abu Dhabi Emirate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Tech</td>
<td>72,500,000 Dhs</td>
<td>57,542,371 Dhs</td>
</tr>
<tr>
<td>GPCC</td>
<td>70,319,498 Dhs</td>
<td>53,000,000 Dhs</td>
</tr>
<tr>
<td>Emirates Precast</td>
<td>64,000,000 Dhs</td>
<td>64,000,000 Dhs</td>
</tr>
<tr>
<td>United Precast</td>
<td>60,330,000 Dhs</td>
<td>60,330,000 Dhs</td>
</tr>
<tr>
<td>Al Mureikhi</td>
<td>53,259,797 Dhs</td>
<td>53,259,797 Dhs</td>
</tr>
<tr>
<td>Square</td>
<td>27,025,000 Dhs</td>
<td>27,025,000 Dhs</td>
</tr>
<tr>
<td>Jumal Majid</td>
<td>25,327,500 Dhs</td>
<td>25,327,500 Dhs</td>
</tr>
<tr>
<td>Con Tech</td>
<td>21,250,000 Dhs</td>
<td>21,250,000 Dhs</td>
</tr>
<tr>
<td>Al Otaiba</td>
<td>2,498,000 Dhs</td>
<td>2,498,000 Dhs</td>
</tr>
<tr>
<td>Ascrop</td>
<td>800,000 Dhs</td>
<td>800,000 Dhs</td>
</tr>
<tr>
<td>Al Fara</td>
<td>200,000 Dhs</td>
<td>200,000 Dhs</td>
</tr>
<tr>
<td>Grand Total</td>
<td>397,509,795 Dhs</td>
<td>145,575,168 Dhs</td>
</tr>
</tbody>
</table>

Reasons for not winning are analysed, both for the UAE market, and by locations:
Figures 64 Examples of graphical representations of market share analyses, compiled from 2003 onwards

- **Market size analyses**

  - Market size evolution in the Emirates is apprehended, both globally and by products.
Daniele Seraphim – Ph.D.

Over time, as the data collection process improved, the company became more confident about the accuracy of these data, and more reliant on their analysis as a critical knowledge on which to base its strategy.
8.2.17.5. Participation in exhibitions

Participation in exhibitions had started during the Quality Integration phase, and was reinforced during the refinement stage, as it proved useful to increase potential client knowledge outside the traditional market of the company, thus strengthening the organisation’s image.

Efforts were concentrated on the Emirates, particularly the Dubai one in which the demand for precast concrete products is high and the penetration of the company is low, and on neighbouring countries, as projects performed outside this area are scarce due to the high cost of precast elements transportation.

Marketing tools, such as brochures and films, proved to be of critical importance during exhibitions, as well as the training of employees selected to receive potential clients.

Follow up on contacts made, is a critical element in transforming potential clients into customers.

8.2.18. Complete IT integration

8.2.18.1. Outsourcing the IT System

The decision was made in 2002, to perform a complete integration of the IT system of the company, and to outsource the project to an IT specialised supplier. The perceived benefits of outsourcing were the following:

- Avoid increasing the number of employees in the IT department during the development phase, which may result in the necessity of dismissing some human resources once the project completed.

- A partner supplier may better absorb the workload variability depending on the project’s phases, by affecting or drawing out human resources from projects with other clients, offering a better correspondence between human resources required at any given time, and human resources available.

- The availability of multiple competencies, knowledge and experience in terms of hardware and software of the IT specialist partner shall ensure fast problem solving.
The selected IT solution provider company was chosen for its physical proximity and administrative propinquity to the organisation, as it is located in the same building and as the local shareholder is common to both companies. This was thought as a token for effective partnership, based on cooperation and trust.

8.2.18.2. Physical integration

The physical integration was performed in two phases:

- During the first phase, all head office data were transferred to a server, and access rights were defined. Users were asked to place all working data on the server, and to avoid using standalone storage devices. This shifting from previous work practice was obtained through training and checking. During training, new data storage rules were explained, as well as advantages of the selected IT solution. Checking was used to verify that the data storage rules were implemented, and non-observation was followed by additional training or warnings. After a while, as the culture for data storage had been observed to have successfully changed, the checking process was dropped.

- During the second phase, remote production areas were connected to the head office through wide area networking. Training and checking were also provided.

8.2.18.3. Logical integration

Two types of data were identified: Those requiring integration within an overall database, and those requiring only sharing or consultation rights.

Among the later type are AutoCAD generated drawings and other correspondence documents. Study groups were in charge of identifying required sharing or consultation rights. A corresponding data structure for easy retrieval was proposed and implemented, rights were defined, and previous data brought in the new structure.

The use of the Oracle system was selected, as it allows wide area networking, and has a good reputation for robustness.

Some modules proposed by the IT partner were thought to be suitable for the company, such as purchasing or accounting. They were customised according to the company’s requirements, and tested. A study group, with members from both organisations, analysed...
which past data were to be loaded in the modules. Data adjustments were performed when necessary, and required historic data brought into the new system. For several months, data entries were performed in both the previous and the new system, and verification was made on data reliability and data feeding, retrieval and analysing processes, and required adjustments performed. Once the new system was deemed to be stable, data feeding in the previous system was dropped.

Using the previously made analysis performed by the company of its additional requirements in terms of IT data, a joint committee with members of both organisations performed a detailed study of existing and missing data. Whenever required, tailor-made modules were developed, and integrated to the modules already in use. The system is conceived to reflect the interdependence of the processes, ease comparisons and avoid double entries.

Example of the IT project integration through different processes.

In a simplified way, the following description relates how projects' data are made available to concerned process owners.

Data entries on a project start with input from the estimation department of volumes of products to be produced and estimated production costs, based on purchasing data available in the system and on last projects' performance.

The design department identifies each panel to be manufactured, with reference to its drawing number.

The quality control technician feeds in the system the mix designs (list of material elements to be mixed together in order to obtain the concrete type specified in the contract), as well as the correspondence between panels (previously fed by the design team) and mix designs.

The factory team identifies mould production requirements and feed them in the system. It identifies material requests, which are validated by the Executive Manager and ordered from suppliers by the purchase department. It tracks mould production and panel production as well as volumes of material and manpower.
consumed during the production process. Material consumption is partly based on the mix design defined.

Material production costs, valorised using purchase data, are passed automatically in the accounting system, as well as labour production costs, using payroll information.

Financial costs and estimated costs can be compared at any time.

The planning department can consult on line the current production status of the projects as well as elements yet to be produced, and the quantity surveyor can prepare his monthly bills.

Panels' deliveries are recorded by the factory team and on site erection by the site team. The sites department identifies material and labour used during site erection, which are available in value in the accounting module.

The monthly payroll is passed using employees’ daily timesheet fed in the system by the head office, factories and sites teams.

8.2.18.4. Data protection system

The usage of a centrally integrated database has brought forward the possibility of unauthorised entry into the system from which access to detailed information about the whole organisation, or data unrelated to employees’ knowledge requirements could be gained.

The company’s policy of providing internet connection to a wide number of PC users in order to foster research and development has also left it sensible to virus infections. The wide network connections have amplified this sensitivity. It soon became apparent that a proactive antivirus protection was required, and that reactive virus removals were no longer effective, and were creating important work disruptions, and even data losses. Therefore, the following system was implemented:

The server is protected by a state-of-the-art unauthorised access protection system, as well as a firewall, which is regularly updated to the latest technology. Access logs are maintained and consulted regularly in order to identify any suspect connection attempts.
Users’ rights are maintained centrally, and defined both through group belonging and individual rights. These are protected through ID identification and password usage. The level of password complexity required is defined centrally by the network administrator, and passwords have a maximum duration validity of three weeks.

A powerful virus protection system is installed on the server, and updated daily. At user log-on, the PC’s antivirus system is automatically updated using the server’s one.

It may be noted that although no successful unauthorised data access is noted as on today, the state-of-the-art virus protection system was unable to prevent a virus infection in 2003, which resulted in a major three-day work disruption. After study of the event, the company decided not to increase further its virus protection system, as its protection was already at the highest range of that proposed to private companies, but to improve considerably its data recovery system, in order to minimise the adverse effects of a virus infection.

8.2.18.5. Data consultation system

Among the core values of the company, are transparency and knowledge sharing. When applied to IT data, these mean extended consultation rights, which might lead to better diagnostics of low performances and to additional suggestions for improvement, but also to information dispatching, outside the organisation, without its agreement.

Faced with this dilemma, the company decided to provide fairly extensive but limited consultation rights to its employees. At the same time, it provided them with the knowledge of the full range of data available, asking them to present justified consultation requests to the management, which may be granted for a defined period of time.

The second issue of data consultation is the difficulty to extract from a huge bunch of detailed data, the ones that are pertinent to a specific study. There is a risk that the user may be lost among too much information, and unable to the extract relevant one. In order to overcome this issue, the company decided on the following objectives.

- Purchase of a renowned extracting software. By specifying tables, fields and extracting ranges, the software makes data readily available in an Excel format.
- User training on the extracting software, including software manipulation and the tables and fields identifiers relative to company’s data.
Daniele Seraphim – Ph.D.

- Availability of IT assistance: When a user is unsuccessful in extracting the data he requires, an IT employee can help him, and the query is saved on the user’s computer, in order for him to use it again, after possible modification. If the IT team finds out repeated difficulties of an IT user to perform required data extraction tasks, the user is proposed for additional training on the software, or on the data structure available in the company.

The knowledge sharing targets of the company are yet fully effective, and further improvements are scheduled.

8.2.18.6. Contingency plan for hardware or software failure

In 2003, a virus infection created a three-day work disruption in the company. Following this incident, the company decided to review and improve its contingency plan for IT failure.

- A list of possible hardware and software failures were identified. They were then simulated, and recovery tests performed, measuring recovery time, and estimating the range of disruption, calculated according to the number of users unable to access their data, and the importance of timely access to them.

- For each hardware and failure identified, possible preventive measures and recovery measures were examined. According to their respective costs, to their estimated probability and to their estimated range of work disruption, preventive and/or recovery devices and/or training were purchased.

It may be noted that practicing recovery procedures had already enabled a positive impact on measured recovery time.

A number of spare parts were purchased, and the network administrator received additional training on how to identify a defective spare part, and how to replace it.

A spare server was purchased, of a lower configuration then the original one, but that can be used to perform its functions at a lower speed, minimising disruptions. This spare computer’s configuration is maintained identical to that of the main server, but with limited access rights, in order to limit access traffic.
Daniele Seraphim – Ph.D.

A hard disk mirroring system has been installed on the server. Every transaction is updated instantly both on the corresponding hard-disk and on its mirror. In case of failure, the mirror hard-disk is taking over, completely avoiding data losses. The failure is transparent to all users except the Network administrator.

8.2.19. Process reengineering

8.2.19.1. Initial belief that process reengineering may be valueless to the company

Process reengineering is opposed to process improvement, in the sense that it implies a total redesign of the process, in view of radical innovation change. This approach was seen by the company as having several advantages:

- Instead of focusing on improving slightly a process, it could foster prompt and breakthrough performance improvement.
- The whole process organisation could be reviewed at the same time as the process operations, cumulating managerial and operational gains.

However, BPR (Business Process Reengineering) was perceived as having major inconveniences:

- It implies discontinuing the current process operation, in view of replacing it with a redesigned one. At time where demand was high, and where the company already faced difficulties in fulfilling its order book, any production disruption was to be avoided.
- It was also estimated that there might be a strong resistance from process owners, who until now had been urged to continuously improve their process and had been successful in this attempt. BPR might be perceived as a top management initiative carrying the following message: “Although you have proved successful in continuously improving your process performance, we now decide to strike it off, and redesign it entirely.”

It appeared that if BPR could be useful for low-performing companies, it might not be effective for a company having successfully implemented the continuous improvement principles within its processes.
The company expansion changed this view: The Dubai factory production centre was set up according to the production process operations in place in the Mussafah factory (which is the original production centre of the company). The Dubai factory management as well as a high percentage of its workforce were new to precast production processes, and it soon appeared that process effectiveness was disappointing, and comparable to what was obtained before the continuous improvement campaign in the Mussafah factory.

Using benchmarking, the objective of reaching an effectiveness comparable to the Mussafah’s one was set, but it soon appeared that although progresses were made, they were slow, as they involved implementing a “continuous improvement” culture among Dubai employees, and was resisted by the Dubai factory management who was reluctant to admit that their performance was low and could gain from internal benchmarking with Mussafah, proposing all types of excuses for the obtained low performance figures.

8.2.19.2. First successful BPR implementation

When the Shahama production centre was purchased, the Top Management decided to assign the ownership of this new production centre to the Mussafah management, as the physical distance between Mussafah and Shahama is small, and as it would limit the number of management staff to be hired.

Thus, the Shahama production centre was developed according to the directives of the Mussafah Management.

When the first productivity figures were published, the top management was amazed at the obtained performance. For example, the labour productivity figures in July 2003 were as follows:

- Dubai factory: 28.6 hours per M3 produced
- Mussafah factory: 22.5 hours per M3 produced
- Shahama factory: 12.0 hours per M3 produced

Although the Dubai factory went on closing slowly the gap with Mussafah factory, and Mussafah factory carried on its process of slow continuous improvement over time, the Shahama factory kept its head up when compared with other production centres.

When a further analysis was performed of the reason behind the outstanding performance of the Shahama factory, it appeared that the Mussafah factory management performed a
BPR analysis, based on their experience in Mussafah and on improvement suggestions that could not be implemented in Mussafah due to historical constraints.

The Mussafah factory management designed the Shahama factory production centre as what a “perfect” Mussafah production centre could be, if it was not limited by constraints, applying BPR principles, and obtaining a performance improvement of more than 50%.

This experience proved that process reengineering could be effective for the company, and foster breakthrough improvements, and that the foreseen inconveniences could be overcome by using the following technique:

- Apply BPR principles to new production centres, and continuous process improvements in operational ones.

  This avoids any production disruption of operational processes, and provides breakthrough improvements in the newly set up ones.

  This technique is especially effective in times of expansion, such as is currently the case for the company, when new production centres are rapidly set in place.

- Involve and even assign the BPR study and implementation of the new production centre to process owners currently responsible of similar processes in an older production centre.

  This technique overcomes any change resistance, ensures that the new processes are redesigned by employees having an in-depth knowledge of process operations and of improvement barriers that should be lifted during the BPR study.

  It also helps then to identify, through benchmarking between the old and the new processes, improvements that could be successfully implemented in the old process. In this sense, the BPR implementation fosters further continuous improvements in the old processes.

It may be noted that the BPR study should be carried out by employees seeking improvements, and should not have as objective to reproduce the current process system. In this sense, the culture of never ending change and improvement, set in place for Total Quality Management implementation, is critical to a BPR study: Employees’ minds have
already integrated that examining process performance from a critical point of view is necessary for improvement; Change for improvement is viewed by all in a positive way, and not as a criticism of the existing system; Suggestions for improvement, previously rejected as inapplicable due to process constraints, can be successfully implemented in the new process, by lifting these constraints.

It is remarkable that this first experience of BPR was not fostered by the top management, but came down the line by production process owners, making use of the TQM improvement culture which had been successfully put into action in the company. Breakthrough improvements, particularly in the light of the mitigated results of the recently designed Dubai factory, drove the top management to reconsider its view of BPR as undesirable in the case of the organisation’s circumstances, as it appeared that the approach taken by the Mussafah factory management overtook all drawbacks viewed by the top management as rendering process reengineering objectionable.

In this sense, it can be said that the company successfully implemented Business Process Engineering based on BPR principles, rather than Business Process Reengineering.

8.2.19.3. Process performance studies

In view of the successful implementation of BPR principles in the Shahama production centre, the top management decided to carry out a review of process effectiveness throughout the company. The project was to cover all processes, Head office, Factories, and Site erection processes, based on the following objectives:

1. Improve the current performance of the processes studied.

2. Use the studies as the basis for process reengineering, to be implemented in new production facilities set in place to sustain the company expansion policy.

The current expansion plan was to set up a factory production centre in the New Mussafah area, which was to be operational by mid 2004, and to shift the overcrowded Abu Dhabi head office within the boundaries of the New Mussafah land.

The land had already been acquired, and feasibility studies had been started in joint partnership with key suppliers. It was thought that applying BPR principles to the
production facilities of the New Mussafah Factory could produce breakthrough improvements in a similar way than the engineering of the Shahama factory did.

In view of their past success, it was decided that the Mussafah factory management would be involved in the study. It was decided to start the study with factory processes, as they are critical to the company’s overall performance. Among the three factories currently operating, the Mussafah factory was selected as a base for this factory process study, for the following reasons:

- Because of its low performance, the Dubai factory was regarded as unsuitable for the BPR part of the study.
- Because of its high performance due to its recent reengineering, the Shahama factory was regarded as having a limited opportunity for current process improvement. The company had also been informed, that the Shahama production centre may be closed down by the authorities in the near future, which reinforced the decision not to select that production facility for the study.

The Mussafah factory was thought to be the “average” production centre, holding processes which could certainly be further improved, and which could be used to highlight constraints blocking the implementation of breakthrough improvements, that would have to be lifted in the new Mussafah factory.

Among the production processes of the Mussafah factory, it was decided to start with the study of the Precast casting process, because of its central importance among other processes, and because of the intuitive belief that improvements may be substantial in this process. The next processes selected were the precast repair process, and the moulding process.

Thus, during this clarification period, the following characteristics of the study had been highlighted and agreed upon:

- **Overall scope:** Study operational efficiency of all company’s processes.
- **Objectives:** Current process improvement.
  - Knowledge of constraints that may be lifted during BPR.
Reduced initial scope: Precast casting process of the Mussafah factory

8.2.19.4. Example: Study of the Mussafah Precast casting process

Once decided that the study would first concentrate on the precast casting process of the Mussafah factory, the following methodology for data collection was agreed upon.

8.2.19.4.1. Main findings of the analysis

It was decided to limit the study team to a minimum during the first process investigation, in order to assess at limited costs whether the proposed study technique may result in substantial benefits. It was agreed that if such was the case, study teams would be expanded, and several process studies would be carried out at the same time in order to accelerate the process, and cover all company’s processes.

8.2.19.4.2. Communicate the scope and objective of the study to the precast casting team, and gain collaboration.

Initial communication of the objective and scope of the study, is of main importance. Communication with the Factory Management was initiated during the selection process of the first process to be studied, as this selection resulted from a joint decision of the Top Management, the SD Manager and the Factory Manager.

Foremen were informed by the SD and Factory Manager of the objectives of the study, and of the reason why this particular process was first selected. They proved willing to join the team, and share their extensive practical knowledge. They were asked to inform the concerned workers of the reasons and objectives of the study.

The Quality Control manager and his employees were informed of the objectives of the study, and provided valuable insight about the product quality issues.

It was clarified that the aim was not to study individual performances, but to collect data concerning the overall running of the process. It was added that the study would not generate any lay offs, even if labour savings could be fostered, as the company was in an expansion phase, and as manpower was in short supply. Finally, workers were asked to carry on their work as usual, and to provide assistance to the teams members when necessary.
It may be noted that communication with labourers, apart from the one described above, which was a top-down information providing one, was almost inexistent during the study, due to the absence of a common language. Enquiries had to be directed to foremen or quality control employees when available, as no full-time translator was affected to the employee in charge of data collection.

The researcher decided to spend a couple of nights (during summer months, most of the casting operations are performed at night) observing process operations, in order for employees to get used to her presence, and to familiarise herself with the execution work.

As the study was relying partly on measuring effectiveness, this initial observation period was used to examine which detailed data could be collected, that would provide information about the process operations, and could be the basis for improvement recommendations, if any.

The following knowledge was collected during that initial study:

- List of tasks regularly performed
- List of main events affecting these tasks
- List of panel characteristics affecting the duration of these tasks

It was decided to collect the following data:

- Characteristics of the mould
- Starting time and finishing time of tasks performed (including waiting), their duration and the number of employees involved
- Events, and their occurrences

Once the data collected, it would be fed by the researcher in a database, and analysed.

A number of tools were elaborated in order for the collection process to be effective: A coding system in order to limit writing to a minimum; A form, in which to feed the data.

The following type of data was collected using the elaborated form:
Table 65 Example of data collection sheet used to analyse the Mussafah Precast Casting process

In the workers column, the number of employees currently performing the task was captured. The task duration was obtained through computer calculation, using the time recorded.

The form was improved over time. Thus, the data collection method used resulted from a trial and error process, rather than an initial concept of what should be captured.

Apart from data captured on the forms, additional qualitative information was collected.

8.2.19.4.5. Data analyses depending on panel characteristics

A database was set up to receive the collected data structured in a way that suited the data collected and that avoided entry mistakes as well as double entries in order to ease the feeding work.

A first analysis of the data was carried out by the researcher, using the characteristics of the casted panels.

The following was uncovered:

- In average over the data collected, the waiting time was 45.21% of the total time
Daniele Seraphim – Ph.D.

- Number of cranes required to bring the concrete to the mould: When 2 cranes were required the waiting time is 29% higher than if the concrete is brought by one crane.

- Proximity of other moulds: When other castings are in progress or will be in progress nearby the studied mould, the waiting time is dropping by 23%.

- Horizontal casting versus Vertical casting: The waiting time for Vertical casting is higher than for Horizontal casting. However, the present analysis did not cover finishing work, and did not take into consideration the amount of repair work, which should be lower for vertically casted panels.

- Colour casting versus Grey casting: Although colour casting is more time-consuming by M3 produced than grey casting, the waiting percentage in both cases is roughly equivalent.

- Ready mix Concrete versus Batching Plant concrete: The waiting time is 5% lower when Ready Mix is used than when the Batching Plant concrete is used. However, the control the company has over the quality of the concrete is lower in case of Ready Mix.

8.2.19.4.6. Analyses using computer simulations.

The following computer simulations were then performed:

1. Remove one worker per casting, when the number of workers present is superior to one. The sequence of the tasks is not modified and waiting time is not used to perform alternative tasks.

   Results: The percentage of waiting time is dropping from 45% to 35%. Overall operations are delayed by 12.25%.

2. Remove one worker per casting, when the number of workers present is superior to two.

   Results: As in Simulation 1, the waiting time in dropping by 10%. Overall operations are delayed by 0.58% only.
3. Removing two workers per casting, when the number of workers present is superior to three.

Results: The waiting time drops from 45% to 26%. Operations require 38 additional minutes to be completed (less than 2% of the total time).

4. Multitasking: Any worker can perform any task and all tasks are completed as early as possible. The timing of events, such as when a new load of concrete is available, is not modified.

Results: Applying multitasking principles to the original data does not improve the performance. Instead of workers waiting for small periods of time until the concrete is available, they finish the tasks earlier and all wait. Thus, intensifying multitasking has no benefit unless the size of the casting teams is reduced.

5. Multitasking on simulations 1, 2 and 3.

Results: If multitasking principles are applied, the smaller number of workers in the casting teams does not delay the production.

In simulation 1 and 2, 16% of the required casting time may be saved (using waiting time). As, in average, 20,776 hours are worked per month in the Precast Casting Section, this means a saving of 3,319 hours per month. As one hour is paid in average 5.86Dhs, it could save up to 19,500Dhs per month to the company.

In simulation 3 (reducing by two the size of the casting teams), 26% of the required time could be saved. This means a saving of 5,454 hours or 32,000Dhs per month to the company.

8.2.19.4.7. Additional learning

Possibility of multi-tasking

A high specialisation of the workers (low multitasking) could be noted in the company, especially when the number of workers is important on a table. “Why would the workers perform tasks that were not originally affected to them? They very well know that everyone will have to wait for the arrival of additional concrete anyway.”
However, when additional concrete is quickly available (in case of ready mix for example) or when the number of workers on a mould is limited (when the team is divided on two adjacent moulds for example), the workers are naturally increasing their multitasking and helping each other in order to keep up with the speed.

**For a better Quality Control**

It was noted that Quality Control inspectors were not using their checksheets while inspecting the casting (however, they did carry the drawings). At best, they were writing a few notes on a piece of paper regarding any problem they noted.

As quality checksheets used by the company were very exhaustive, and were requiring a long time to fill, their on the spot utilisation was not possible, and they were filled later on in the office. This late checksheet filling had no added value to the process, and was estimated to require a minimum of 4 hours per day and per factory of quality inspectors’ time.

**Avoiding grey spotting on moulds used for colour casting**

Some moulds, in which pigmented concrete was to be casted, were placed on the cranage routes to bring grey concrete to other moulds. When the buckets containing grey concrete were passing above these empty moulds, a few grey waterish drops may fall on the mould, which may affect the evenness of the colour.

8.2.10.8. **Recommendations for continuous improvement**

Reduce the number of employees by precast casting team, whenever the production schedule is not too tight. This recommendation is being implemented.

Promote multiple skills through training and incentive schemes, and decrease the number of employees by precast casting team independently of the schedule contracted. The policy of encouraging multiple skills has been reinforced, and relevant training increased.

Whenever possible, place moulds next to one another, and avoid standalone mould locations. This had been already identified and acted upon before the study by the factory management. However, following the measured importance of this issue, the policy was reinforced, and considered as a major performance issue, and not only a preference.

However, due to constraints of historical growth in the Mussafah production centre, the
existence of several stockyards and the placement of the batching plants and the gantry cranes, prevented a breakthrough improvement: placing all moulds in the same area, next to another.

Avoid placing moulds that will receive colour concrete on the grey concrete cranage routes or, when such a solution is not practical, cover the moulds with plastic sheets. This recommendation was immediately implemented.

Simplify the Quality Control forms effectiveness, in view of their “on-the-spot” utilisation. Study the possibility of feeding the relevant data in palm computers, with an easy download system within the centralised database. Both studies have been selected as strategic objectives during the 2004 strategic plan review.

8.2.19.4.9. Recommendations for Process Reengineering

The study highlighted that bringing the concrete on time to the mould is the key factor to break-through improvements, and that the casting process cannot be significantly sped up unless a technique is found to provide just in time wet concrete to the moulds. Constraints in Mussafah production centre, mainly the cranage system in place, prevent this major process improvement, as a major investment in changing the conveying system would not be economical, taking into consideration that the Mussafah production centre will at least be partially dismantled in one to two years time.

The feasibility studies for the New Mussafah production centre however, are evaluating several breakthrough options:

- Using an automated overhead conveying system, placed on rails, using the ‘flying buckets’ concept, in order to provide JIT wet concrete to the moulds.

- Limit tower crane usage to stockyard operations, and cover the whole production area with gantry cranage incorporated into the roofing system.

- Several high-capacity automated batching plants, with multiple access either by the conveying system of by the gantry cranes system, for high speed delivery of wet concrete to the transportation system.

Another critical performance factor highlighted by the study was the close location of the moulds. Although improvements have been carried out in the Mussafah factory, no
breakthrough amelioration could be implemented without a complete reengineering of the
grounds, which the company did not wish to perform. However, the issue is under study
for the New Mussafah factory, and several proposals are currently being examined.

- It has been decided that the production ground would be located in one area, and
  that no stockyard or administrative buildings were to be placed in this area.

- The concept of storing moulds using a shelf system that would allow selecting, on a
daily basis, the moulds required for production is currently under study. Selected
moulds would be brought to the production area using an automated belt conveying
system, and would be placed next to one another. Using this technology, all moulds
to be casted would be concentrated on an area, without any gap due to moulds in
which no casting is scheduled on the considered date.

The quality of the cranage system had been highlighted as critical to process efficiency.
The followings elements are taken into consideration while studying the production
facilities to be set up in the New Mussafah factory:

- Rapid and effective conveying system from the batching plants to the production
  area.

- Alternative routes in case of breakdown, with limited drop of rapidity and
effectiveness.

8.2.19.4.10. **Success of the process study**

The study of the precast casting process proved highly successful, as it provided practical
improvement recommendations for the process under study, and highlighted key success
factors for the engineering of a similar process in the new production facilities.

However, the study process took time. It started in August 2003, and recommendations
were provided in January 2004. This was mainly due to the fact that only one employee
was put in charge of the data collection and analysis process, on top of her other activities.
As all resources of the support and development department were dedicated, by January
2004, to the participation in the Sheikh Khalifa Industry Award and the review of the
strategic plan, study of other processes had been delayed.
The top management decided that the team for the next study would include a number of junior staff, who would both help during the study itself and be trained on how to conduct it, and could later be assigned as project leaders on process performance investigations.

8.2.20. Utilisation of quality engineering tools

8.2.20.1. Rational of introducing of quality engineering tools

During its formal research of Total Quality Management principles through literature review, the researcher uncovered that a number of quality engineering tools had been developed for the mass production industry, and that reports of successful implementations were numerous.

Although the project-specific production of the company may not be as suitable for quality engineering tools as a mass production one, it was thought that some of the tools may still be of use to the company. This was confirmed by the study of the precast management job opportunities published by PCI (Precast and Prestressed Concrete Institute) in the United States, where a required knowledge of Six Sigma was often mentioned.

Among the possible tools, three of them were short listed as potentially valuable to the company:

- **Failure Mode and Effect Analysis (FMEA):** It was thought that an FMEA study team, with members selected among the Support and Development, Design, Quality Control, Factory Production and Site Erection Departments, may be formed, having for objective to improve Quality prevention in the company.

- **Design of Experiment (DoE):** It was thought that DoE could be used in order to improve the quality of the products. Reducing deflection variability in Hollowcore product was selected as one of the projects that could be undertaken using this technique.

- **Statistical Process Control (SPC):** It was thought that SPC could be successfully used for certain production processes. Among the possible SPC projects, controlling precast manufacturing capability through analyses of cube crushing results appeared particularly attractive.
The researcher estimated that the company was ready to start the introduction of quality engineering tools, as the employees were showing a positive mind set towards improvement opportunities, which was thought as having been successfully and sustainably introduced as part of the company’s culture.

It was decided to concentrate on one of the pre-selected tools, in order not to overload employees with too many experimental studies at a given time, but to try to introduce them gradually.

As reports of successful SPC utilisation were numerous, and as it was often quoted first among the quality engineering tools by TQM authors, the company decided to start the implementation experiment with this tool.

8.2.20.2. Initial training on Statistical Process Control

An initial training on SPC was conducted among management, quality control and factory production employees. Were also invited to the training some suppliers and clients partners.

During the training, the six sigma and SPC concepts were reviewed, and examples of machine capability and process capability calculations and usage of control charts utilisation were proposed.

Trainees were also asked to reflect on the possible utilisation of the proposed tools within their area of work.

Analysis of training evaluation proved that it was viewed as highly interesting by the employees attending it, and the imparted knowledge was new to them, thought to be relevant to their area of work, to have a high probability of affecting their daily work.

8.2.20.3. Importance of a successful pilot study

A couple of months after the training, trainees were contacted and asked if they had taken the opportunity of practically testing the knowledge provided by the training. It appeared that none of them did. It became apparent to the management that training alone was insufficient to introduce a tool within a company, even when an improvement culture was present.
Daniele Seraphim – Ph.D.

It was decided to perform a pilot study, and to provide measured data proving the effectiveness of the tool. It was thought that subsequent studies would gain, by the knowledge thus provided, of the applicability of the theory to the practical environment of the company.

The researcher reviewed the possible utilisation of SPC tools proposed by the trainees, and decided to maintain its original assumption that controlling precast manufacturing capability through analyses of cube crushing results could prove effective.

A team was formed comprising employees from the Support and Development department and from the Quality Control department, to perform an initial process performance measure, using cube crushing results. It was decided that the Top Management and the Factory Management would be involved in the review of the obtained results.

8.2.20.4. SPC utilisation for Mix Design cost savings

The study took place in February 2004, using cube crushing results collected in September and October (it was thought that these months were a good representation of the average performance of the company) by the Quality Control department.

The cube crushing process is as follows: During the casting process, wet concrete is placed both in the panel moulds and in small cube moulds which are submitted to the exact environment than the panels themselves. Some of these cubes are crushed before the panels are demoulded, in order to make sure that the strength of the concrete is sufficient in order for the elements not to be adversely affected by the demoulding process. Others are placed in water tanks, under controlled water temperature, according to the British standards. Among these, some are crushed after 7 days, and some after 28 days. The crushing machine provides an accurate measure of the strength of the cubes.

When signing a project, the required strength of the concrete is specified. This is compared with the cube crushing results obtained after 28 days. If the obtained crushing strength is below required level, all panels relevant to the cubes are deemed non-conforming.

It was decided to use results after 28 days in the pilot study, as they could be compared with contracts’ strength requirements. It was also decided to conduct the study based on a reference strength of 40 Newton per mm² (N/mm²) for Preast products (which is the
most common strength required for precast products), and 50 N/mm² for Hollowcore products, for which the company was facing some Quality issues.

It was noted that the data selected were following a normal distribution, and therefore could be analysed with SPC Capability study for normal distribution, and be followed up using SPC Control charts.

8.2.20.4.1. Process capability of Precast 40 N/mm²

The first difficulty encountered, is that if there is a Lower Specification Level (LSL) (given by the contract), there is no Upper Specification Level (USL) and no target value. It is deemed that any strength above LSL is acceptable.

A target value was calculated by the team as the lowest percentage above LSL for which the process capability would be close to 1.33. For a target value of 17% above contractual required strength (46.8 N/mm²), and using a USL artificially set at equal distance from the target value than the LSL (53.6 N/mm²), calculations showed a capable process with a process capability of 1.361 (a capable process is a process having a process capability of 1.33 or above).

It appeared that the Precast 40 N/mm² products had a strength above what would be required in order to have a capable process. The average was 50 N, while the target value is 46.8 N. It may be noted that the measurement of the process capability, which demonstrates a capable process, is adversely affected by the USL set, and not the LSL. As the USL is artificially constructed in symmetry of the LSL according to the target value, and as a result the above USL does not, in the case of precast concrete elements, adversely affect the satisfaction of the client, the process capability measure obtained is artificially low.

The researcher decided to study whether the process would still be capable if the strength of each reading were lowered. If lowering the strength of each of the 50 data by 3N, a capability of 2.497 was obtained (very capable process). By 4N, the process would still be very capable (2.276). By 5N and 6N, the process would still be capable (1.897 and 1.518 of capability respectively). However, by reducing all data by 7N, the process would not be capable any longer (1.140 of process capability, while a value of 1.33 and above is required for a capable process).
This meant that if each reading were reduced by 6N, the company would still have a capable process. Until now this was not done as this gap of 6N was kept as a safety precaution in order to avoid that a special cause might produce an unexpected drop of strength. In order to identify negative trends and to define the basis of special cause elimination, the team recommended the routine utilisation of process control charts.

It was thought that Process Control charts usage could increase the certainty that the process is operating correctly, thus removing the need for the security gap as they would help identify any deviation or possible deviation, and can be used as a base for eliminating special causes. Once special causes are eliminated, the spread of the normal distribution can be reduced, thus further increasing the process capability.

Once the spread reduced, and using past Process Capability and control chart representation, clients may be convinced of the results to their satisfaction.

The researcher calculated that if the spread could be reduced by 10%, the target value could be set at 13% above Lower Specification Level, and the company could reduce by 15 N all the readings, and still have a capable process.

The team concluded by saying that without modifying the current process, the company could reduce the strength of the concrete by 6 N, and still have a capable process. However, the process should be routinely monitored thought Process Control Charts, in view of providing extra control on the process because the safety gap of 6 N has been removed.

By eliminating special causes using the information provided by Process Control Charts, the company should be able to reduce the spread. By reducing the spread by 10%, an additional reduction of 9 N (15 N of saving in total) could be implemented.

8.2.20.4.2. Process capability of Hollowcore 50 N mm²

The same study has been carried out for Hollowcore 50 N. The target value was fixed at 15% above LSL, in order to obtain a process next to capable (1.168 of process capability). Here also, the graphical representation showed the possibility of reducing the strength of the Concrete. When reducing the strength by 3 or 4N, the process would still capable (respectively 1.713 and 1.473 of capability). If the strength was reduced by 5N, the process would be slightly below capability (1.233 of process capability).
The Process Control Chart established showed three points for which special causes should be studied, as well as 7 points in a row below average which would require additional investigation. By eliminating special causes, the company may reduce the spread of the normal distribution. If the spread could be reduced by 10%, the targeted value could be set at 12% above LSL, and the strength may be reducing by 1 N further.

**8.2.20.4.3. Recommendations**

The team recommended using the following methodology:

1. Routinely use SPC charts to control the process.

2. Slowly decrease the use of micro-silica and cement and verify the obtained readings on the SPC charts.

3. As soon as a significant modification is noted, perform a capability study.

4. Form a study group in charge of proposing solutions in order to eliminate special causes.

5. After introduction of an improvement in the process, closely monitor SPC charts, and perform a capability study whenever required.

6. Measure the financial savings obtained.

The implementation of these recommendations has been selected as a strategic objective by the management during the 2004 strategic plan review.

The team also recommended the following further studies:

1. Estimate the saving in Material resulting from a strength reduction.

2. Carry out SPC studies for other grades of concrete.

3. Study the possibility of using SPC for other readings than cube crushing results.

4. Introduce other improvement tools (such as Taguchi Methods or FMEA) and calculate the obtained improvements in terms of Process Capability.
It is thought that significant savings in material costs may result, by replacing costly components by less expensive ones.

Two major reasons were thought to be at the origin of the current “over performance” of the company processes:

➢ The company’s policy to avoid product failure at any cost.

➢ The low trust the company has in its ability to control process variability.

SPC usage should be of great help on this latest issue.

**8.2.21. HSE improvements**

**8.2.21.1. Fire evacuation**

Until 2003, no fire evacuation exercises were performed by the company. In view of the characteristics of “open-ground” productions areas, it was thought that fire evacuation exercises had little relevance to the safety level in the company. Other fire fighting protection elements, such as fire equipment inspected regularly, fire fighting teams receiving regular training, or storage in an air-conditioned environment of inflammable material stock, had been set in place, and were regularly audited. It may be noted that due to the non-flammable characteristics of the production, and the limited utilisation of inflammable products, no fire incident had ever been reported during the twenty years of operation of the company.

Among the check-list relative to the silver level of the Sheikh Khalifa Industry award, the following was proposed: “Have you held a fire drill and evacuation of the factory in the last year?” This item was among the compulsory ones in order to reach the silver level.

Thus, the company decided to perform a fire drill evacuation exercise both in the production centres and in the Head Office. During the employee training preceding the evacuation, it appeared that the knowledge regarding safety recommendations in case of fire was limited:

➢ Few Head Office employees were aware that the use of elevators is not recommended in case of fire, and that two set of stairs were available in the building.
Daniele Seraphim – Ph.D.

➢ Factory employees were confused regarding which type of equipment should be turned off in case of fire alarm, and which ones could be left on.

➢ Knowledge of fire meeting points was limited, as well as the necessity of not wandering around away from these points.

It appeared that such exercises which had been deemed unnecessary in the case of the company, were in fact informative and required. Thus, the following item was added to the safety procedure of the company:

"An evacuation exercise is carried out at least once per year, in the Head Office and in all Factories. Once per year, the sites management contacts some of the company's major contractors and suggests a joint site evacuation exercise."

8.2.21.2. Minimising risks relative to dangerous materials

During the SKIA silver audit, it appeared that some of the MSDS (Material Safety Data Sheet) sheets relevant to a few dangerous chemicals were missing, and that the knowledge of precautions to be taken in case of spillage or first aid requirements was limited to the safety officers.

It was thus revealed that the company's safety procedure needed improvement, and the following items were added:

At least once per year, the HSE Officer updates a list of materials that may cause a safety or environmental hazard, using MSDS forms collected from Suppliers. The list specifies the material type, possible hazards, control method and first aid/emergency measures. It is then circulated to all concerned supervisory staff for review. The list is then displayed in the stores and in the HSE office.

The Goods Requisition issuer of any new chemical mentions in the requisition that the Supplier must provide the corresponding MSDS sheet. The Purchase Department includes this condition on the purchase order. The storekeeper or site in charge verifies that the MSDS sheet is provided, and forwards it to the HSE Officer.

8.2.21.3. Risk Analysis

An article by Jannadi and Almishari (2003) relative to risk assessment in construction, attracted the attention of the researcher, as the method proposed appeared to be adapted, in a simplified way, to the company.

It provided formulas to assess activity risks, and justification factors:

"Activity Risk Score = Severity . Exposure . Probability"
The article was sent for review to the members of the HSE committee, and a study of how these concepts could be used in the company was carried out.

- It was decided that a list of risks should first be elaborated, depending on the process. It was proposed that the HSE committee would elaborate a preliminary list, which would be circulated among the managerial staff involved in the process, in order to review and complete it.

- Severity, exposure and probability would then be evaluated. It was proposed that Severity and Probability would be estimated by the HSE committee members and the managerial staff involved in the process, using a 1 to 5 scaling system. Average of obtained grades would be retained. As for the exposure, it would be calculated by the HSE committee using accident and incident statistics over the past years.

- A list of possible corrections related to the identified risks would then be elaborated by the HSE committee, and circulated among the managerial staff involved in the process, for review.

- In close collaboration with the purchase department, the HSE committee would then evaluate the cost factor associated with each identified possible correction.

- The degree of correction would be estimated using a 1 to 5 scaling system, either by the HSE committee or by the HSE committee and the managerial staff involved in the process. It was decided to leave this decision to a later stage.

- The HSE committee would than provide its recommendations to the top management, based on the measured justification factor.

- The HSE committee would regularly review the methodology and assess its effectiveness, in order to identify possible improvements.

Although the article was proposing a computerised risk assessment system, it was decided to leave the study of a possible computerisation to a later stage, once the effectiveness of the proposed method established.
The proposed methodology for risk assessment was discussed in a management review meeting, and it was decided to perform a pilot study and to extend it to the whole company processes if deemed satisfactory.

The risk assessment study was identified as a strategic objective in the 2004 strategic plan review, and its implementation should start by the end of the year.

### 8.2.21.4. Safety Manual

Although the company defined a safety procedure since 1996, no safety manual was successfully elaborated. In 1999, a team undertook the task of proposing a safety manual, but the English writing level of the employees being low, the document elaborated was not judged satisfactory, and was rejected by the top management. In 2002, an external company was asked to propose a draft of safety manual. However, it appeared that the manual proposed was not closely related to the operations and the culture of the company, and was not retained.

In 2003, the following success factors for the elaboration of a safety manual were identified:

- It should be established within the company in order to ensure the adequacy to its characteristics.
- The employee in charge of writing the manual should possess a high level of written English.
- It should be in line with the ISO 18000 standard as the company had defined obtaining this certification as one of its strategic objectives.
- Regular review of progresses so far should be performed, in order to avoid spending valuable time on a document which would be discarded in its final stage of elaboration.

An action plan was defined, identifying the following tasks:
### Project Milestones

<table>
<thead>
<tr>
<th>PHASE I – ESTABLISH THE HEALTH AND SAFETY MANUAL</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Decide on Project Leader</td>
<td>SKO</td>
</tr>
<tr>
<td>2. Provide documentation to Project Leader</td>
<td>SKO; DS</td>
</tr>
<tr>
<td>3. Register to ISO 18001 training</td>
<td>Meenu</td>
</tr>
<tr>
<td>4. ISO 18001 training</td>
<td>HA</td>
</tr>
<tr>
<td>5. Read the documentation</td>
<td>HA</td>
</tr>
<tr>
<td>6. Prepare a cost plan</td>
<td>HA</td>
</tr>
<tr>
<td>7. Review and discuss cost plan with Top Management</td>
<td>HA; SKO; MJ; DS</td>
</tr>
<tr>
<td>8. Establish a possible Structure</td>
<td>HA</td>
</tr>
<tr>
<td>9. Review Structure with Top Management</td>
<td>HA; SKO; MJ; DS</td>
</tr>
<tr>
<td>10. Update the Structure and obtain Top Management validation</td>
<td>HA</td>
</tr>
<tr>
<td>11. Prepare a list of possible elements relative to the validated Structure, with corresponding rating of estimated importance and cost</td>
<td>HA; SKO; MJ; DS; PF</td>
</tr>
<tr>
<td>12. Review the list of possible elements and make a selection. Decide on the list of reviewers</td>
<td>HA</td>
</tr>
<tr>
<td>13. Send the selected list of possible elements to the reviewers and collect their feedback.</td>
<td>HA</td>
</tr>
<tr>
<td>14. Prepare possible modifications according to feedbacks.</td>
<td>HA; SKO; MJ; DS; PF</td>
</tr>
<tr>
<td>15. Establish the approved List of elements.</td>
<td>HA</td>
</tr>
<tr>
<td>17. Send the draft of Safety Manual for review to the reviewers and collect feedbacks.</td>
<td>HA</td>
</tr>
<tr>
<td>18. Prepare possible modifications according to feedbacks.</td>
<td>HA</td>
</tr>
<tr>
<td>19. Validate the Safety Manual</td>
<td>HA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHASE II – IMPLEMENT THE HEALTH AND SAFETY MANUAL</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Establish an Action Plan with clear targets, and training requirements.</td>
<td>HA; PF; DS</td>
</tr>
<tr>
<td>21. Proceed with training and implementation.</td>
<td>HSE Officers; Heads of Dept</td>
</tr>
<tr>
<td>22. Prepare modifications in ISO Manual required to obtain ISO 18001 certification.</td>
<td>DS; HA</td>
</tr>
<tr>
<td>23. Audit the implementation of the health and safety manual.</td>
<td>HA; DS</td>
</tr>
<tr>
<td>24. Propose revision to Health and Safety Manual if required</td>
<td>DS; HA</td>
</tr>
<tr>
<td>25. Propose revision to ISO Procedures if required</td>
<td>MRM members; HA</td>
</tr>
<tr>
<td>26. Management Review Meeting on modifications</td>
<td>DS</td>
</tr>
<tr>
<td>27. Ask for ISO 18001 pre-assessment from certification body</td>
<td>DS; HA</td>
</tr>
<tr>
<td>28. Study the feedback from assessors and modify Health and Safety Manual and ISO procedures.</td>
<td>MRM members; HA</td>
</tr>
<tr>
<td>29. Management Review Meeting on modifications</td>
<td>DS; HA</td>
</tr>
<tr>
<td>Obtain ISO 18001 certification</td>
<td></td>
</tr>
</tbody>
</table>

Table 66 Action Plan defined for the elaboration of a Safety Manual

Establishing a safety manual has been identified by the company as a strategic objective, and the phase I of the action plan is currently in process.

**8.2.21.5. Road management system**

The transportation of heavy panels from the production centres to the sites is a critical activity for the company. This is particularly true, as a number of erection sites are located in the desert, which cannot be accessed through asphalted roads, and as some of the sites are at their preliminary stage, and do not benefit from a proper road infrastructure. Thus, the experience and the driving abilities of the driver are critical.

In 2003, 7% of the product non-conformances were related to transportation. In most of the cases, panels are slightly damaged during the transport process. In very rare cases, they
imply road accidents, but due to the heavy weight of the product transported, these are potentially of high severity.

The management decided to invest on a road management system that would enable the measurement of drivers’ performance. Using an electronic device placed in the trucks, the number of sharp breaks, the speed of the truck and number of driving hours of each driver are recorded. When entering and leaving the cabin, the driver identifies himself with an electronic card. The collected data are analysed using a software that calculates the safety performance of the drivers.

The utilisation of this road management system was selected as a strategic objective, and is currently taking place. In the balanced scorecard, the safety road management index has been identified as a Key Performance Indicator, and an improvement objective will be defined based on the average safety grade currently obtained.

8.2.21.6. Crane operators evaluation

Safety in the factory production centres is dependant on the performance of the crane operators. The possibility of evaluating this performance was discussed during management review meetings. It appeared that the participants agreed that three factors should be taken into consideration when evaluating the performance of crane operators:

1. The internal satisfaction of the foremen using the services of the crane operator.
2. The internal satisfaction of the Safety Officer, who supervises the crane operator’s performance from a safety point of view.
3. The internal satisfaction of the Maintenance team, according to the daily preventive maintenance performed by the operator on the crane he operates and which, when performed properly, may prevent accidents.

It was decided that 50% of the obtained grade should be assigned to the first factor, and 25% to the last two factors respectively.

Using a scale from 1 to 5, concerned foremen, safety officers and maintenance foremen are evaluating the performance of the crane operators. Every six months, the operator with the highest average grade is receiving a financial reward, as well as a certificate. The certificate is handed over by the Executive Manager, during one of the company’s ceremonies.
Example of operator performance evaluation:

<table>
<thead>
<tr>
<th>Month</th>
<th>SI No</th>
<th>File No</th>
<th>Operator</th>
<th>Equipment Operated</th>
<th>Productivity Rating by Foremen</th>
<th>Safety by HSE Officer</th>
<th>Daily Maint. by Maint. Forman</th>
<th>Grand %Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb</td>
<td>1</td>
<td>F1-083</td>
<td>V.R. Narsaiah</td>
<td>Gantry crane</td>
<td>4</td>
<td>75.00</td>
<td>3.5</td>
<td>63.13</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>P2-0155</td>
<td>Gurmail Singh</td>
<td>Overhead crane</td>
<td>4</td>
<td>75.00</td>
<td>2.75</td>
<td>60.63</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>P2-0163</td>
<td>Amer Naveed</td>
<td>Gantry crane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>P3-0018</td>
<td>Gurmail Singh</td>
<td>Gantry crane</td>
<td>4</td>
<td>75.00</td>
<td>3.00</td>
<td>67.50</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>P5-0004</td>
<td>Nishay Singh</td>
<td>Mobile crane</td>
<td>4</td>
<td>66.67</td>
<td>3.75</td>
<td>67.71</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>P6-0019</td>
<td>Hamdi Abdullah</td>
<td>Gantry crane</td>
<td>5</td>
<td>87.50</td>
<td>3.75</td>
<td>84.38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Month</th>
<th>SI No</th>
<th>File No</th>
<th>Operator</th>
<th>Equipment Operated</th>
<th>Productivity Rating by Foremen</th>
<th>Safety by HSE Officer</th>
<th>Daily Maint. by Maint. Forman</th>
<th>Grand %Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar</td>
<td>1</td>
<td>F1-083</td>
<td>V.R. Narsaiah</td>
<td>Gantry crane</td>
<td>4</td>
<td>75.00</td>
<td>3.00</td>
<td>62.50</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>P2-0155</td>
<td>Gurmail Singh</td>
<td>Overhead crane</td>
<td>3</td>
<td>50.00</td>
<td>2.75</td>
<td>46.88</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>P2-0163</td>
<td>Amer Naveed</td>
<td>Gantry crane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>P3-0018</td>
<td>Gurmail Singh</td>
<td>Gantry crane</td>
<td>4</td>
<td>75.00</td>
<td>3.00</td>
<td>68.00</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>P5-0004</td>
<td>Nishay Singh</td>
<td>Mobile crane</td>
<td>4</td>
<td>75.00</td>
<td>3.75</td>
<td>70.63</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>P6-0019</td>
<td>Hamdi Abdullah</td>
<td>Gantry crane</td>
<td>4</td>
<td>75.00</td>
<td>3.50</td>
<td>73.75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Month</th>
<th>SI No</th>
<th>File No</th>
<th>Operator</th>
<th>Equipment Operated</th>
<th>Productivity Rating by Foremen</th>
<th>Safety by HSE Officer</th>
<th>Daily Maint. by Maint. Forman</th>
<th>Grand %Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr</td>
<td>1</td>
<td>F1-083</td>
<td>V.R. Narsaiah</td>
<td>Gantry crane</td>
<td>4</td>
<td>75.00</td>
<td>3.50</td>
<td>68.75</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>P2-0155</td>
<td>Gurmail Singh</td>
<td>Overhead crane</td>
<td>5</td>
<td>75.00</td>
<td>3.50</td>
<td>68.75</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>P2-0163</td>
<td>Amer Naveed</td>
<td>Gantry crane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>P3-0018</td>
<td>Gurmail Singh</td>
<td>Gantry crane</td>
<td>4</td>
<td>75.00</td>
<td>3.50</td>
<td>71.25</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>P5-0004</td>
<td>Nishay Singh</td>
<td>Mobile crane</td>
<td>4</td>
<td>86.75</td>
<td>4.00</td>
<td>74.38</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>P6-0019</td>
<td>Hamdi Abdullah</td>
<td>Gantry crane</td>
<td>4</td>
<td>75.00</td>
<td>4.00</td>
<td>77.50</td>
</tr>
</tbody>
</table>

This technique proved effective. For example, while the average grades obtained in the Mussafah factory in November 2003 (first month during which the evaluation was performed) was of 63.43, it reached 76.34 by May 2004.

The necessity to perform monthly operator performance evaluations was included in the documented procedures of the company.

**8.2.21.7. Regular Camp visit by HR Manager**

A programme of improvement of living conditions in the camps was initiated, following the low satisfaction index expressed by the workers in the camp satisfaction survey. It was
Daniele Seraphim – Ph.D.

decided that the Human Resources manager should visit the camps monthly, in order to perform the following tasks:

- Verify the progresses of improvements decided upon.
- Verify that safety prevention measures are observed.
- Communicate verbally with the workers in order to collect their grievances, explain the improvement programme, deliver the message that the management does care about their living conditions and is serious about improving them.

These visits provided a valuable follow up tool, and ensured that the improvements were directed towards elements which were of real added value to the employees. The main difficulty, however, was the required presence of three to four employees responsible for translation in the different languages of the workers, and the tension that resulted from this indirect means of communication, as some employees were worried that requests or suggestions were not properly translated.

8.2.21.8. Sustaining the improvements

As for other improvements introduced within the company’s quality system, follow up and sustainability of HSE ameliorations were found to be a major factor for success. Several techniques were used in this regard:

- Some improvements are specified in the documented procedures of the company, ensuring regular internal and external audits.
- Some are identified as strategic objective, ensuring that their implementation will closely be monitored.
- Key Performance Indicators may be established, and the progress of the improvement reported in the balanced scorecard.
- An action plan may be defined when the implementation process is long, or when a high number of tasks are to be performed.
8.2.22. ISO 9001:2000 certification

8.2.22.1. Approach used to prepare the certification

The company acquired some knowledge about the requirements of the new version of ISO 9001, by the end of 2001. After the company identified that its current ISO 9001:1994 documented quality system was preventing improvements in the organisation instead of fostering it, it was decided to redesign the documented Quality System and to integrate it with the implementation of Total Quality Principles.

Thus, the same department was attributed the responsibility of taking over the ISO certification process, and of following up on TQM improvements. It was decided that the process owner (the researcher) should be trained as ISO Lead Auditor, and that this training would cover the requirements of the new version.

The objective was not only to obtain ISO 9001:2000 in the near future, but rather to improve elements of the existing system and include missing elements within the overall TQM improvement process decided by the company.

Beginning of 2002, a gap analysis for an effective quality system in accordance with the ISO 9001:2000 standards, highlighted elements that required improvements or developments:

- **Process approach**: A better knowledge of processes could be obtained by formally identifying their inputs and outputs and by flowcharting their operations; Formally identify interactions between processes.

- **Documented procedures**: Update the procedures in order for them to reflect current process operations; Implement a system that will ensure that procedures are updated dynamically, following modifications in the Quality System.

- **Customer focus and satisfaction**: Improve knowledge of customer requirements and satisfaction by introducing a customer satisfaction survey.

- **Responsibility and authority**: Update the organisation chart; Review job descriptions.
Daniele Seraphim – Ph.D.

➤ Reporting on the performance of the quality system: Record non-conformances in a database and provide regular statistical analyses.

➤ Preventive action: Formally record preventive actions taken.

➤ Human resources: Generalise the utilisation of competence tests when hiring new employees; Evaluate training effectiveness.

➤ Customer complaints: Improve the effectiveness of the company’s customer complaints system.

➤ Review of supplier performance: Improve the effectiveness of the company’s review of supplier performance system.

➤ Process measurement, analysis and improvement: Extend the performance measurement system to all processes, and define continual improvement objectives for these processes.

It may be noted that the objective was no longer to obtain an ISO certificate, as was the case with the first certification of the organisation in 1996, but to implement an effective quality system, that would be aligned with the ISO requirements.

These improvements were introduced along with improvements identified through other means, such as self-assessment gap analyses with the SK1A requirements, employee suggestions, improvements identified through TQM literature review etc.

By the end of 2002, it was clear that the company would soon be ready for certification, and that no consultants’ external services would be required. It was decided, however, to request a pre-assessment in order to make sure that no requirements had been overlooked.

The certification assessment was fixed in September 2003, although the company could have been ready for it well before this date. However, the previous ISO 9001:1994 certificate was valid until July 2003, and the company was informed by the certification body that waiting until the expiration of the certificate would minimise certification costs.

The pre-assessment highlighted some modifications in the Quality System documentation, but none in the system itself, and no non-conformances were reported during the assessment review.
8.2.22.2. Similarities between ISO 9001:2000 and TQM

The company did not face any problem to integrate its objective of ISO 9001:2000 certification with its overall objective of implementing TQM principles, as the new version of ISO is aligned with TQM principles.

Past history of the company was showing that ISO 9001:1994 certification could lead, depending on the way the company apprehends it, either to significant improvements in an organisation’s quality system, or to a hindrance to improvements. The new version, however, with its requirement to demonstrate continuous improvement, was viewed by the company as more aligned with TQM objectives, and less likely to be compatible with a stagnating quality system.

In many ways, it appeared that the ISO 9001:2000 standards are less demanding than TQM recommendations. For example, there is no recommendation in the ISO 9001 standards that the company should build a clear strategy in line with its quality policy, and that the measuring system adopted should reflect strategic objectives, while strategic planning is generally recognised as one of the guiding principles of Total Quality Management. As a second example, while supplier evaluation is an ISO 9001:2000 requirement, supplier partnership is not, while it is one of the bases for TQM implementation.

However, if such elements are not mandatory for ISO 9001:2000 certification, they do not prevent certification, and are perceived as an additional evidence of an effective quality system during the certification process.

The ISO 9004:2000 standard is even closer to Total Quality Management principles. A study of the 9004 standards established that the company would not face any major difficulty in gaining this certification. However, a brief survey among the company’s clients proved that, contrary to the ISO 9001:2000 standard, the 9004 standard is at best not known in the Emirates, and often mistaken for a partial extract of the 9001 standard, in the same way that ISO 9002:1994 was equivalent to ISO 9001:1994, with the exclusion of the design process.

Thus, the company decided not to register for ISO 9004:2000 certification, but to use this standard for self-assessment, and as a tool to prepare for the Silver and Gold Level...
8.2.22.3. Quality system documentation utilisation to sustain improvements.

The company is using its ISO certification and maintenance processes to identify opportunities for improvements.

During internal audits, suggestions for improvements are systematically collected, as well as non-conformances. Non-conformances are studied in view of understanding their root cause, which often leads to modifications in the system itself, in order to adapt it to employee or process requirements.

During external audits, all remarks made by assessors are registered. They are then sent to the relevant process owners for study and followed up by the Support and Development department.

The ISO 9001:2000 standard is less demanding in terms of documentation than its precedent version. The company studied whether it should take the opportunity of the certification to the new standard, and remove or simplify some of its procedures.

It was decided not to do so for the following reasons:

- From 2001 onwards, the company carried out efforts to improve its quality system based on the 9001:1994 standard, and to improve its efficiency, with the objective that the documentation system should no longer hold back the company's improvement, but participate in its improvement achievements. The organisation was highly successful in this regard. After such a success, the company did not want to change a system that was proving to be finally effective.

- With the rapid improvement pace that was driving the company, it soon appeared that if identifying possible improvements does not enhance the system unless these are implemented, implementation itself is not effective unless sustained. When a company is continually improving its processes, it cannot rely on work habits to sustain them, but must set in place techniques to prevent reversion. In this, written procedures along with regular internal and external audits, proved effective.
Written audited procedures are useful as supported evidence of the implementation of a TQM principle, during the audits of the SKIA. They provide proof of an implemented and sustained system.

8.2.23. The Sheikh Khalifa Industry Award

8.2.23.1. New Process of the SKIA

Prior to 2003, organisations were awarded bronze, silver, or gold awards in the SKIA, according to their level of performance during the assessment. This procedure, however, required companies starting on the TQM road, to complete an extensive and time consuming assessment process.

During the 2003 assessment, the Sheikh Khalifa Industry Award proposed three levels, each of them covering a number of different items: Bronze, Silver and Gold. New participants were required to successfully pass the bronze level before being allowed to enter the Silver one, and then the Gold one. Candidates having obtained a Gold award in the previous year could enter the assessment directly at the Silver level.

Obtaining a Bronze, Silver or Gold award is subject to demonstrating a level of TQM implementation corresponding to each level. It is therefore not a competition. The Diamond award, however, is handed over to the organisation obtaining the highest score in the Gold level.

The company was thus required to successfully complete the Silver level, before participating in the Gold level. The objective of the organisation was to strive to obtain the Diamond award, as it obtained the second highest score in the Gold level on the previous assessment, missing the Diamond by one point only.

8.2.23.2. The Silver Level

The Silver level is based on a Yes/No questionnaire, covering ISO 9004:2000 and ISO 9001:2000 requirements. References to corresponding ISO clauses are provided.

286 questions are considered as Essential Elements and all of them must be positively answered in order to successfully pass the Silver level. 150 items are Desired Elements, and a minimum of 100 of them should be positively answered. All the requirements of ISO 9001:2000 must be met to achieve the Silver Level of the award.
The company decided to limit as much as possible the involvement of process owners in the silver level, on the basis that this level should be successfully completed without much difficulty, and that the company should concentrate its energy and time in the completion of the Gold level.

On reception of the questionnaire, all questions for which a clear Yes could be answered were put aside by the researcher. When in doubt, even limited, the question was noted as "arguable". A list of items marked either "arguable" or "no", was elaborated.

A committee examined the selected questions. In some cases, it appeared that some questions originally marked as "arguable" could be answered positively. A few questions were sent to process owners for further study. It was decided to immediately implement the few missing "essential" elements, in order to be able to answer positively to the questions by the time of submission. Among "desired" elements (the company had already more than a hundred positive answers), the committee selected the ones that the company wished to implement. If the implementation process could be performed before the limit date for submission of the Silver checklist, they were immediately scheduled; if not, they were written in the SAGA (self-assessment gap analysis) list, for future implementation.

During a Silver level pre-assessment, the SKIA auditors reviewed with the company’s management some of the checklist questions, in order to assess the likelihood of passing the Silver level.

For organisations demonstrating a good chance of passing the Silver level, such as the company, a one-day assessment, including a visit to a production centre, was performed by a team of three professional SKIA auditors, and a senior auditor from an ISO certification body. Answers to the questions were reviewed, and corresponding evidences collected. Conformance to ISO 9001:2000 and ISO 9004:2000 was examined.

Following the audit, the ISO certification body forwarded its recommendations to the SKIA team as well as a detailed feedback report to the company. All items of this report were analysed by the company, and remarks forwarded to the concerned process owners for review. Improvements were either immediately implemented, or added to the SAGA list.

The SKIA team informed the company that it had successfully passed the Silver level.
Gold level items were presented in a similar way than enablers criteria in the 2001-2002 competition (see paragraph 8.2.16.2), except that some of the items were accompanied with result tables, which had to be filled by the company with corresponding budgets and actual data over the last four years.

Each item was constituted of a title and a description, often referring to world-class practices, a question relative to the practices used by the company in regard to the considered item, and a question relative to the available evidences to support the answer. These were followed by 5 statements, representing the benchmark against which the company had to self-assess its practices. Factory score according to the self-assessment was to be estimated by the company, and the Audit score would be filled by the SKIA team following the audit.

In the example provided below, the item elements provided by the SKIA are displayed in italic, and the company's answer in normal characters:

| SKIA – Measurement analysis and improvement |
| Item No 1 – Measuring and monitoring performance |

*For leaders to be able to understand how the factory is performing it is essential that systems for measuring performance are in place with measurements monitored and actions taken as necessary. Leaders of World Class factories measure all aspects of business performance and these are routinely reported to, and reflected upon, by the leadership to enable control to be achieved.*

<table>
<thead>
<tr>
<th>How do the leaders of your factory measure the factory's performance?</th>
<th>What evidence is there to support this?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process objectives and targets are described in the Strategic Plan of the company, and progresses are reported every 6 months and reviewed during &quot;Operation Support Team&quot; meetings.</td>
<td>Strategic Plan. &quot;Progress on our Strategic Plan&quot; memos. Minutes of OST meetings.</td>
</tr>
<tr>
<td>As part of the Strategic Plan review process, a detailed yearly operations budget is prepared, based on the order book. Comparisons between actual costs and budgeted costs are prepared on a monthly basis. For each project, a detailed budget is prepared, and each concerned process owner is routinely comparing actual projects' costs with estimated projects' costs.</td>
<td>Comparison analyses. Examples of estimated costs against actual cost by project.</td>
</tr>
<tr>
<td>For each process, a performance measuring system has been set in place. Process owners are selecting one or several key indicators and are proposing objectives for continuous improvement to the Top Management, who checks their alignment with the company's strategy and validates them. Process owners send periodical readings to the Top Management and QA Management.</td>
<td>Objectives for Continuous Improvements.</td>
</tr>
<tr>
<td>The company has established a balanced scorecard in which current readings of Key Performance Indicators (KPI) relative to 4 perspectives (Customers &amp; Community; Innovation &amp; Learning; Financial &amp; Commercial; Process excellence) are reported, along with corresponding objectives. Some of the indicators are matching the continuous improvement objectives of the process owners. Readings on Balanced Scorecard KPI are updated every 3 months, studied by the Top Management, and dispatched to Process owners. Whenever required, the Balanced Scorecards Distribution memos.</td>
<td></td>
</tr>
</tbody>
</table>
Top Management schedules improvement meetings with process owners to discuss deviation or possible deviations from the objectives.

Using a “Market Research” database, benchmarking data on Market share and Competitor pricing policy are routinely collected and analysed. Customers are asked to compare the performance of the company on a wide range of aspects against the performance of our competitors, though Customer Satisfaction Survey (CSS). Those data are analysed by the company to understand its strength and weaknesses.

Benchmarking data are used to set the Strategic Plan and the Balanced Scorecard of the company.

<table>
<thead>
<tr>
<th>Market Research database.</th>
<th>Market share analyses</th>
<th>Competitor pricing policy analyses</th>
<th>Customer Satisfaction Survey Analyses on CSS</th>
<th>Strategic Plan Balanced Scorecard</th>
</tr>
</thead>
</table>

Rate your factory’s performance against the following benchmarks:

1 - The leaders receive few, if any, measures of business performance.
2 - The leaders receive and monitor the results of some measures of performance and initiate actions as appropriate.
3 - The leaders receive performance measures on key aspects of the factory through formal processes and monitor these results against targets or budgets.
4 - Formal processes are documented, implemented and audited which measure all aspects of business performance, and monitor these against targets and external benchmarks. The leaders have key roles in these processes.

**Factory score** 7  **Audit score**

<table>
<thead>
<tr>
<th>Year</th>
<th>Target volume of production</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual volume of production</td>
<td>19,736 M3</td>
<td>37,540 M3</td>
<td>46,006 M3</td>
<td>106,926 M3</td>
</tr>
</tbody>
</table>

Document 5 Example of questionnaire prepared for the SKIA during the 2003 participation

Items were regrouped in four categories (and not seven as in the 2001-2002 assessment): Management responsibilities; Resource management; Product realisation (or Process management); and Measurement analysis and improvement. Forty items were proposed in each category.

While answering the items using the process described in paragraph 8.2.16.2, possible improvements were immediately reported on the SAGA list.

During the two-day Gold Level audit, a number of items were reviewed by the SKIA assessors, and evidences were checked. The auditors performed visual checks through wandering in the offices and on the factory grounds, and took the opportunity of discussing with a number of employees, from top managers to workers.

8.2.23.4. **Obtained scores**

Both performance levels and business results were scored for the four criteria. The scores obtained are taking into consideration both self-assessments and audit visits, as explained.
by the SKIA in their feedback report: “During the visits half of the self-assessment issues were audited by the assessment team. The evidence for the company’s score was examined and used as a basis for the team’s score. This was done in an open meeting with the reasons for the score being explained. On the basis of the findings for the examined half of the issues the other scores were adjusted by the same ratio. The various issues were given relative weightings according to their importance to the objectives of the award and a total score for each of the sections was determined.”

The SKIA team provided correction factors for the four categories. It may be noted that all correction factors were close to 1, which indicates that the self-assessment made by the company is very close to the scores given by the assessment team, and that the ability of the company to self-assess its performance, has improved over the years.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Correction factor for Management Responsibility criterion</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correction factor for Resource Management criterion</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Correction factor for Process Management criterion</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Correction factor for Results analysis and Improvement criterion</td>
<td>0.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Performance Scores</th>
<th>Business Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Company’s scores</td>
<td>Average gold participants’ scores</td>
</tr>
<tr>
<td>Management Responsibility</td>
<td>92%</td>
<td>79%</td>
</tr>
<tr>
<td>Resource Management</td>
<td>87%</td>
<td>77%</td>
</tr>
<tr>
<td>Process Management</td>
<td>95%</td>
<td>87%</td>
</tr>
<tr>
<td>Results analysis and Improvement</td>
<td>87%</td>
<td>84%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Performance Scores</th>
<th>Business Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Company’s scores</td>
<td>Average gold participants’ scores</td>
</tr>
<tr>
<td>Management Responsibility</td>
<td>92%</td>
<td>79%</td>
</tr>
<tr>
<td>Resource Management</td>
<td>87%</td>
<td>77%</td>
</tr>
<tr>
<td>Process Management</td>
<td>95%</td>
<td>87%</td>
</tr>
<tr>
<td>Results analysis and Improvement</td>
<td>87%</td>
<td>84%</td>
</tr>
</tbody>
</table>

Table 68 Results obtained by the company during the 2003 participation in the SKIA, compared with the average results of Gold level participants

Commenting on the performance scores of the company, the SKIA is stating in its feedback report that “your company is above the average of the companies in the Gold award.” Commenting on the business results, it states that “your company scored consistently higher than the average, reflecting this strength in your performance".
8.2.23.5. The diamond award

A ceremony was held in May 2004, during which the company was informed that it had won the Diamond award. According to the SKIA, the Diamond award “is the most prestigious award available to factories in Abu Dhabi and is awarded to the factory whose performance excels above all others”.

The award was handed over by the UAE Minister of Economy and Commerce, in the presence of the Under-Secretary of the Department of Economy, Ambassadors and senior government officials and business elite.

The “Gulf News” newspaper reported that “the Diamond Award, the top prize in the UAE’s first regular manufacturing award, was given to Gulf Precast Co for their strong performance and continuous development”.

The “Khaleej Times” newspaper stated that the Diamond Award “is given to those companies which have demonstrated strong, tangible and sustained improvement over the past years”.

8.2.24. TQM improvement process: A endless process

The ‘Quality refinement’ phase is considered by the author as the TQM maturity phase. However, if one accepts the definition John Cuthtbert of Total Quality Management as “continuous improvement through people”, the journey of the studied company does not end here. Additional improvements will be introduced in the Quality System and further refinements performed.

By analysing the different phases of TQM implementation and the improvements on the Quality System, three recurring components may be noted: Introduction of an improvement element in the Quality System, Refinement of the element introduced, and Preservation of the improvement over time.

In some cases, the second component may be omitted, if the company is satisfied with improvement obtained out of the initial introduction of the element, but in most of the cases, the improvement introduced is refined until the company is satisfied that it gives the best possible outcome.
However if the third component is omitted, the company runs a high risk of losing the benefits of the element introduced. The company has to make the effort to preserve the improvement with such actions as: Include its refinement in the Strategic Plan; Include a target for further improvement in the Balance Scorecard; Record it in the Quality System documentation; Base an Action Plan for continual improvement in it. Unless a ‘preservation’ action is taken, the improvement will be short lived and will soon disappear from the Quality System of the company.

**8.2.25. The ‘Quality refinement’ phase as TQM maturity**

If TQM implementation is an endless process, why select the ‘Quality refinement’ phase as TQM maturity for the company?

From ‘Quality refinement’ onwards, the author is confident that the TQM philosophy of continual improvement is sustainable. This means that the culture of the company has successfully been modified and is, from then onwards, a continual improvement culture. The continuous search for possible improvements is in-built both in the Quality System of the company, and in the minds of its employees.

Until this phase, introducing, refining and preserving improvements necessitated important efforts and the company was in constant danger that the improvement process may stop and the company revert to its previous static position. From ‘Quality refinement’ onwards, looking for possible improvements and experimenting their introduction in the system is a ‘natural’ approach in the company, and the risk of reverting to a static position no longer exists. TQM is sustainable in the company.

**8.3. Analysis of findings**

**8.3.1. The internal perspective**

**8.3.1.1. Customer Results**

**8.3.1.1.1. Increased Customer Satisfaction**

The customer satisfaction, as calculated through customer satisfaction survey, increased from 75.35% in 2002 to 79.30% in 2003. It may be noted that the newly operational Dubai and Shahama production centres were not as successful as the well established Mussafah factory in satisfying customers. When limiting data to the Mussafah factory, the satisfaction percentage increased from 75.35% in 2002 to 80.31% in 2003.
### Table 69 Comparison between 2002 and 2003 customer satisfaction, measured through customer satisfaction survey

<table>
<thead>
<tr>
<th>Process</th>
<th>2002 satisfaction</th>
<th>2003 satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>77.21</td>
<td>80.34</td>
</tr>
<tr>
<td>Design</td>
<td>81.53</td>
<td>83.12</td>
</tr>
<tr>
<td>Factory production</td>
<td>71.29</td>
<td>79.56</td>
</tr>
<tr>
<td>Site construction / delivery</td>
<td>72.79</td>
<td>73.57</td>
</tr>
<tr>
<td>Quality</td>
<td>72.56</td>
<td>79.85</td>
</tr>
<tr>
<td>General</td>
<td>75.54</td>
<td>80.00</td>
</tr>
</tbody>
</table>

This improved customer satisfaction can be noticed for all processes, but is particularly marked for the Factory production process, which was at the centre of the improvement efforts of the company from 2003 onwards.

8.3.1.2 Reduced cost of non-conformances per M3 produced

The company was able to reduce the number of product non-conformances. On top of reducing the cost of non-conformances per cubic meters produced, the company improved its ability of detecting non-conformances before client delivery. In the first half of 2003, clients were aware of 33.90% of the cost of non-conformances. This figure dropped to 5.33% by the second half of 2003, and 4.16% by the first half of 2004.

Its progress in reducing product non-conformances, as well as its improved ability of detecting them early in the production process, is demonstrating the progress of the company in better satisfying its customers.

![Cost of non-conformances per M3 produced](image_url)

**Figure 66 Trend of the cost of non-conformances per M3 produced from September 2002 to June 2004**
8.3.1.3. Improved New Customer Attraction

The aim of the company from 2003 onwards, is to maintain its market leader position in the Abu Dhabi Emirate, and to penetrate the Dubai market. This means attracting new Dubai based clients.

In 2003, 39% of the company’s projects were performed with new clients, to be compared with 24% of new customer attraction in 2002. This success in attracting new customers is confirmed by an increase of the company’s Dubai market share, from 2% in 2002 to 6% in 2003.

8.3.1.4. Increased expenditure in Quality Control, Assurance and TQM

Using an indicator reflecting Human Resource costs solely dedicated to QC, QA and TQM in order to evaluate the trend over time of the company’s effort for those activities (and not an accurate value of the effort), 2003 reflects the continuity of the company’s willingness to control products quality, to prevent non-conformances in products and processes and to set in place a system that improves the company’s overall performance.

This indicator shows a 49% of increase compared with 2002, which itself reflected a 61% increase in comparison with 2001. Thus, over three years, this indicator reflects an increase of 239% of manpower solely dedicated to QC, QA and TQM activities.

8.3.1.2. Business Environment results

8.3.1.2.1. Marginal safety improvements

Following the improvement trend started in 2000, the number of accidents per 10,000 cubic meter reflects a further decreased in 2003, reaching a 4.53 index to be compared with the 5.22 index recorded in 2002. This corresponds to a 13.22 % decrease over one year.
Figure 67 Trend of the number of accidents per 10,000 M3 produced, from 2000 to 2003

Although the 2003 figure shows a safety improvement, it can be noted that the trend is of a decreasing power type, and not a linear one. This is due to the fact that although the company was able to maintain and further improve its safety performance, the policy of safety focus of the company, which led to dramatic improvement of the safety indicators over the first year by eliminating major accident risks, had to focus on eliminating minor ones over the forthcoming years, thus slowing down the pace of improvement.

The same tendency can be noted for the “Accident frequency rate” indicator in the Mussafah factory, which only improved by 0.51% in 2003, reaching a 21.48 value, while the same indicator had improved by 21% and 44% in 2002 and 2001 respectively. As the Dubai and Shahama factories were not yet operational in 2002, comparisons cannot be made for those production centres.

Thus, it can be said that the company maintained and marginally improved its safety level in 2003, but that no break-through improvements were achieved in this regard.

8.3.1.2.2. Increased Investment in state of the art facilities

2003 is characterised by the setting up of two new production centres: the Dubai factory and the Shahama factory, and by a production increase of 133%. State of the art facilities have been purchased both to set up the new factories, and to deal with the increased production, with investments ranging from cranes, laboratories and testing equipments, production equipment, information technology hardware and software etc.
In total, a record 9.4 million Dirhams was invested in state of the art facilities in 2003, which is about 10% of the sales figure for the year, to be compared with the 2.2 million in 2002. Thus, from January 2000 until December 2003, the company invested 14.5 million Dirhams in state of the art facilities, showing its willingness in developing and keeping abreast of new technology.

8.3.1.2.3. Increased interactions with the community's Educational System

Following its policy of increased interaction with the community, the company recorded 10 specific events in 2003, to be compared with 7 in the previous year. Those interactions ranged from providing summer training to UAE based and European university students, active participation in exhibitions, and donations to UAE, Arabian world and international charity organisations.

The aim of the company is to provide support to the national, the Arab world, and the international community, and to provide the employees with the knowledge that their company is dedicated to having a positive sociable impact. In this regard, receiving undergraduates proved effective, as there is a direct interaction between the employees and the students.

Apart from students, generally of Arab nationality, from UAE based universities and schools, the organisation started to receive European students, from Germany, France and Belgium, in response to requests of the international community, where students are encouraged attend courses in a number of different countries, and expected to secure foreign summer training.

The budget for expenditure on educational support was increased by 18% in 2003, mostly used to provide training allowances to guest students.

8.3.1.3. People results

8.3.1.3.1. Important increase of employee training

In 2003, the efforts of the company towards employee training increased significantly. The training expenditures increased by 327% over one year, while the number of training hours increased by 469% over the same period. The number of hours of training per employee over the year increased from 8.27 in 2002 to 50.46 in 2003.
The majority of this training was directed to managerial and supervisory training.

- It was directed towards forming supervisory staff able to handle a production more than doubled over the year, both towards newly hired supervisory and managerial staff, and internal promotion to these positions.

- It was also directed towards improving the knowledge of employees at all hierarchical level, over certain products, such as Hollowcore, in all processes linked to the product production technique.

8.3.1.3.2. Decreased labour-force turnover

Workers' turnover, which reached 7.8% in 2001 following the financial difficulties of 2000 and the consecutive delay in salary payments, showed a positive trend over the following years, reaching 3.4% in 2003. It may be noted that the workers’ turnover index is not as strongly correlated to the workers satisfaction index as the staff turnover index. This is due to the legal impossibility for a worker to change employment in the UAE. Following his resignation, a worker would have no other choice but to leave the country altogether, with a ban of six months applied on his passport. Thus, a small increase in the workers’ turnover index reflects a high level of dissatisfaction. With regular salary payments from the end of 2001, as well as with the policy improving workers’ accommodation facilities, the decrease of turnover observed in 2002 and 2003 can be interpreted as a steady improvement of satisfaction.
The Staff turnover index reacts more strongly to any variation of satisfaction. The 21% of staff turnover in 2001, reflects both a strong dissatisfaction and difficulties to adapt to the modification of Top Management. The lower figures in 2002 and 2003 are reflecting both an improved satisfaction, and a greater trust in the future of the company. However, while the staff turnover index was of 5.3% in 2002, it increased to 5.8% in 2003. A close study of the underlying data uncovered that this negative trend was due to a number of newly hired staff facing difficulties in adapting either to the company or to the country. This was particularly true for new graduates hired from abroad, who left both their country and their family, and for whom the company was their first employer. It appears that many of them were disoriented by the lack of family and friend support, by difficulties to adapt to a new country and to the working life. In some cases, newly graduates had idealized the UAE life, and were highly disappointed.

One of the strategic objectives defined for 2004 was to ease the integration of newly hired staff, through regular meetings and better follow up of their requirements by the personnel department.

8.3.1.3.3. Increased employee recognition

The number of employees financially rewarded, on top of salary increases and bonus distributed, has steadily increased from the first year this technique was used. 16 employees were rewarded in 2001, 32 in 2002 and 78 in 2003.
These rewards are related either to an improvement suggestion proposed by an employee, or to an exceptional achievement. Are not counted in the index any non-financial rewards, such as recognitions as employees of the year, and any financial reward attributed during overall recognition schemes (annual salary review, annual bonus distribution).

With the financial recovery of the company, the top management resumed its policy of bonus distribution, rewarding employees for their efforts. 433,100 Dirhams were distributed in 2003, as employees' reward corresponding to the 2002 profits, and 800,000 in 2004, corresponding to the 2003 profits.

8.3.1.3.4. Increased productivity

The trend of increased productivity started in 2002 accelerated in 2003, reflecting both an improvement in processes and increased employee satisfaction.

This is particularly true for the Precast production: In 2002, the gain of manpower productivity was of 6% when compared with the previous year, while the gain was of 19% in 2003.

For the Hollowcore product, the productivity improved by 9% in 2003 only. This can be explained both by the fact that the Hollowcore production is less labour intensive than the Precast production, and that the process improvement efforts of the company in 2003 were mainly directed towards the precast casting process.

![Manpower hours per M3 produced](image)
8.3.1.4. Key performance results

8.3.1.4.1. Improved product quality

As examined earlier, the decrease of non-conformances cost per cubic meter produced clearly indicates an improvement in the products’ quality. However, cost of non-conformance data have been collected only recently, and if the trend of this indicator is thought to be meaningful, its values are deemed underestimated.

Another indicator of the products’ quality is the number of repair hours per cubic meter produced. It is calculated using the number of hours worked in the repair sections. Employees of the repair section are performing two types of tasks:

- They perform finishing work on the casted panels, in order for them to look perfectly even and smooth. This task is compulsory for any precast panel, except when external appearance is of no added value (precast slabs that will be recovered by grouting at site, for example), and has to be performed even when the casted product is of high quality.

- They perform repair work such as fixing chopped edges, minor or major cracks, and any other product repair work that is not affecting the structural soundness or customer requirements of the elements.

Data related to hours of repair are routinely collected by the company for a number of years, and are used both as input to the payroll process and as an indicator of products quality. They are available by product and by project, and are routinely analysed. They are thought to be reliable and accurate.

An improvement in the number of repair hours per cubic meter produced can have two major causes:

- An improvement in the repair process, which can positively affect both types of repair work.

- An improvement in the quality of casted elements, which will positively affect the second type of repair work, reducing the necessity of bringing products to a conforming level.
The improvement in the number of repair hours per cubic meter produced observed in 2002 and 2003, is thought to reflect these two types of improvements, and to be strongly correlated the improved quality of casted products.

Over three years, the indicator reflects an improvement of 95% percent for Hollowcore products (as the Hollowcore production started by the end of 2000 only, the substantial 2001 decrease in repair hours per cubic meter is reflecting a better knowledge of the Hollowcore production process), and of 37% for the Precast product. This confirms the improvement of quality noted through the “cost of non-conformances per M3 produced” indicator.

8.3.1.4.2. Increased Investments

As noted earlier, the company invested heavily in state-of-the-art facilities in 2003. Other types of investments were also necessary in order to sustain the company’s growth, and the
operations of its two new production centres. In fact, investments increased by 212% in 2003 in comparison with 2002, which had already increased by 42% in comparison with 2001.

![Expenditure on Development](image)

**Figure 72 Trend of Expenditure on Development from 2000 to 2003**

8.3.1.4.3. *Increased Production*

With a production that increased by 133%, 2003 was a year of rapid growth, with a record growth rate over the past few years.

![Production](image)

**Figure 73 Trend of volume produced from 1999 to 2003**

The sales figure for 2003 is also reflecting this rapid growth.
Several indicators are clearly showing process performance improvements in 2003. The 10% improvement in Hollowcore productivity and 23% in Precast productivity over the year, has already been noted.

This is confirmed by the overall production costs per M3, which decreased by 21% in 2003, confirming the improvement trend of the previous years. Over four years, the company has reduced from 70% its overall production cost per M3 produced.

---

**Figure 74** Sales trend from 1999 to 2003

**Figure 75** Trend of production costs per M3 from 2000 to 2003
8.3.4.5. **High Profitability**

The company performed above 9 million profit in 2003. This positive trend is confirmed in 2004, where net profits already reached 11.2 million by August.

Thus, the company is over its period of financial recovery, and has reached a period of high profitability.

**8.3.1.5. Improvements of the period, classified according to the EFQM Model**

Figure 77 Improvements introduced during the third period, classified according to the EFQM Model
## Improvements of the Refinement

### Leadership
- 8.2.8. Continual improvement objectives are defined for each process
- 8.2.9. A managerial tool to grasp the Company's overall performance: Balanced Scorecard

### Policy & Strategy
- 8.2.1. TQM Gap Analysis based on TQM literature review
- 8.2.2. Detailed accounting provisions for the year
- 8.2.3.1. Defined Strategic Plan Review process
- 8.2.3.2. Increased Employee Participation in the elaboration of Strategic Objectives
- 8.2.3.3.2. Defined Inputs to the Strategic Plan
- 8.2.3.3.3.1. Defined Strategic Plan deployment process

### Partnerships & Resources
- 8.2.7.2. Increasingly basing investments on feasibility studies
- 8.2.7.3. Analysis of cost of Equipment breakdown
- 8.2.7.4. Equipment depreciation system based on whole life costing
- 8.2.7.5. Infrastructure Ergonomic review
- 8.2.7.6. Increased research on state-of-the-art facilities
- 8.2.7.7. Invoking main suppliers and clients to training courses
- 8.2.14.3. Partnership and feasibility studies
- 8.2.14.4. Partnership and process improvement
- 8.2.14.1. Partnership as a Strategic Process
- 8.2.14.2. Mutually beneficial relations for added value in both organizations

### People
- 8.2.2.3. Employee survey
- 8.2.5.2. Increased utilisation of contract work
- 8.2.6.4. HR Gap analysis and HR recruitment Plan
- 8.2.6.5. Generalisation of Recruitment test
- 8.2.6.6. Increased multi-departmental team working

### Processes
- 8.2.10. Customer Satisfaction Survey is used to analyse satisfaction and benchmark processes
- 8.2.11.1. Improved assessment of Failure cost
- 8.2.11.2. Cost of quality prevention and appraisal
- 8.2.16.1. Internal benchmarking

### People Results
- 8.3.1.2.1. Marginal safety improvements
- 8.3.1.3.1. Important increase of employee training
- 8.3.1.3.2. Decreased labour-force turnover
- 8.3.1.3.3. Increased employee recognition
- 8.3.1.3.4. Increased Productivity

### Customer Results
- 8.3.1.1.1. Increased Customer Satisfaction
- 8.3.1.1.2. Reduced cost of non-conformances per M3 produced
- 8.3.1.1.3. Improved New Customer Attraction
- 8.3.1.1.4. Increased expenditure in QC, QA & TQM

### Society Results
- 8.3.1.2.2. Increased investments in state of the art facilities
- 8.3.1.2.3. Increased interactions with the community's Educational System
- 8.3.2.2. ISO 9001:2000 certification
- 8.3.2.3. A Diamond award in the Sheikh Khalifa Industry award

### Key Performance Results
- 8.3.2.3. A Diamond award in the Sheikh Khalifa Industry award
- 8.3.1.4.3. Increased Production
- 8.3.1.4.4. Improved process performances
- 8.3.1.4.5. High Profitability
8.3.2. The external audit perspective

In May 2004 the SKIA informed the company that it had won the Diamond Award in the 2003 participation round. The SKIA had modified its categories from previous evaluations. Scores were given in four categories, and the following correspondence with previous categories was provided:

- Management responsibility included many of the issues in the Leadership and Strategic Planning sections of the old award model.
- Resource management included many of the issues in the Human Resources, Strategic Planning and Business Environment sections of the old award model.
- Process management (or Product realisation) included many of the issues in the Customer Focus and Process Management sections of the old model.
- Measurement, analysis and improvement included many of the issues in the Use of Information and Process Management sections of the old model.

For comparison purposes, the scores of the 2001-2002 participation round will be converted into the 2003 format, using the following formulas:

- Management Responsibility is the average of: twice the Leadership + the Strategy score.
- Resource Management is the average of: twice the Human Resources score + twice the Business Environment score + the Strategy score.
- Process Management is the average of: twice the Customer & Market Focus score + the Process Management score.
- Measurement, Analysis and Improvement is the average of: twice the Use of Information score + the Process Management score.

As the SKIA had informed the participant that the calculation technique for the results had been significantly modified, no meaningful comparison could be made between the result category (Business Results) of the 2001-2002 participation round and the four results categories of the 2003 participation round.
8.3.2.1. **SKIA evaluation of the company**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Environment</td>
<td>Resource management</td>
<td>62%</td>
<td>73%</td>
<td>87%</td>
<td>78%</td>
</tr>
<tr>
<td>Human Resources</td>
<td></td>
<td>76%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy</td>
<td>Management responsibility</td>
<td>88%</td>
<td>83%</td>
<td>92%</td>
<td>70%</td>
</tr>
<tr>
<td>Leadership</td>
<td></td>
<td>80%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer &amp; Market Focus</td>
<td>Process management</td>
<td>82%</td>
<td>79%</td>
<td>95%</td>
<td>78%</td>
</tr>
<tr>
<td>Use of Information</td>
<td>Measurement, analysis and improvement</td>
<td>74%</td>
<td>77%</td>
<td>87%</td>
<td>76%</td>
</tr>
<tr>
<td>Award obtained</td>
<td>Gold Award – First place</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diamond Award</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The company obtained a Diamond Award for its 2003 participation, while it received a Gold Award for its 2001-2002 participation. This indicates a progress, although it can be argued that as the organisation was only one point below the Diamond winner in the 2001-2002 round, it is difficult to evaluate how substantial the progress had been without a detailed review of the categories' scores.

8.3.2.2. **Process management**

The SKIA reported a progress of 16 points in the Process management category, which obtained the highest score, both according to performance and to results.

This matches the company’s evaluation, which had set process improvements as a priority for the period, and which had introduced significant improvements in this area: 8.2.3.3 The Strategic Plan deployment and progress review; 8.2.4 Reviewing processes for improvement using flow-charting; 8.2.5 Department process control and measurement; 8.2.10 Customer Satisfaction Survey 8.2.17 Improving the Marketing; 8.2.19 Process reengineering; 8.2.20 Utilisation of Quality engineering tools; 8.2.22 ISO 9001:2000 certification

The SKIA scores confirmed that the company had been successful in improving its processes.

8.3.2.3. **Resource Management**

The performance of Resource Management category progressed of 14 points. The result score of that category was the highest obtained by the organisation (the same score than Process Management result). This category included previous Human Resources, Business
Environment and some of the Strategy categories. As the company had identified weaknesses in Human Resources and Business Environment elements due to its specific culture, efforts had been deployed throughout the three periods to improve these areas. These efforts had clearly been taken into consideration by the SKIA, which was reflected by the 14 points progress on performance.

During the third period, the following initiatives were taken to improve Resource Management: 8.2.2.3 Employee survey; 8.2.3.1.2 Increased employee participation in the elaboration of the Strategic Plan; 8.2.6 Alignment of the Human Resources with the company’s Quality System; 8.2.7 Alignment of Equipment and Infrastructure with the company’s Quality System; 8.2.12 Follow-up committees set in place; 8.2.13 Increased Training; 8.2.21 HSE Improvements

The progress of the company, recognised by the SKIA, was particularly significant when considering the difficulties resulting from the initial culture of the company.

8.3.2.4. Measurement, analysis and improvement

The SKIA reported a progress of 10 points in Measurement, analysis and improvement. This reflects the evaluation of the company, which had introduced significant improvements relative to this category during the second period, and had refined and aligned them during the third period.

Initiatives taken in this aspect during the third period were: 8.2.2.2 Detailed accounting previsions for the year; 8.2.3.2 Inputs of the Strategic Plan (Customer, employee and society perception; company’s performance, benchmarking and forecast data; Research); 8.2.5 Department process control and measurement; 8.2.8 Continual improvement objectives; 8.2.9 A managerial tool to grasp the overall performance of the company: Balanced Scorecard 8.2.11 Improved measurement of the cost of non-conformances; 8.2.16 Benchmarking; 8.2.13 Complete IT integration

8.3.2.5. Management responsibility

Management responsibility was the category in which the company progressed the least, according to the SKIA. However, the progress rate was not negligible (9 points). The score obtained in that category being of 92%, it is arguable whether the organisation could have progressed much more.
A few initiatives taken during the third phase were directly related to that category: 8.2.3.1 Defined process for Strategic Plan review, deployment and follow up; 8.2.9 A managerial tool to grasp the overall performance of the company: Balanced Scorecard; 8.4.14 Partnerships

On top of these specific initiatives, the management of the organisation supervised all the other improvements.

**8.4. Review of priorities initially set**

**8.4.1. Cultural change**

During the third period the organisation had decided to pursue its efforts for a cultural change, concentrating on the CSF which had not received major attention to date.

**8.4.1.1. Team working**

Team Working is the Critical Success Factor, identified by the organisation as being in conflict with its initial culture, which had received least attention. During the third period, the company had set this as a priority to improve.

As described in detail in paragraph 8.2.12, a large number of teams are created, each with clearly defined goals. Some of the teams were built under the coaching concept (higher ranking team members are coaching lower ranking ones), while in others hierarchical subordination was established. While some teams comprised of employees of an identical hierarchical level, others opted for more diversity, including multi-disciplinary or/and multi-hierarchical members. Although it is not as easy for the organisation to form multi-hierarchical teams operating under the coaching concept, some experiences were successful.

As most of the team working experiences were introduced during the third phase only, it is difficult to judge whether the practice of team working will persist and develop in the future. It is also too early to assess whether teams with multi-hierarchical team-members, operating under the coaching principle, will last as long as teams with a restricted hierarchical diversity, operating under more authoritarian principles.
8.4.1.2. Communication system

Some additional initiatives were introduced during the third phase in order to further improve the communication system: 8.2.2.3 Employee Survey; 8.2.6.1 Measuring adherence to core values; 8.2.9 Balanced Scorecard; 8.2.13.4 Magazine circulation

Even during this third period, the communication towards and from the lower hierarchical levels remained limited.

8.4.1.3. Employee participation, involvement and empowerment

A few initiatives were also introduced in view of improving employee participation, involvement and empowerment: 8.2.3.1.2 Increased employee participation in the elaboration of Strategic objectives; 8.2.8.2 Process owners select their objectives for continual improvement; 8.2.13.4 Continuous Learning scheme

Because the communication towards and from the lowest hierarchical levels stayed limited, workers' participation, involvement and empowerment remains low and difficult.

However, there is a true involvement and empowerment of the staff, who did propose strategic course of actions to the top management.

8.4.1.4. Working environment and conditions

During the previous period, the company had positioned itself as caring for its employees' well-being. Initiatives taken during the third period continued in this direction: 8.2.3.2.2 Perception of Employee Satisfaction as an input to the Strategic Plan; 8.2.7.5 Infrastructure ergonomic review; 8.2.13.1 Evaluation of training effectiveness; 8.2.13.5 Intensive continuous Learning scheme; 8.2.20.3 SPC training; 8.2.21.1 Fire evacuation exercises; 8.2.21.2 Minimising risks relative to dangerous material; 8.2.21.6 Crane operators evaluation; 8.2.21.7 Regular visits by the HR Manager to the camps

Efforts for improving working and living conditions encompassed all hierarchical levels, taking into consideration their specific needs. There was also a marked difference to the attitude of the company prior to TQM implementation.

8.4.1.5. Awareness and concern for the needs of the society

Several additional initiatives took place during the third phase that reflected the organisation's concern for the needs of the society: 8.2.3.2.3 Perception of Society
satisfaction as an input to the Strategic Plan; 8.2.21.2 Minimising risks relative to
dangerous material; 8.2.21.5 Road management system

Although the concern for the needs of the society is of lower concern to the organisation
than the well-being of its employees, it is undeniable that the company is making slow but
steady improvements in its awareness of and concern for the society in which it operates.

8.4.1.6.  Overall review of initiatives for cultural change

Apart from the newly introduced attempt for increased team working, the third period is
characterised by the willingness of the organisation to further improve employees’ working
and living conditions, and to effectively increase the involvement and empowerment of its
staff using a performing communication system. Workers involvement and empowerment
remained limited due to limitations in the communication system with the lower
hierarchical levels. The needs of the society are taken into consideration and the
organisation demonstrates some efforts to answer them.

Thus, the third period shows significant progress on all five Critical Success Factors
targeted, as is demonstrated both by the company’s internal indicators relative to Employee
and Society Satisfaction, and to the score obtained in the SKIA in the Resource
Management category (87% of performance, 14 point of increase when compared with
previous assessment).

Figure 78 Business Environment and Human Resources Indicators – Progress from 2002 to 2003
8.4.2. TQM literature review

Until the ‘Quality refinement’ phase, the company based its improvement process on the recommendation of the SKIA. When the company was not sure how to introduce a specific improvement, it would research the available literature on the specific element. This had been the case of the 360 degree leadership evaluation or the housekeeping evaluation for example. During the ‘Quality refinement’ phase, an overall study of the TQM philosophy and the available recommendations and tools was carried out by the company. This research was the base for new improvements such as: Utilisation of Balanced Scorecard; Process flowcharting; Utilisation of Statistical Process Control etc.

The additional knowledge obtained through TQM research was spread within the company using a ‘Continual Learning’ scheme, which consists of distributing articles of specific interest to key employees.

The TQM literature review proved highly successful in highlighting further possible improvements, which were selected for their compatibility with the TQM system of the company. It is significant that some of the improvement tools uncovered by the organisation during its Literature research, were included in the 2003 questionnaires of the SKIA (while not mentioned in earlier questionnaires), which indicates that the award body, during its review process, incorporated these tools as relevant, at approximately the same time that the company was considering their introduction.

Thus, although the SKIA was used by the company as a ‘stepping stone’, and ‘aid’ to developing TQM, on reflection, would the organisation have been as successful in its TQM implementation if it had ignored the SKIA, and based its improvement project on a TQM literature review instead?

The researcher considers that the company would not have been as successful in its TQM implementation, for the following reasons:

- A TQM literature review provides impressive knowledge as well as numerous recommendations, sometimes in contradiction with each other. Among this mass of information, an organisation might be at a loss about were to start. The SKIA answers very clearly this question: “Start with the categories in which you obtained the lowest score”. It even went further than this, and provided companies with
suggestions for improvements based on a detailed analysis of items’ grades in the lowest scoring categories. It also prevents organisations being confused about the differences of opinion of TQM experts: The SKIA had carried out its own TQM Literature Review, and proposed a coherent TQM expertise which, in its opinion, was most suited to generate a positive impact on the industrial sector of Abu Dhabi based factories.

Through its numerous interactions with the participants (visits, feedback reports, conferences etc), it provided a renewed interest in the TQM implementation project, while a company basing its project on TQM Literature Review alone might start with enthusiasm, but subsequently see this decline.

It also provides credence to the team in charge of the implementation. The initiatives introduced, which are sometimes resented as a nuisance because they modify the work habits of the employees, are not perceived as the latest fads of the implementation team, but are based on the commendations of a recognised governmental body. Thus employees are more receptive to apply them.

The award body provides measured external assessment of the organisation success in implementing TQM principles, and allows the organisation to readjust its implementation process according to the latest figures provided.

An award for a company’s TQM scheme both boosts employees’ pride, renewing internal interest for the implementation programme, and is an external recognition of the organisation’s performance.

During the third phase of its TQM implementation project, the organisation was able to greatly benefit from the TQM literature review performed, as the main directions of the improvement project were already set in place, which enabled the researcher to make educated decisions about the relevance, or not, of uncovered additional concepts or tools presented in literature, and their compatibility with the organisation’s current Quality System.
8.4.3. Process management improvements

The company also decided to review in detail its processes, in view of improvements. A number of initiatives in relation to process clarification, review or improvement were taken during the third period (see paragraph 8.3.2.2).

In the first and second phase, process review and improvement had mainly dealt with managerial processes. During the third phase, production processes were also subject to detailed studies and reviews for improvement.

Process operations were studied in detail, using flow charts, grading of process inputs, and internal and external customer satisfaction.

The possible use Quality Engineering tools was examined for the first time during the third period, and pilot studies were carried out, demonstrating significant potentials for improvement. Statistical Process Control charts were introduced to control some processes and measure benefits of newly introduced improvements.

The success of the company in regard to this process improvement priority was externally confirmed by the company's score in the Process Management category of the SK1A: A score of 95%, in progress of 16 points, compared with the previous assessment.

8.4.4. Relationships with key partners

The organisation also set strengthening its links with its key partners as a priority.

Key clients and suppliers were invited to participate in the TQM training introduced by the company, with view to reinforcing the links between the organisations.

Preferential agreements with key Suppliers were established based on the company evaluation of supplied products and services, on purchase and payment terms agreements, and on training cooperation both by the suppliers and by the company.

The basis for formal partnerships with key Clients and Suppliers were elaborated and the company participates in Value Engineering and Partnering initiatives which were only then emerging in the country.
8.4.5. Fine tuning and alignment of the Quality System

Finally, the company wished to review the coherence of its whole system, to fine-tune some of the improvements previously introduced, and to verify and enhance the alignment of the improvements introduced during the three periods.

Processes for Strategic Plan elaboration, deployment and follow-up, first defined during the first period, were fine-tuned during the third one.

The performance measuring system, which already received a lot of attention during the second phase, was fine-tuned. Measuring and monitoring was no longer limited to production processes, but included support processes. Performance measures were calculated by the process owners themselves, who were proposing objectives for continual improvement in line with the Strategy of the company. Monthly comparisons were done between provisional budget and actual figures. The company consolidated its benchmarking data through analysis of SKIA results, ISO 9001:2000 certification, analyses of customer satisfaction and partnership with its Suppliers.

The Balanced scorecard system was introduced with a view to improve the alignment between strategic objectives and continual improvements objectives, and ease communication and progress reviews. It presented objectives and achievements according to four different perspectives, and was updated every trimester.

Review of better alignment with strategic objectives was not limited to the Measuring System, but also concerned the Human Resources management and Equipment & Infrastructure.

8.5. Reflection on company’s objectives

8.5.1. TQM implementation and organisation’s performance

As demonstrated by the Internal Performance Indicators (see paragraph 8.3.1) and confirmed by external assessment of the SKIA (see paragraph 8.3.2), the performance of the company increased significantly during this third phase of TQM implementation. Furthermore, this performance improvement was not limited to some aspects of the company’s operating system but was, overall, balanced, as demonstrated by marked improvements in the four categories of the SKIA model, and by all performance scores between 87 to 95%.
This supports further the achievement of the first objective which was to raise the performance of the company by implementing TQM principles, and to overcome its crisis situation in doing so.

8.5.2. TQM implementation and stakeholders’ satisfaction

The second objective was to raise the satisfaction of all stakeholders while implementing TQM principles.

There is no doubt, during the third phase, that the satisfaction of all stakeholders had indeed been raised, and that this rise was strongly linked to the increased performance generated by TQM implementation. This was backed up by both internal performance indicators (see paragraph 8.3.1) and by external ones (see paragraph 8.3.2), and confirms the achievement of the second objective.

8.5.3. TQM implementation and TQM award body

The third objective was to offset the limited TQM knowledge available in the company through the application of the recommendations provided by the Sheikh Khalifa Industry Award body.

During the first two phases, the organisation used the feedback report of the SKIA to assess its performance and identify areas for improvement. During the third period, the company estimated that this technique was not sufficient any longer. Two additional techniques were used to identify areas for improvement:

- The company performed a self-assessment gap analysis, based on the SKIA submission questionnaires, benchmarking the current performance of the organisation against “world-class” practices, as described by the award body. This analysis was performed at the beginning of the participation round, and the company did not wait for the feedback report from the SKIA to start its improvements implementation.

- The researcher performed an extensive TQM Literature Review, identifying concepts and tools which might enhance the performance of the organisation, and proposed their implementation to the Top Management.
Although the recommendations of the SKIA were still used by the company, they were no longer the main source of TQM knowledge. Major improvements of the period (such as Balanced Scorecard or SPC for example), had been identified through Literature Review. This is linked to the fact that the more the company progressed towards a score of 100% in the TQM scheme, the more limited in scope were the recommendations for further improvement provided by the award body.

Once an organisation reaches the phase of TQM maturity, the recommendations provided by a TQM governmental award body are less beneficial, and additional sources of knowledge should be looked for. This is pertinent to the fact that the organisation is not any longer characterised by a limited TQM knowledge, as its knowledge had been significantly raised by the previous phases of TQM implementation.

Thus, the achievement of the third objective cannot be assessed by an organisation reaching TQM maturity, as it does not meet the initial criterion of that objective: to be characterised by a limited TQM knowledge.

However, several of the improvements introduced by the company during the third period, based on the Literature Review carried out by the researcher, were mentioned for the first time in the 2003 questionnaires of the SKIA (see paragraph 8.4.2). This attests that the SKIA model is not static (see paragraph 9.3.1), but is changing and adapting. Being a governmental body, it may not change as quickly as a company can, but it ‘improves’ and keeps ‘up to date’. It thus remains of valuable assistance to the companies with limited TQM knowledge.

8.5.4. TQM implementation and cultural specificity

The fourth objective was to overcome or minimise implementation difficulties linked to the specific culture of a company.

At the end of the third phase (as will be confirmed by an evaluation of employees’ perception of cultural change in paragraph 9.2.1), the company has succeeded in modifying some aspects of its company culture (see paragraph 8.4.1). This partial success enabled the implementation of TQM principles (such as employee participation and empowerment or team working for example), which would have had little chance of success if the initial culture had prevailed. This does not mean that the cultural identity of the organisation had
been transformed (that the company has evolved from a large power-distance in the sense of Hofstede (2005) to a small power-distance, for example), but rather that its culture has been sufficiently modified to enable at least a partial fulfilment of the TQM CSFs (the power-distance in the company is not as large as it used to be).

In the light the third period, the fourth objective has been achieved, to the extent that the organisation is pursuing a progressive cultural modification scheme aimed at developing cultural characteristics more suited to TQM principles.
9. EVALUATION OF TQM IMPLEMENTATIONS

9.1. The company’s viewpoint of its progress

It is undeniable that three to four years after the company’s decision to implement TQM principles by the end of 2000, the organisation has progressed tremendously.

It would have been interesting to present the progress using the balanced scorecard approach, and comparing measures of key performance indicators by the end of 2000 and by the end of 2003 or 2004. However, as the balanced scorecard approach was adopted by the company by mid 2003 only, and as many performance indicators were developed during the TQM implementation process, this option is not possible, and one must revert to examining the indicators which were already set in place by the end of 2000. However, they will be regrouped hereafter using the four perspectives defined by the company in its balanced scorecard.

9.1.1. Financial and commercial perspective

By the end of 2000, the company was registering a financial loss of more than 4.5 million Dirhams. 2001 and 2002 were financial recovery years, and from 2003 onwards, the company entered a phase of high financial profits, with 8.8 million profit over the year 2003, and 11.2 million profit over the first eight months of 2004.

Sales figures have increased by 107% over three years, reaching 96 million for 2003. This trend is confirmed by the first figures of 2004, with an amount of sales of 108 million by September 2004.

Over three years, the production in cubic meter has been multiplied by more than 4, reaching 107 thousand of cubic meters in 2003, against 20 thousand in 2000. Two new factories have been developed, and two additional ones should be operational in 2005.

This was achieved through high investments on Development, based more and more on in-depth feasibility studies. From 2001 to 2003, the company has invested more than 27 million Dirhams on Development, of which 13 million were on state-of-the-art facilities.
9.1.2. Process excellence perspective

An important effort has been deployed by the company in order to improve the performance of its processes. This was further increased from 2003 onwards, with the utilisation of quality engineering tools, such as SPC and process study and reengineering. Process performance indicators are reflecting the success of this approach:

Over three years, the labour cost per cubic meter has decreased by 37%, and the production costs per cubic meter by 41%, reaching 133 and 628 Dhs/M3 in 2003 respectively.

The Hollowcore productivity has increased by 57% between 2002 and 2003 (the Hollowcore production was marginal only before 2002), and the Precast productivity has increased by 37% from 2001 to 2003 (productivity figures are not available before 2001).

9.1.3. Customer and community perspective

9.1.3.1. External customer satisfaction

Direct measures of customer satisfaction are available from 2002 onwards only. Thus indirect measures have to be used to compare the 2000 level of client satisfaction with the 2003 one.

Market share of the company in the UAE Precast manufacturing industry, has increased by 50% over three years, reaching 18% in 2003. It may be noted that the few major competitors of the company followed a policy of expansion similar to the one of the company, each of them increasing their shares, while the market shares of smaller competitors who did not progress has quickly diminished. This explains that although the market share of the organisation increased, it could not secure a leadership position in the UAE, but only maintain its second position.

On the Abu Dhabi market, the company progressed even quicker, with a 76% of market increase over three years, securing a leadership position in 2003, as its progress was faster than its Abu Dhabi competitors.

From 2003 onwards the company started its penetration of the Dubai market, securing a 6% market share in this Emirate.

Customer loyalty indicator also reflects an increase of client satisfaction, with more than 52% of loyalty increase between 2000 and 2002. The slight drop in the 2003 loyalty figure
Daniele Seraphim – Ph.D.

is due to the attraction of new Dubai based customers, and reduces the progress over three years to 22% of loyalty increase.

In order to increase its external customer satisfaction, the company improved the quality of its product. This may be perceived through its “repair hours by cubic meter produced” indicators. There is a decrease of 37% of hours of repair per cubic meter of precast produced, from 2001 to 2003 (2000 figures are not available for this indicator). The same trend can be noticed for the Hollowcore production, but as production of Hollowcore started only by the end of 2001, the progress can be monitored for a short period only (57% of repair decrease from 2002 to 2003).

9.1.3.2. Community satisfaction

From 2002 onwards, the company started to actively increase its involvement in the community, through a policy of long term commitments and event driven participation with charismatic organisations. From 2000 to 2003, the company has multiplied by 9 its yearly amount of donations.

The company started also a policy of active educational support, mainly through providing summer training for undergraduates.

Overall, the company recorded 10 different interactions with the community in 2003, to be compared with 7 in 2002, and only a few before this date.

The company also tried to minimise possible negative impacts on the environment. This can be evaluated using the “cost of rubbish removal per cubic meter produced” indicator, which showed a 80% decrease from 2000 to 2002. In 2003, this indicator is not meaningful any longer, as the company had to remove its Mussafah factory sub-base in order to hand over the land, and as cost of the rubbish removal indicator cannot distinguish between production wastage and sub-base wastage.

9.1.3.3. Internal customer satisfaction

Employee satisfaction has increased from 2000 to 2003, as demonstrated by several indicators. The “Employee turnover” indicator shows a decrease of 18% from 2000 to 2003, while the stability increased of 11% over the same period (the “employee stability” indicator is disfavourably influenced by the hiring of new employees, which was important during this period). The employee job satisfaction index, as calculated using the job
satisfaction survey, has increased by 3% from 2002 to 2003, while the camp satisfaction index has increased by 23% over the same period (these indicators were not available prior to 2002).

From 2001 onwards, the company started a policy of employee recognition. Sixteen employees were recognised in 2001, and this increased by four times in 2003. Bonus distribution has restarted in 2002 with an amount of 433,100 Dhs distributed over the year, and 800,000 Dhs in 2003, showing the willingness of the organisation to share the benefits of the company's financial success with its employees.

The increase of productivity is also thought to be linked to an improved employee satisfaction, with 23% of productivity increase for the Precast production from 2001 to 2003, and 24% of productivity increase for the Hollowcore production.

Last but not least, the company has increased its safety level. From 2000 to 2003, the number of accidents per cubic meter produced has been reduced by 80%, while the accident frequency rate decreased by 56% over the same period.

9.1.4. Innovation and Learning perspective

From 2001 to 2003 onwards, the organisation recognised the primary importance of innovation and learning, and provided corresponding training to its employees.

While in 2000, the number of annual training hours per employee was of 1.18, it reached 50.46 in 2003. The training expenditures were multiplied by 5 over the same period, and the number of training hours by 76.

The training expenditure was mostly directed on managerial and supervisory training, while the bulk of training hours were directed to front line staff and workers.

Other indicators of innovation and learning activities, such as "number of improvement action plans", "goal achievement index", "magazine reading", or "employee involvement index" were evaluated from 2003 onwards only, and no trend over the considered period can therefore be deduced.
9.1.5. Correlation between the company’s successes and its policy of TQM principles implementation

There is no doubt that the company has been successful in overcoming the financial crisis of 2000, and in entering a phase of high profitability, improved satisfaction of all stakeholders and rapid growth.

One can ask, however, whether those successes are due to its policy of TQM principles implementation, or whether they have been fostered by a favourable market evolution.

The UAE Precast Manufacturing market is undoubtedly in an expansion phase, with a high and rapidly increasing demand, and an offer that requires time to adjust to this demand, due to the necessity of important investments and to the restricting national laws about employment. The gap between demand and offer cannot be met by importation of products, due to the heavy cost of transportation.

In such an environment, there is little doubt that an experienced company, willing to invest in order to expand, could find opportunities for growth, and one cannot deny that part of the company’s fast success is due to the favourable climate of the Precast Manufacturing industry in the UAE.

However, this favourable climate was already present in 2000, and the company tried to respond to it by increasing its yearly production by 63%. The result however, far from being an overall success, was a record financial loss, as the company was unable to face this challenge. At the same time, processes deteriorated as demonstrated by the decrease of products quality, and stakeholders’ satisfaction: Clients were unsatisfied by delays in the production and by poor product quality; Employees were unsatisfied by an additional workload, no bonus distribution and delays in salary payments; Suppliers were unsatisfied by delays in their payments; Shareholders were unsatisfied by a financial loss of more than four million.

Thus, the company needed to integrate some of the TQM principles in order to be capable of using the favourable climate to its advantage.

A second argument in favour of the importance of the implementation of TQM principles in the company’s successes, even when overlooking its previous inability of taking advantage of a favourable market evolution as demonstrated by the 2000 crisis, is that the
company's growth accompanied with processes' improvements and higher satisfaction levels of all stakeholders.

If the company growth was only the result of a favourable market climate, there is no good reason why process performance should improve, and thus why customer or employee satisfaction should increase. One would expect:

- A production growth
- At best an equivalent level of process performance
- Thus an equivalent level of customer satisfaction
- This would generate a profit increase in proportion of the production increase, and thus a slightly higher shareholders' satisfaction
- A slightly higher supplier satisfaction resulting from an increased volume of sales
- An equivalent level of employee satisfaction as the yearly amount of bonus distribution would be slightly higher, in proportion to the profit increase, but would be distributed among more employees (as we are examining the hypothesis of a stable process performance)

This scenario is far from being the case of the company. The company's production growth went along with major process improvements, along with significant customer, employee and supplier satisfaction increase, and not only a financial recovery, but a high financial success, all in three to four years time.

There is no doubt, therefore, that if the favourable market climate is a positive factor in the company success, its policy of TQM principles implementation is the determining factor in both its extent and its momentum.

**9.2. Internal perception of change**

In 2005 an employee survey was launched to assess the following issues using employees' perception:

- Level of TQM knowledge in the organisation. The questions relevant to this issue were identical to the ones of the 2001 survey (see paragraph 6.2.2.10).
By comparing the answers of the 2001 survey with those of 2005, the researcher aimed to verify whether or not the TQM knowledge in the organisation had been raised.

The “Power Distance” in the sense of Hofstede (Hofstede and Hofstede, 2005) prevailing in the organisation, in 2005.

A possible modification of “Power Distance” over the last five years.

The “Masculinity” and “Feminity” in the sense of Hofstede (Hofstede and Hofstede, 2005) prevailing in the organisation at that time.

A possible evolution of the “Masculinity” or “Feminity” traits over the last five years

To maintain consistency with the survey of 2001 (see section 5.11.6 page 70), the survey was distributed only to employees from Foreman and above only.

**9.2.1. Rise of TQM knowledge in the organisation**

Employees were asked to estimate their knowledge of the concept of Total Quality Management, and their awareness of Quality Improvement tools. They were also asked to specify which Quality improvement tools they were aware of.

The following answers were collected:

<table>
<thead>
<tr>
<th>I am familiar with the concept of Total Quality Management.</th>
<th>Indicate the extent to which you agree with these statements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>I am aware of several Quality improvement tools.</td>
<td>17.02%</td>
</tr>
</tbody>
</table>

**Table 70 TQM knowledge survey of 2005**

Thus, 85.11% of the employees (from Foreman and above) estimated that they were familiar with the concept of TQM, and 74.36% that they were aware of several Quality improvement tools. This is to be compared with the 2001 survey, where 47.06% of the employees estimated being familiar with the concept of TQM, and 38.10% having some knowledge of Quality Improvement tools.
When asked to specify TQM improvement tools, 36.17% of the employees proposed one to several tools. In 2001, only 10.15% of the employees could specify a tool (among which 7.25% specified “ISO” only).

These figures demonstrate a clear rise of TQM knowledge within the organisation.

It is of interest to check which tools or concepts have been quoted by the employees during the 2005 survey. Some employees have quoted several of them. Some employees have even exceeded four tools or concepts, while only four lines were available in the survey to answer the free entry question: “Specify below some Quality improvement tools you are aware of”.

<table>
<thead>
<tr>
<th>TQM tools or concepts</th>
<th>No of employees who selected this tool / concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe and healthy working environment</td>
<td>6</td>
</tr>
<tr>
<td>Team working/Cooperation</td>
<td>5</td>
</tr>
<tr>
<td>Strategic Plan</td>
<td>4</td>
</tr>
<tr>
<td>BSC</td>
<td>4</td>
</tr>
<tr>
<td>Good Coordination</td>
<td>4</td>
</tr>
<tr>
<td>Continuous Improvement Measures</td>
<td>4</td>
</tr>
<tr>
<td>KPI</td>
<td>3</td>
</tr>
<tr>
<td>Product Quality</td>
<td>3</td>
</tr>
<tr>
<td>Using Quality Material</td>
<td>3</td>
</tr>
<tr>
<td>6 Sigma</td>
<td>3</td>
</tr>
<tr>
<td>Client Satisfaction</td>
<td>2</td>
</tr>
<tr>
<td>Good Communication</td>
<td>2</td>
</tr>
<tr>
<td>Vision</td>
<td>2</td>
</tr>
<tr>
<td>SPC</td>
<td>2</td>
</tr>
<tr>
<td>Suggestion Competition</td>
<td>1</td>
</tr>
<tr>
<td>Control charts</td>
<td>1</td>
</tr>
<tr>
<td>Customer Satisfaction Survey</td>
<td>1</td>
</tr>
<tr>
<td>Job Satisfaction Survey</td>
<td>1</td>
</tr>
<tr>
<td>Market Survey</td>
<td>1</td>
</tr>
<tr>
<td>Camp Survey</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 71 List of TQM tools or concepts quoted by the Employees in the 2005 survey

The following points of interest can be noted:

Tools/concepts linked to Employee Management were quoted 20 times, which was equivalent to 37.74% of the overall tools/concepts quoted. This was linked to the priority for Employee Management improvements set by the company throughout its TQM implementation.
Tools/concepts linked to the Measuring System were also quoted 22 times (41.51% of the overall tools/concepts quoted). This was linked to the efforts deployed by the organisation during the second and third period to improve its measuring system.

9.2.2. Employees’ perception of “Power Distance” in the organisation

The second aim of the survey was to assess the “Power Distance” within the organisation through Employees’ perception, and to check whether it had evolved over the five past years.

The original assumption of the researcher was that the culture of the company was characterised by a large “Power Distance” in the sense of Hofstede (Hofstede and Hofstede, 2005). Based on this assumption, the researcher identified three CSF for TQM implementation that might be in contradiction with the specific culture of the organisation (see paragraph 5.2.2). A high number of initiatives had been taken during the three periods of TQM implementation to reduce the “Power Distance”, in order for these three CSF’s to be at least partially met.

It is thus of interest to verify the veracity of the initial assumption, as well as a possible cultural change in regard to “Power Distance” over the last five years.

Hofstede (Hofstede and Hofstede, 2005) reports that he used three survey items for composing the power distance index:

“1 – Answers by non-managerial employees on the questions ‘How frequently, in your experience, does the following problem occur: employees being afraid to express disagreement with their manager?’

2 – Subordinates’ perception of their boss’s actual decision-making style (percentage choosing the description of either an autocratic or a paternalistic style, out of four possible styles)

3 – Subordinates’ preference for their boss’s decision-making style (percentage preferring an autocratic or a paternalistic style or, on the contrary, a style based on majority vote, but not a consultative style)”

In addition to these three items, the researcher decided to include an item relative to the employees’ perception of how frequently employees used to be afraid to express
disagreement with their manager five years ago, and their perception of their boss’s decision-making style five years ago. The aim of these two last items was to identify a possible modification of culture.

Regarding the two items relative to employees being afraid to express disagreements with their manager (current perception and perception of the situation five years ago), the answers of Senior Staff were excluded by the researcher, as Hofstede specifies that only answers from non-managerial employees should be considered. The following data were collected:

<table>
<thead>
<tr>
<th>How frequently, in your experience, do the following problems occur at present?</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>very frequently</td>
<td>frequently</td>
<td>sometimes</td>
<td>Seldom</td>
<td>very seldom</td>
</tr>
<tr>
<td>Employees being afraid to express disagreement with their manager</td>
<td>6.06%</td>
<td>18.18%</td>
<td>66.67%</td>
<td>3.03%</td>
</tr>
</tbody>
</table>

Table 72 Employees being afraid to express disagreement with their manager – Survey of 2005

<table>
<thead>
<tr>
<th>How frequently did they occur 5 years ago</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>very frequently</td>
<td>frequently</td>
<td>sometimes</td>
<td>Seldom</td>
<td>very seldom</td>
</tr>
<tr>
<td>Employees being afraid to express disagreement with their manager</td>
<td>6.67%</td>
<td>33.33%</td>
<td>44.33%</td>
<td>10.00%</td>
</tr>
</tbody>
</table>

Table 73 Employees being afraid to express disagreement with their manager five years ago – Survey of 2005

The first comment is that the obtained answers do indeed support the assumption of a large “Power Distance”, as a significant majority report that being afraid to express disagreement with their manager was not infrequent.

40% of the employees report that it happened frequently to very frequently five years ago, against 24% in 2005. This is consistent with a diminution of “Power Distance” over the last five years.
Table 74 Management style according to the 2005 survey

Remark: The descriptions of the managers are the ones provided by Hofstede (Hofstede, 2001). Manager 1 corresponds to an autocratic management style, and manager 2 to a paternalistic management style.

30% of the employees preferred an autocratic or paternalistic management style, and 32% considered that the style of their manager was either autocratic or paternalistic. Using these data, it is difficult to evaluate the Power Distance Index (Hofstede and Hofstede, 2005) specifies that it is calculated by “adding or subtracting the three scores after multiplying each with a fixed number, and finally adding another fixed number”). However, they appear to be consistent with a large “Power Distance”, especially considering that some employees might be afraid of reporting that their manager’s style is autocratic or paternalistic.

39% of the employees reported that their manager’s style was autocratic or paternalistic five years ago, against 32% for their present evaluation. This confirms the reduction of “Power Distance” in the organisation over the last five years.
9.2.3. Employees' perception of "Masculinity" in the organisation

The third aim of the survey was to assess the "Masculinity" within the organisation through Employees' perception, and to check whether it had evolved over the five past years.

The original assumption of the researcher was that the culture of the company was characterised by a strong "Masculinity" in the sense of Hofstede (Hofstede and Hofstede, 2005). Based on this assumption, the researcher identified two CSF for TQM implementation that might be in contradiction with the specific culture of the organisation (see paragraph 5.2.2). Initiatives had been taken during the three periods of TQM implementation to increase the "Feminity", in order for these two CSF to be at least partially met.

The survey had been elaborated based on Hofstede technique (Hofstede and Hofstede, 2005), who reports using four items for the masculine pole, and four for the feminine pole as follows:

"For the masculine pole

1. **Earnings**: have an opportunity for high earnings.
2. **Recognition**: get the recognition you deserve when you do a good job.
3. **Advancement**: have an opportunity for advancement to higher-level jobs.
4. **Challenge**: have challenging work to do – work from which you can get a personnel sense of accomplishment.

For the opposite, feminine pole

1. **Manager**: have a good working relationship with your direct superior.
2. **Cooperation**: work with people who cooperate well with one another.
3. **Living area**: live in an area desirable to you and your family.
4. **Employment security**: have the security that you will be able to work for your company as long as you want to.”

The results regarding the 2005 perception of Masculinity/Feminity were as follows:
In order to ease the analysis, the researcher replaced “is of utmost importance to me” answers with a 100% of importance, “is very important” with 75%, “is of moderate importance” with 50%, “is of little importance” with 25% and “is of little or no importance” with 0%.

The following averages were then calculated:

<table>
<thead>
<tr>
<th>Current importance (in 2005)</th>
<th>Feminine - Cooperation</th>
<th>Feminine - Manager</th>
<th>Masculine - Earnings</th>
<th>Masculine - Recognition</th>
<th>Feminine - Living area</th>
<th>Masculine - Challenge</th>
<th>Masculine - Advancement</th>
<th>Feminine - Employment security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current importance (in 2005)</td>
<td>85.64</td>
<td>85.11</td>
<td>85.11</td>
<td>84.24</td>
<td>82.45</td>
<td>82.45</td>
<td>75.53</td>
<td>70.11</td>
</tr>
</tbody>
</table>

Table 76 Current importance of Masculine and Feminine items - 2005 survey

An average of 81.83% of importance was obtained for masculine items, against 80.83% for feminine items. The difference between the two averages was minimal.

Employees had also been asked to evaluate how important these items were for them five years ago. The following averages were calculated:
Table 77 Importance of Masculine and Feminine items 5 years ago - 2005 survey

<table>
<thead>
<tr>
<th>Importance 5 years ago</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Feminine - Cooperation</td>
<td>84.78</td>
</tr>
<tr>
<td>Feminine - Manager</td>
<td>82.61</td>
</tr>
<tr>
<td>Masculine - Challenge</td>
<td>79.89</td>
</tr>
<tr>
<td>Masculine - Earnings</td>
<td>79.79</td>
</tr>
<tr>
<td>Masculine - Recognition</td>
<td>78.33</td>
</tr>
<tr>
<td>Feminine - Living area</td>
<td>75.56</td>
</tr>
<tr>
<td>Feminine - Employment security</td>
<td>70.74</td>
</tr>
<tr>
<td>Masculine - Advancement</td>
<td>70.74</td>
</tr>
</tbody>
</table>

An average of 77.19% of importance was obtained for masculine items, against 78.42% for feminine items.

This was in direct contradiction with the researcher’s initial assumption. According to the survey, not only the culture of the company five years ago was slightly more feminine than masculine, but the masculinity of the company had increased over the last five years.

There were two possible reasons for these surprising findings:

- Either the researcher (as well as several company’s high ranking managers) was wrong, and the company was not characterised, at the start of its TQM implementation project, by a high masculinity,
- or the survey results were not reflecting the actual Masculinity and Feminity of the organisation.

**Elements in favour of a high masculinity at the onset of the TQM implementation project**

The researcher’s initial assumption that the culture of the company was biased towards Masculine qualities, was not only backed up by discussions with high ranking employees in the company, but also by Hofstede (2001) masculinity index which was supposed to be further increased by the quasi-exclusivity of male employees in the organisation (Hofstede states that “from the most feminine to the most masculine country, the range of Masculinity Index scores for men is about 50 percent wider than the range for women” (Hofstede and Hofstede, 2005)).
1. Verifying the Masculinity bias culture using the scores of the Abu Dhabi industrial sector in the SKIA

A possible element of verification would be to check the results of the Abu Dhabi industrial sector in the SKIA, on the two items influenced by a high masculinity: Business Environment and Employee Management. Assuming that the company’s culture at the onset of the TQM implementation project shared its cultural identity with the Abu Dhabi industrial sector at large, an overall low ranking in the Business Environment and Employee Management categories would back up the researcher assumption of a “Masculine” oriented culture.

In the 1999 round of participation in the SKIA, the lower scoring enabler category was “Business Environment”, followed by “People Management”.

In 2000, the lowest scoring enabler category was “Human Resources” followed by “Business Environment”.

In 2001, the lowest scoring enabler category was also “Human Resources” followed by “Business Environment”.

Finally, in 2003, the lowest scoring category was “Resource Management” (revised model proposed by the SKIA).

There is a high probability that the low scores recorded in Business Environment and People Management might partly be the result of high Masculinity culture in the Abu Dhabi industrial sector, although a large Power Distance culture also influences negatively the “Human Resources” category.

The average scores obtained by the Abu Dhabi Industrial sector in the two categories that are negatively influenced by a high “Masculinity”, are consistent with the initial assumption of the researcher that the company’s culture was more “Masculine” than “Feminine” at the onset of the TQM implementation project.
2. Examining the high scoring feminine items, in the light of the company’s characteristics.

Two “feminine” items are scoring particularly high in the 2005 survey: “Have a good working relationship with your manager” and “Work with people who cooperate well with one another”.

Regarding the first of these items, it is logical that in a large “Power Distance” culture, employees wish strongly to have good relationships with their manager. After all, the manager has a great deal of influence over their future, as he takes autocratic decisions concerning his subordinates. However, if the high “Power Distance” may explain the high score of the “Feminine – Manager” item, one would expect that its importance would reduce when the “Power Distance” reduces. However, this item appeared to be stable over time (it accounts for 13.25% of overall items “five years ago”, and for 13.08% in the 2005 “current” estimation).

In an organisation were the communication system is not very effective, employees may attribute a higher importance to good cooperation with one another, which could explain the high score of the “Cooperation” item.

Both items might also be influenced by the fact that employees work in average between 10 to 11 hours per day, 6 days a week. A friendly working environment is therefore of the highest importance.

3. Reviewing the characteristics of a feminine workplace.

In paragraph 5.2.2, the researcher had examined the “Masculine” characteristics of a workplace according to Hofstede (Hofstede and Hofstede, 2005), and uncovered that many of these were present in the organisation under study. If the researcher had made a mistake in her original assumption of a high “Masculine” culture, and if in fact the company was more, or as much, “Feminine” than “Masculine”, one should be able to recognise that the company matched several of the “Feminine” characteristics proposed by Hofstede.
Feminine characteristics in the workplace, according to Hofstede and Hofstede (2005) | Characteristics of the company under study
---|---
Management as ménage: intuition and consensus | False. The management style of the organisation was not characterised by a reliance on consensus. Regarding "intuition", it is harder to evaluate
Resolution of conflicts by compromise and negotiation | False. Compromise and negotiation was felt as a weakness, particularly in management.
Rewards are based on equality | False. Rewards were based on performance, not on requirements
Preference for smaller organisations | This item is difficult to judge
People work in order to live | This is true in the sense that employees work in order to allow their relatives to live. They are ready to accept harsh living conditions and hard work for themselves, in order to improve the lives of their families back home.
More leisure time is preferred over more money | False. Employees are ready to have next to no leisure time if it allows them to send more money back home
Careers are optional for both genders | False. In both the Arab and Asia cultures, careers are compulsory for men
There is a higher share of working women in professional jobs | False (3 women for 1300 men)
Humanisation of work by job contact and cooperation | True. According to the answers to the survey, it appears that job contact and cooperation are important.
Competitive agriculture and service industries | 

Table 78 Comparison between the Feminine characteristics in the workplace, according to Hofstede, and the company's characteristics

Apart from "Humanisation of work by job contact and cooperation" and partially from "People work in order to live" other elements are either inconclusive or false, while five "Masculine" characteristics were strongly conclusive.

In view of the three above mentioned considerations (overall scores in the SKIA for the Abu Dhabi industry, review of the two high scoring items, and low match with feminine characteristics), there is a high probability that the culture or the organisation at the onset of its TQM implementation programme was more "Masculine" than what was measured through the 2005 survey. This discrepancy might result from:

- Questionnaire items might be influenced by other characteristics of the company independently of "Masculinity/Feminity" aspect.
Employees might be influenced in their answers by the campaign carried out by the company over the last 5 years to promote “Feminine” characteristics, and might have a low recollection of what was the Masculine/Feminine culture prevailing in the organisation five years ago.

### 9.2.4. Internal perception of TQM initiatives

In 2005, the researcher compiled a list of 59 initiatives taken over the last five years, in view of implementing TQM principles. Recently introduced initiatives were not included in the list, nor initiatives limited to a specific department, and having limited repercussions on the performance of other departments. The selected items were as follows:

<table>
<thead>
<tr>
<th>Initiative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual review of Mission and Vision statements</td>
</tr>
<tr>
<td>Regular review of Quality Policy statements</td>
</tr>
<tr>
<td>Annual update of the Strategic Plan through a defined process</td>
</tr>
<tr>
<td>Increased Employee Participation in the elaboration of Strategic Objectives</td>
</tr>
<tr>
<td>Defined Strategic Plan deployment process and Regular review on progresses</td>
</tr>
<tr>
<td>Regular review of Key performance indicators</td>
</tr>
<tr>
<td>Continual improvement objectives defined for each process</td>
</tr>
<tr>
<td>Balanced Scorecard used to grasp the Company’s overall performance</td>
</tr>
<tr>
<td>Annual review of the organisation chart</td>
</tr>
<tr>
<td>Annual review of role, responsibility and job description of key Employees</td>
</tr>
<tr>
<td>Training Survey &amp; Programme</td>
</tr>
<tr>
<td>Evaluation of Training Effectiveness</td>
</tr>
<tr>
<td>Regular Staff meetings (RSC; OST...)</td>
</tr>
<tr>
<td>Job Satisfaction Surveys and Employee Surveys</td>
</tr>
<tr>
<td>Suggestion Competition</td>
</tr>
<tr>
<td>Suggestion Boxes</td>
</tr>
<tr>
<td>Magazine and articles circulation</td>
</tr>
<tr>
<td>Improved Inter-departmental Communication</td>
</tr>
<tr>
<td>Increased multi-departmental team working</td>
</tr>
<tr>
<td>Improved involvement/empowerment of the workforce</td>
</tr>
<tr>
<td>Team building activities (such as Raft race, Appreciation day, Bowling day, etc)</td>
</tr>
<tr>
<td>Hiring policy giving priority to Employees’ family</td>
</tr>
<tr>
<td>Social activities for the workforce</td>
</tr>
<tr>
<td>Salaries paid on time</td>
</tr>
<tr>
<td>Annual Appraisal of employee performance</td>
</tr>
<tr>
<td>Bonus sharing</td>
</tr>
<tr>
<td>Increased utilisation of contract work</td>
</tr>
<tr>
<td>Medical clinic in the labour camps</td>
</tr>
<tr>
<td>Procedure set in place for solidarity among employees (fund collection)</td>
</tr>
<tr>
<td>Regular Safety reviews and improvements</td>
</tr>
<tr>
<td>Safety Representatives</td>
</tr>
<tr>
<td>Housekeeping evaluation</td>
</tr>
<tr>
<td>Reviewing processes using flow-charting</td>
</tr>
<tr>
<td>Improved Departmental measures of processes performance</td>
</tr>
<tr>
<td>Emergence of Value Engineering and Partnering</td>
</tr>
<tr>
<td>Improved Clarification of Contractual Specification</td>
</tr>
</tbody>
</table>
Daniel Seraphim – Ph.D.

<table>
<thead>
<tr>
<th>Improved IT Integration</th>
<th>Generalisation of Recruitment tests</th>
<th>Improvements in Planning Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detail accounting provisions for the year</td>
<td>Hollowcore Quality Improvement (through X-Tec training etc)</td>
<td>Quality Control Department independent from the production processes</td>
</tr>
<tr>
<td>Increased Quality Prevention activities performed by the Quality Control team</td>
<td>Non-Conformances and actions to prevent recurrence openly discussed</td>
<td>Customer Satisfaction Survey used to analyse satisfaction and benchmark processes</td>
</tr>
<tr>
<td>Increased Internal benchmarking (comparisons between departments/processes performance)</td>
<td>Improved knowledge of Manpower productivity</td>
<td>Updates on the Quality System using feedback on audits</td>
</tr>
<tr>
<td>Quality Documentation reflecting the actual situation of the Company</td>
<td>Improved assessment of Failure cost (NCR analyses)</td>
<td>Market Share, Market Size and Competitor Pricing Analyses</td>
</tr>
<tr>
<td>Increasingly basing investments on feasibility studies</td>
<td>Increased research on state-of-the art facilities</td>
<td>Employee involvement in cause related initiatives</td>
</tr>
<tr>
<td>Participation in construction exhibition</td>
<td>Improved relations with Suppliers</td>
<td>Student Summer Training</td>
</tr>
<tr>
<td>Company’s WEB Site</td>
<td>Improved marketing tools (brochures, promotional films etc)</td>
<td></td>
</tr>
</tbody>
</table>

Table 79 List of initiatives sent for assessment to twelve high ranking employees

This list was send to twelve high ranking employees who were asked whether or not they were aware of these initiatives (Yes/No), whether they believed that they required further improvements (Yes/No), to evaluate the importance of each item (using a scale from 1 to 5), and to rate the improvement (if any) achieved by the company over the last five years in the considered items (using a scale from 1 to 5).

The answers were then converted to percentages ("Not at all" answer = 0%, “A great deal” = 100%, etc).

The average of Importance over the 59 initiative was 76.05%, and the average of improvement was 58.66%.

18 improvement initiatives rated 80% or above in terms of importance:

<table>
<thead>
<tr>
<th>Initiatives</th>
<th>Importance</th>
<th>Improvement over the last 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed accounting provisions for the year</td>
<td>93.18</td>
<td>75.00</td>
</tr>
<tr>
<td>Hollowcore Quality Improvement (through X-Tec training etc)</td>
<td>91.67</td>
<td>64.58</td>
</tr>
<tr>
<td>Annual update of the Strategic Plan through a defined process</td>
<td>91.67</td>
<td>83.33</td>
</tr>
<tr>
<td>Increased multi-departmental team working</td>
<td>87.50</td>
<td>58.33</td>
</tr>
<tr>
<td>Improved Inter-departmental Communication</td>
<td>87.50</td>
<td>64.58</td>
</tr>
</tbody>
</table>
Among the 18 higher ranking initiatives in terms of importance,

- 5 were relative to internal Communication (Multi-departmental team working, Inter-departmental communication, Non-Conformances and actions to prevent recurrence openly discussed, Updates on the Quality System using feedbacks on audits, Regular Staff meetings),

- 5 were relative to the Measuring System (Detailed accounting previsions, Strategic Plan, Manpower productivity, Assessment of failure cost, Market Share, Market Size and Competitor Pricing Analyses),

- 4 were relative to Employee well being (Annual appraisal of employee performance, Salaries paid on time, Bonus sharing, Regular Safety reviews and improvements),

- 4 were relative to process improvements (Hollowcore Quality Improvement, Annual update of the Strategic Plan through a defined process, Updates on the Quality System using feedback on audits, Improvements in planning activities),

- 3 were relative to the maintenance and improvement of the ISO Quality System (Non-Conformances and actions to prevent recurrence openly discussed, Updates on the Quality System using feedback on audits, Improved assessment of Failure cost).

Among these 18 initiatives, it was estimated that the company improved below average on “Regular Safety reviews and improvements”, “Improvements in Planning Activities,”...
"Increased knowledge of Manpower productivity", "Market Share, Market Size and Competitor Pricing Analyses", and "Increased multi-departmental team working". The remaining 13 items have progressed more than the average improvements over the 59 initiatives.

When considering initiatives scoring 70% or below on the importance criterion, the following list can be compiled:

<table>
<thead>
<tr>
<th>Initiatives</th>
<th>Importance</th>
<th>Improvement over the last 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social activities for the workforce</td>
<td>60.42</td>
<td>53.33</td>
</tr>
<tr>
<td>Student Summer Training</td>
<td>62.50</td>
<td>54.17</td>
</tr>
<tr>
<td>Employee involvement in cause related initiatives</td>
<td>63.89</td>
<td>41.67</td>
</tr>
<tr>
<td>Evaluation of Training Effectiveness</td>
<td>64.58</td>
<td>31.25</td>
</tr>
<tr>
<td>Emergence of Value Engineering and Partnering</td>
<td>65.91</td>
<td>38.64</td>
</tr>
<tr>
<td>Housekeeping evaluation</td>
<td>65.91</td>
<td>52.27</td>
</tr>
<tr>
<td>Medical clinic in the labour camps</td>
<td>65.91</td>
<td>32.50</td>
</tr>
<tr>
<td>Reviewing processes using flow-charting</td>
<td>66.67</td>
<td>47.92</td>
</tr>
<tr>
<td>Suggestion Boxes</td>
<td>66.67</td>
<td>45.83</td>
</tr>
<tr>
<td>Improved involvement/empowerment of the workforce</td>
<td>68.18</td>
<td>45.45</td>
</tr>
<tr>
<td>Annual review of role, responsibility and job description of key Employees</td>
<td>68.75</td>
<td>62.50</td>
</tr>
<tr>
<td>Procedure set in place for solidarity among employees (fund collection)</td>
<td>68.75</td>
<td>52.08</td>
</tr>
</tbody>
</table>

Table 81 Improvement initiatives rates 70% or below in term of importance – 2005 survey

Among the 12 lower ranking initiatives in terms of importance,

- 4 are relative to care for the employees’ well-being (Social activities for the workforce, Housekeeping evaluation, Medical clinic in the labour camps, Procedure set in place for solidarity among employees (fund collection)),

- 3 additional ones are relative to employees’ participation, involvement and empowerment (Employee involvement in cause related initiatives, Suggestion Boxes, Improved involvement/empowerment of the workforce), which brings to 7 initiatives linked to Employee Management,

- 2 are relative to the measuring system (Evaluation of Training Effectiveness, Housekeeping evaluation).

Among the 12 items considered, 11 are below average in term of improvement.
When considering items having 25% or more gap between importance and improvements over the last five years, the following list is obtained:

<table>
<thead>
<tr>
<th>Initiatives</th>
<th>Importance - Improvement</th>
<th>Importance</th>
<th>Improvement over the last 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company's WEB Site</td>
<td>43.75</td>
<td>75.00</td>
<td>31.25</td>
</tr>
<tr>
<td>Regular Safety reviews and improvements</td>
<td>37.50</td>
<td>81.25</td>
<td>43.75</td>
</tr>
<tr>
<td>Medical clinic in the labour camps</td>
<td>37.50</td>
<td>65.91</td>
<td>32.50</td>
</tr>
<tr>
<td>Evaluation of Training Effectiveness</td>
<td>33.33</td>
<td>64.58</td>
<td>31.25</td>
</tr>
<tr>
<td>Safety Representatives</td>
<td>31.82</td>
<td>79.55</td>
<td>47.73</td>
</tr>
<tr>
<td>Training Survey &amp; Programme</td>
<td>31.25</td>
<td>77.08</td>
<td>45.83</td>
</tr>
<tr>
<td>Improvements in Planning Activities</td>
<td>31.25</td>
<td>83.33</td>
<td>52.08</td>
</tr>
<tr>
<td>Improved IT Integration</td>
<td>31.25</td>
<td>75.00</td>
<td>43.75</td>
</tr>
<tr>
<td>Generalisation of Recruitment tests</td>
<td>29.55</td>
<td>72.73</td>
<td>43.18</td>
</tr>
<tr>
<td>Increased multi-departmental team working</td>
<td>29.17</td>
<td>87.50</td>
<td>58.33</td>
</tr>
<tr>
<td>Increased knowledge of Manpower productivity</td>
<td>29.17</td>
<td>83.33</td>
<td>54.17</td>
</tr>
<tr>
<td>Emergence of Value Engineering and Partnering</td>
<td>27.27</td>
<td>65.91</td>
<td>38.64</td>
</tr>
<tr>
<td>Suggestion Competition</td>
<td>27.08</td>
<td>72.92</td>
<td>45.83</td>
</tr>
<tr>
<td>Increased research on state-of-the-art facilities</td>
<td>27.08</td>
<td>72.92</td>
<td>45.83</td>
</tr>
<tr>
<td>Improved relations with Suppliers</td>
<td>27.08</td>
<td>77.08</td>
<td>50.00</td>
</tr>
<tr>
<td>Hollowcore Quality Improvement (through X-Tec training etc)</td>
<td>27.08</td>
<td>91.67</td>
<td>64.58</td>
</tr>
<tr>
<td>Market Share, Market Size and Competitor Pricing Analyses</td>
<td>25.00</td>
<td>81.25</td>
<td>56.25</td>
</tr>
<tr>
<td>Increased Internal benchmarking (comparisons between departments/processes performance)</td>
<td>25.00</td>
<td>70.45</td>
<td>45.45</td>
</tr>
</tbody>
</table>

Table 82 Improvement initiatives having a 25% or above gap between importance and improvement over the last 5 years – 2005 survey

Among the 18 initiatives having the wider gap between importance and improvements,

- 6 were in the highest importance list, which means that the progress of these items was thought unsatisfactory (“Regular Safety reviews and improvements”, “Improvements in Planning Activities”, “Increased multi-departmental team working”, “Increased knowledge of Manpower productivity”, “Hollowcore Quality Improvement”, “Market Share, Market Size and Competitor Pricing Analyses”),

- 3 were in the lowest importance list, which means that as these items were thought to be of reduced importance, only minimal improvements were achieved in their regard (“Medical clinic in the labour camps”, “Evaluation of Training Effectiveness”, “Emergence of Value Engineering and Partnering”),

- 8 items were relative to Employee Management, among which 3 were relative to care for Employee well-being (“Medical clinic in the labour camps”, “Regular Safety reviews and improvements”, “Safety Representatives”). 2 to Training
Daniele Seraphim – Ph.D.

("Training Survey & Programme", "Evaluation of Training Effectiveness"), 2 to communication, participation and involvement ("Increased multi-departmental team working", "Suggestion Competition"),

5 were relative to the Measuring System ("Evaluation of Training Effectiveness", "Improved IT Integration", "Increased knowledge of Manpower productivity", "Market Share, Market Size and Competitor Pricing Analyses", "Increased Internal benchmarking"),

2 were relative to IT ("Company's WEB Site", "Improved IT Integration").

This survey confirms the central place of Employee Management in the organisation: 9 initiatives among the 18 most important ones, 7 initiatives among the 12 lowest important ones, and 8 initiatives among the 18 ones with the widest gap between importance and improvements over the last 5 years, were relative to Employee Management.

When grouping initiatives in categories (some items are placed in several categories), the following averages on improvements over the last 5 years are obtained:

- Strategy: 69.58% of improvement over 5 years
- ISO Quality system: 64.82%
- Product Quality: 64.02%
- Measurement & Analysis: 59.34%
- Process Management: 57.45%
- Human Resources: 57.39%
- Research & Development: 55.87%
- Concern for Society: 53.82%

Although all categories have significantly progressed, the "Concern for Society" category has progressed the less, followed by "Research & Development", "Human Resources" and "Process Management". "Product Quality" and "ISO Quality system" are showing a good progression, and "Strategy" the highest progression of all.

This matches the researcher's perception of the company's progresses:
Daniele Seraphim – Ph.D.

“Concern for Society” had been identified as possibly in conflict with the company’s culture. Progresses on this category had been steady but limited in scope.

Progresses on “Research & Development” and on “Process Management” took place mainly during the last period, which explains that employees are reporting limited improvements in these categories so far.

“Human Resources” is the second category which was identified as possibly in conflict with the company’s culture. Although the company deployed considerable efforts to progress on this category over the three periods, the improvements were slow because of cultural difficulties.

The researcher’s perception matches the survey results concerning good progresses in the “Product Quality” and “ISO Quality system” categories, and excellent improvements in the “Strategy”.

The result of the survey should be used by the management to set its improvement priorities for the future:

- The six initiatives with high importance and wide gap between importance and improvements over the last five years should certainly be selected as strategic objectives.

- Other initiatives with wide gap between importance and improvements and medium importance (“Company’s WEB Site”, “Safety Representatives”, “Training Survey & Programme”, “Improved IT Integration”, “Generalisation of Recruitment tests”, “Suggestion Competition”, “Increased research on state-of-the art facilities”, “Improved relations with Suppliers”, “Increased Internal benchmarking”) should be considered for further improvement.

- Finally, initiatives with wide gap and low importance should be examined carefully. It is possible that the low importance attributed by the management is the result of the lack of success of the company in improving on these items. This possibility is consistent with the fact that among the 12 lowest ranking initiatives in term of importance, 11 are below average in term of improvement. Thus, employees had a biased view of their importance based on the following reasoning:
“it is not important because it does not work”, which might be misleading. The management should review these items, and take a decision about whether or not to pursue improvement efforts.

The improvement strategy of the organisation should not only be based on pursuing the above mentioned initiatives, but also on introducing new additional improvement initiatives, including those started during the last period, and new ones identified through literature review.

9.3. **External assessment of the company progresses**

9.3.1. **Presentation of the Sheikh Khalifa Industry award for Total Quality Management**

9.3.1.1. **What is the Sheikh Khalifa Industry Award?**

The Sheikh Khalifa Industry Award is a regional award for Total Quality Management, dedicated to the improvement in quality and efficiency of the Abu Dhabi Emirate’s industrial sector.

It was established in 1997 by a decree of the Executive Council. It is the oldest Abu Dhabi award, and the only one in the UAE specifically designed for the industrial sector.

Any factory based in the Abu Dhabi Emirate can enter the scheme free of charge. Award assessors are full time professionals, and are auditing all participants.

It provides critical external assessments to the participants, highlighting both strengths and weaknesses, and drives them to set objectives for improvements. This proved successful, as most of the 70 factories which participated in this award by 2003, have shown significant improvements, as measured by the award body itself (documentation provided by the SKIA).

The award is aligned with the principles of Total Quality, as it seeks to improve the satisfactions of all stakeholders: customers, employees, owners, suppliers and the Abu Dhabi society.

The award model has varied over the years, as described in paragraph 9.3.1.3, but the above mentioned characteristics have remained valid.
9.3.1.2. Its mission and vision

As presented by the award body, its mission “is to promote the development of the industrial sector of the Abu Dhabi Emirate. It seeks to achieve this by encouraging management to adopt Total Quality Management principles and to work to World Class Standards.” (Documentation provided by the SKIA).

Its vision is:

- To be recognised throughout the industrial sector of Abu Dhabi as providing a professional award programme to international standards that adds value to their operations.
- To be accepted in the GCC countries and beyond as being a valid indicator of the performance of participating companies to international standards.”

Its regional and sectorial identity is best illustrated by HH Sheikh Khalifa Bin Zayed Al Nahyan in the Sponsor’s message: “Our primary concern is to widen the sources of our national income. The best way for us to do this is through the optimum use of our natural resources and the development of a diverse and sustainable industrial base. This approach will ensure growth for our economy and the prosperity of our future generations. We must therefore utilise our natural resources and continue sound industrial development to the best of our ability.”

9.3.1.3. The assessment model

The SKIA has evolved over time. According to the documentation provided by the SKIA, it has been first developed using European and USA standards and similar awards, and has adapted them to the UAE and Abu Dhabi contexts.

Its evolution over time will be studied according to the time base of the case studies, from 1999 to 2003 onwards. Three main stages can be highlighted: The model as on 1999, the model from 2000 to 2002, and the one from 2003 onwards.

Although the details of the award model have evolved over time, its principles as described in the previous paragraphs did not change. Thus, from the point of view of a company having participated in the award from its early days, the coherence of expectations is fully
respected over the years, and improvements according to one model are reflected in the following models.

9.3.1.3.1. The 1999 model

The 1999 Award Criteria are as follows:

- Implementing Strategy
- Leadership
- Business Environment
- Use of Information
- Sheikh Khalifa Industry Award
- Customer & Market Focus
- Human Resources
- Business Results
- Process Management

Figure 79 Model used by the SKJA in 1999

The weightings of the scores between criteria are not given to the participants, and are said to “be reviewed by the judges to consider the relative priorities in Abu Dhabi Emirate of the issues involved” (documentation provided by the SKJA).

In 1999, for the first time, a simplified scheme for “emerging factories that have only recently started on the path to Total Quality” is proposed.

The award process is based on interactions and exchanges between the companies and the professional full-time assessors of the award:

- Initial self-assessment by the company, forwarded to the SKIA.
- First visit of the SKIA assessors.
- Performance questionnaire filled by the company and forwarded to the SKIA.
- Feedback report prepared by the SKIA and forwarded to the company.
The company prepares two action plans based on the feedback report, and forwards them to the SKIA.

Second visit from the SKIA to check the figures of the performance report, and verify progresses on Action Plans.

SKIA evaluates performances using a computer analysis programme, and announces Bronze, Silver, Gold and Diamond winners.

Thus, interactions between participants and assessors are multiple, spread over time, and provide numerous opportunities for learning.

It may be noted that the results of the development and implementation of the action plans are not considered in a separate criterion, but incorporated in the business results criterion.

9.3.1.3.2. From 2000 to 2002

The model used from 2000 to 2002 is as follows:

![Abu Dhabi Business Environment Diagram](image)

Figure 80 Model used by the SKIA from 2000 to 2002

Percentages per criterion are not provided, except for the “Business Results” “Action Plans” ones, which amounts for 27% and 10% of the overall score respectively.
It can be noted that the same categories are proposed, except that the "Action Plans" is now a category of its own, separate from the "Business Results" category. Inter-relations between categories are highlighted.

Overall, the presentation of the model is closer to the Malcolm Baldridge or the EFQM one.

The “Business environment” category takes into consideration regional issues. It is described as follows in the document provided by the SKIA:

“The government of Abu Dhabi has defined clear criteria for the development of the industrial sector. These include protecting the overall environment, working with the community, employing UAE nationals, using of “state of the art” technology, exporting and using local suppliers. Each factory’s performance in meeting these criteria is considered during the Award process.”

Other categories are closer to the ones proposed by the main international awards. For example, the Leadership category is described as follows:

“Total Quality starts with the actions of the leaders of a factory. These are the people in a factory who coordinate and balance the interests of all parties involved in the factory activities. The leaders will usually include the owners, partners, directors and managers. In each factory there must be a group of people who give leadership; without leadership the factory will drift like a ship tossed by the sea.

In World Class Factories leaders develop the mission, vision and values of the factory. They decide the reason of the factory’s existence and where it is going. They decide how the members of the factory behave and set the example for all.

In World Class Factories the leaders are personally involved in ensuring the management system is developed, implemented and continually improved. They ensure that the processes of the factory are suitable for its needs, are understood at all levels and are followed.”

The importance of the “Use of information” category reminds more of the Malcolm Baldridge award then the EFQM one.
Results are not divided in categories as in the EFQM model, but considered as a whole in the “Business Results” category.

Finally, one can note the importance of the “Action Plans” category. Evaluating such category requires in-depth follow up and interactions with the participants, which is provided by the SKIA but would be more difficult for major awards, in which the number of visits are limited (generally one visit limited to high performing companies only).

The process of the award is similar to the previous one, except for the self-assessment part which has been developed and improved. The award body proposes the following process to complete the self-assessment:

1. The self-assessment should be completed as a group exercise with representatives selected for their involvement with the specific criteria. For instance the Customer and Market Focus self assessment should include sales staff. Human Resources should include employee representatives.

2. Obtain the self-assessment unit and make copies for all representatives.

3. Examine the first topic and discuss what the factory is doing with respect to that issue. During this discussion it is important to consider what evidence is available. Record the current position and indicate the evidence on the self-assessment.

4. Examine the benchmarks with respect to that issue and work down from the top until you find a statement which best describes your current position. (Score 1,3,5,7) If you consider your position is slightly in advance of the statement, then you should score one point higher. (Score 2,4 or 6) The score should be based on the decision of the group and consensus is important. Relate your score to the evidence you have indicated.

5. Record your findings on the internet and return them to the GIC.

6. Continue until all of the self-assessment packs have been completed."

For an example of self-assessment questionnaire, please refer to paragraph 4.4.16.2. The benchmarks provided in the scoring are based on the following logic:
A score of 1 corresponds to the absence of evidence of actions for the item considered.

A score of 3 corresponds to available evidence that remedial action is being taken (i.e. when a problem occurs it is fixed), for the item considered.

A score of 5 corresponds to available evidence that corrective actions are in place (i.e. when problems have occurred systems have been designed to ensure that they cannot recur).

A score of 7 requires evidence of preventive action: At the planning stage risk analysis has been done to anticipate problems; Contingency plans are in place; Targets are set with respect to the criteria and the system monitors performance against the targets and action is taken.

Once the self-assessment questionnaires completed, all factories are visited by the Auditors. Following these initial audits, a feedback report is sent to all participant, providing assessments on the enablers criteria, and asking them to set at least two improvement action plans. A number of possible action plans are suggested by the award body, based on low scoring items in each category, providing further advice to the participants. They are also asked to fill Performance Questionnaires with data over three years.

A few months later, a second visit is scheduled, examining the progresses on the current year and previous years Action Plans, and checking performance data. A complementory report is then sent to the company.

Then, Senior auditors from the SKIA perform calculations using a comprehensive software, and present the results of the audits and their findings to a panel of Judges, who grant Bronze, Silver, Gold and Diamond awards to factories demonstrating “commitment”, “advancement”, “overall achievement” or “performance above all others” respectively.

2.3.1.3.3. The 2003 model

The main innovation in the 2003 onwards model is that the SKIA has adopted the ISO 9004:2000 model as the basis to its assessment process. This change was made in order to benefit from the following advantages: Internationally recognised standard; Same format
as ISO 9001:2000; Process-based model; Criteria-based awards; Recognition for certificates.

The SKIA body clarifies that both ISO 9001:2000 and ISO 9004:2000 international standards “have been used as a base for the criteria for the Silver and Gold award levels. At both these levels there are extra requirements related to society, the environment, and health and safety.” It adds that “the criteria have been carefully developed to suit companies in the manufacturing sector of the UAE. Many are specific to such companies, others are more universally applicable, but all are pragmatic and based on experience of what works well in successful companies.” (Documentation provided by the SKIA).

Another innovation is that the Bronze and Silver levels of the award are benefiting from a less time-consuming answering process, based on Yes/No answers to a precise list of items. Gold participants must first successfully pass the Silver level, and then complete a more time-consuming self-assessment, based on the four criteria described below.
Figure 8.1 Model used by the SK1A in 2003

There are four sections in the model:

- Management responsibility, which includes many of the issues in the Leadership and Strategic Planning sections of the old award model.

- Resource management, which includes many of the issues in the Human Resources, Strategic Planning and Business Environment sections of the old award model.

- Process management (or Product realisation), which includes many of the issues in the Customer Focus and Process Management sections of the old model.

- Measurement, analysis and improvement, which includes many of the issues in the Use of Information and Process Management sections of the old model.
Results are integrated in each of these four categories, and are no longer a separate criterion.

It is based on the eight principles of the ISO 9004:2000 standards:

1. Customer focus
2. Leadership
3. Employee involvement
4. Process approach
5. System approach to management
6. Continual improvement
7. Factual approach to decision making
8. Mutually beneficial supplier arrangements.

This new model differs greatly in its presentation from the internationally renowned models for Total Quality, in the fact that it is based on the ISO 9000:2000 international standard.

The audit process for the gold level includes even more interactions with the award body than the old process, as it includes an initial visit for the silver level, a second Silver level visit which is performed both by the award auditors and by representatives of an ISO certification body, and a Gold level visit.

It may be noted that companies winning a Silver, Gold or Diamond award are automatically entitled to ISO 9001:2000 certification, which cost is entirely taken over by the SKIA. This is possible because accredited ISO auditors from accredited certification body accompany the SKIA auditors on the final visit at the Silver level and confirm that all of the Silver level criteria that form part of the ISO 9001:2000 have been achieved and that overall the participant fulfils the requirements if ISO 9001:2000 (see paragraph 4.4.23.2).

9.3.1.4. Comparison with other TOM awards

As seen in the previous paragraph, if the 2000-2002 model is very similar to the traditional international awards such as the Malcolm Baldrige or the EFQM one, the 2003 model is very original in its desire to be aligned with the ISO 9004:2000 requirements.

The fact that participants to the awards are limited to Abu Dhabi based industries, allows the award body to have requirements much more specific than an international award in
which any type of organisation (whether private or public) can apply. For example, a question such as “What support does your company give to UAE Nationals?” could not be considered in an international award.

One of the major strengths of the SKIA is the important interaction between the award body and the participants. For example, during its 2003 participation, the company benefited from four days of visits from the SKIA assessors. This enables the award body to follow up better on the participants’ progresses, and motivates the companies to continually improve.

Unlike the European award, for example, the SKIA assessors are full-time professionals, and not external individuals having received training and who are auditing at best a few organisations per year. This has several advantages: First of all, it eases comparisons between the companies’ performance, as it is the same assessors who are visiting all participants. It also helps the award body to evaluate the progress of the participants when they have participated more than once. Some of the criteria are even taking into consideration progress on the previous year, such as the “Action Plans” one, in which progresses are examined for several years. In the EFQM model, in contrario, assessors are given neither the feedback reports nor the obtained scores of audited companies who participated in the scheme during previous years. As one of the main principles of TQM is continual improvement, this additional knowledge about participants is very relevant.

Another difference with traditional awards is that the SKIA provides more advice to its participants. On the contrary, assessors of the EFQM model are asked not to give any “consultation” advices, and not to include in their feedback reports suggestions about what the company should improve. On the other hand, the SKIA provides clear knowledge to its participants about what is expected from them. For example, if a participant answers “No” to the Bronze level item “Are all inflammable materials stored to minimise risk of fire?”, it immediately knows which improvement is possible.

At the Gold level, the benchmarks which are provided for each of the 160 items are also very useful, as they provide a guided way to reach a World Class level. The participants are left with no incertitude about what is required from them in order to achieve a specific level for each item. This characteristic, apart from facilitating gap analyses for participants, reduces the part of subjectivity in the assessment (see paragraph 8.2.16.2). It is a marked
difference with other Quality Awards, in which the scoring is largely subjective and depends on what the examiners consider best practice.

Unlike in most of the renowned awards, participation in the SKIA is free of charge. It is established by law and is entirely supported by government funds. This factor which is of little importance to well-established successful companies may be of major importance to organisations in financial difficulties and to small companies. For example, it is doubtful that the company studied would have participated in the 2001-2002 award due to its temporary financial difficulties, if the participation had not been free of charge. However, this participation was useful for the company, as it greatly helped its recovery. From 2003, companies are further encouraged to participate, as they receive a free of charge ISO 9001:2000 certification if they reach the Gold level.

With the new model, participation in the Bronze and Silver levels of the SKIA is not time-consuming any longer, as it consists in answering Yes or No to a number of questions. As seen earlier, gap analyses are very easy, as the questions are clear and well-defined. However, participation in the Gold Level remains a time consuming exercise, if less so than the writing of a 70 page application as in the EFQM award. This is particularly true in a country where many employees are facing difficulties with long written dissertations. In the SKIA, a gold level application of low written quality will not influence as much the scoring, due to the high number of interactions with the SKIA assessors during which employees are given the opportunity to express themselves verbally, in English or in Arabic.

9.3.1.5. **Benefits of participation in the SKIA**

9.3.1.5.1. **Benefits from the company’s view point**

It is undeniable that the SKIA has been a key element in the company’s recovery and current success. It provided several factors that were used by the company to progress:

- During a financial crisis situation, it provided direction to the company. At a time where all shareholders were at a loss about improvements required to overcome the crisis, the SKIA recommendations had been used to mark the way to progress.

- The company used the external knowledge provided by the SKIA about its performance, to mobilise all the organisation’s forces towards a common
improvement goal. From shareholders to Top Management and to every single employee, all agreed that changes were required and were ready to use the advices of the SKIA in this regard.

The SKIA was a real partner throughout the improvement road, through in-depth and regular interactions with the company. It provided measurement of the current performance, measurement of the progress, as well as recommendations about areas in which progress was required. Possible improvements were identified both through direct recommendations by the SKIA, and through self-assessment during participation. It also encouraged the company to go beyond the award scheme itself, to research TQM best practices, and to identify further possible improvements from this research.

The awards received by the company were a tangible way to assess its progress, and to share its success. The sense of recognition was strongly felt by all employees and strengthened the feeling of belonging as well as the knowledge that everyone’s efforts were successful and recognised even outside the organisation.

If the company found in the SKIA a key partner that helped it progress, do other participants in this scheme benefit in the same way from their participation?

9.3.1.2. Assessing benefits for the Abu Dhabi Industrial sector

Reports from the SKIA are demonstrating that overall, participants in the scheme benefited from their involvement.

This is reflected by the notes of gratitude to the SKIA, given by the participants. A few of them are reported hereafter:

“One of the advantages of entering the H.H. Sheikh Khalifa Industry Award is that it provided additional motivation to our staff at all levels to have pride in what they do. This resulted in increased efficiency, improved product quality and of course achieving the Gold Standard. The purpose of the Award is to encourage Companies to improve their professionalism across the full ranges of business disciplines. The most important aspect of the Award is the content of the assessment report as this provides an independent view of the company’s strengths and weaknesses and
Daniele Seraphim – Ph.D.

identifies where extra effort is required to improve the overall standing of the Company.”

“The process used in determining the Sheikh Khalifa Award recipients is a fantastic opportunity for local companies to ‘benchmark’ themselves against world-class companies. This process can only lead to improved management of the company, which in turn will lead to improved long-term business results. As stated in the awards presentation, ‘the only losers are the companies who chose not to participate’.”

“The Sheikh Khalifa Industry Award has been an eye opener in terms of identifying our strengths and weaknesses. It has been a pleasure to experience the assessment and has been a guiding tool in planning and organising us towards becoming a world-class company. We (...) feel that participation in this Award has also given us good insight into the best practices and their measurement.”

“We recommend all factories in the industrial sector of Abu Dhabi to participate in the HH Sheikh Khalifa Industry Award programme. The participants gain considerably from feedback reports submitted by the auditors. All participants discover positive changes in their activities and their processes during the participation in the award.”

“We wish to express deep appreciation and sincere gratitude to ‘HH Sheikh Khalifa Industry Award Committee’ for the opportunities that the committee is availing to all industrial companies in the UAE, and thus contributing to the steady and rapid development of the Industry under the wise and discrete leadership of His Highness Sheikh Zayed Bin Sultan Al Nahyan, and the directives of His Highness Sheikh Khalifa Bin Zayed Al Nahyan.”

“For the last four years we have been competing in the Sheikh Khalifa Industry Awards as a means to measure our company against other factories and Total Quality International Standards. By guiding us with its stringent requirements and recommendations, this competition has helped our Company to establish improvement targets, and has mobilised all company employees towards progress.”
Daniele Seraphim – Ph.D.

"In the award we learnt our standard compared to other companies in Abu Dhabi. It has encouraged us to make greater efforts to get the award in the year to come. By participating in the Award we have added many developments and achieved higher standards. We honestly believe this Award is necessary for the industry to improve."

Commenting on the 2000 award round, the Internet site for “GIC – News” reported that “Out of the 33 companies that competed this year, 22 also competed in 1999, and therefore it has been possible to compare the performance of these companies between the two years. This comparison shows that 18 of the companies had improved over this period and in five companies the improvement was 12% or more.”

Following the 2001-2002 round, the award body announced that “the number of participating companies increased by 25%”, and that “the scores achieved by the participating companies have demonstrated a real improvement in overall performance. The objective evidence of this, is that the average of all companies increased by 6%.”

It also reported that “six companies scored higher than the winner of the year 2000, and nine companies scored higher than the winner of 1999.” (Documentation provided by the SKIA)

In 2003, the SKIA reported that “in the first four rounds of the award, over 75 different factories took part”. “During this time, over 500 improvement projects were identified and implemented. These improvements have greatly increased the efficiency and profitability of the companies that have used the award to drive their performance towards World Class Standards.”

There is therefore little doubt that the Sheikh Khalifa Industry Award scheme has been successful in fulfilling its mission of “encouraging management to adopt Total Quality Management principles”, and was an important factor in the efficiency improvement that took place in the Abu Dhabi industrial sector over the last few years.

9.3.2. Scores obtained by the company from 1999 to 2003

The following table shows a comparison of the company’s score obtained in the SKIA over the years.
Daniele Seraphim – Ph.D.

### Table 83 Evolution of the scores obtained by the company in the SKIA from 1999 to 2003

Comparisons are difficult to make because the model has evolved over the years. However, one may note that the company evolved from a Silver award in 1999, to a second place in the Gold award in 2000, a first Gold place in 2001-2003, and finally won the Diamond award in 2003.

It is important to highlight once again that the Diamond award obtained by the company in 2003, places it as the Abu Dhabi industrial company having achieved the highest management excellence from a TQM point of view, among all participants that year. The feedback report from the SKIA specifies: “Your company has demonstrated that it performs at a level higher than the international standard. The results of the Gold assessment show that the performance is well above the level of the companies participating at the Gold level of the award. To reflect this achievement the company has been awarded a Diamond award and we would like to congratulate you for this performance.”

This means that the company progressed continually in its implementation of TQM principles from 1999 to 2003, and that it progressed more rapidly than other participants in the scheme, who, as seen in paragraph 9.3.1.5.2 have regularly progressed in their implementation of TQM principles.
9.4. **Comparison between the internal views and the external one**

The SKIA scores obtained from 1999 onwards are therefore confirming that TQM principles have been more and more implemented in the company over the years, as demonstrated by the enablers’ scores. They also confirm that the organisation’s results have progressed positively over this period, and by the increased knowledge about Total Quality concepts and tools among employees.

The improvements introduced by the company in line with TQM principles, measured internally by the favourable trend in its key performance indicators and by the perception of improvements shared by the employees, are validated externally by the scores obtained in the Sheikh Khalifa Industry Award scheme.

This external validation is of main importance to prove the company’s success, both because the SKIA is a recognised unbiased government body, and because it confirms the link established by the company between implementation of TQM principles and improved results. There is therefore clear evidence that the progress of the company is not only linked to a favourable market, but that it has been enhanced and probably fostered by the Total Quality improvements set in place in the organisation.
10. REVIEW OF CRITICAL SUCCESS FACTORS IDENTIFIED DURING LITERATURE REVIEW

Once established that the company has been successful in implementing TQM principles as demonstrated by its internal results and by the scores obtained in the SKIA, it is of major importance to review the critical success factors identified during Literature Review, and to verify the ones which indeed were critical to the company's progress, and the ones which were less so.

10.1. Recognised CSFs for successful TQM implementation

In chapter 2, a list of critical success factors for a successful implementation has been established through literature review, identifying those which are generally thought universal, those which have been characterised as specific to the Construction industry, and those specific to the Precast Manufacturing industry. Following an identical structure, we will review them in the light of the cases studied.

10.1.1. Managerial Commitment and Leadership

The degree of visibility and support that management takes in implementing a total quality environment has been identified as critical by many TQM gurus (Deming, 1982; Juran and Gryna, 1980). This has proved to be right for the company studied. The decision of implementing TQM principles in order to introduce improvements in the company was taken by the management. Over the years, its commitment was made highly visible by renewed participation in the SKIA, and by the importance it placed on implementing identified improvements.

10.1.1.1. Top Management commitment

The cases studied are in agreement with Scarnati and Scarnati (2002) when they state that quality "must be nurtured from the top down" that it is "a synergetic teamwork philosophy, a group empowerment process, and a 'can-do' attitude that must be embraced by the entire organisation. Leadership's responsibility is to ensure the philosophy is firmly embedded in the organisation culture. Commitment from the top is an essential ingredient for success."

In the company studied, the Top Management ensures that the TQM culture is embedded in the company by renewed participation in the SKIA, by personal involvement in improvement projects, and by defining core values in line with TQM principles. This
Daniele Seraphim – Ph.D.

fosters a “synergic teamwork philosophy”, promotes employee empowerment and a “can-do’ attitude”.

Without this strong and constant top management commitment, it is doubtful that the company would have been as successful in its TQM implementation process. This is in agreement with Hoffman and Mehra (1999) who classify “Luke warm commitment and involvement by top management” as the first ranking major factor for failures, and with Warwood and Roberts (2004) for whom the Leadership CSF is the most important one, “way out in the front”.

The top management commitment to TQM has not been a passing fad in the company studied, but has remained constant over the years. It is not limited to specific areas of the organisation, and customers, suppliers and subcontractors are asked for their active participation in the improvement process, and are often willing to provide it in a mutually beneficial context. This is in agreement with Oakland’s (1995) view that the commitment of management must be a constant purpose and embrace all departments, as well as customers, suppliers and subcontractors.

In the light of the organisation studied, one can only agree with Rao et al. (2004) that management commitment to the TQM philosophy is the major contributor to the success of any quality initiative.

From the viewpoint of the company studied, it is certainly true, as claimed by Nwabueze (2001), that the dominant belief that TQM must be championed from the top has misled some executives to think that what is required to kick-start TQM is just mere “talk” and executive posturing, rather than focus on what is critically important to the customer, and that this results in the industrial landscape being littered with many mediocre attempts at TQM. This is confirmed by the earlier participation of company in the SKIA: In 1998, the company participated for the first time in the SKIA. This was a commercial move, an “executive posturing” only, unlinked to any willingness to seriously implement TQM principles. As it was the first round of the SKIA, as the company was ISO certified and as the TQM knowledge at that time in the Emirate was very limited, the company was one of the top of those considered that year, and won a Gold award. However, this first participation was not followed by any major attempt at improvement. Therefore, it was
Daniele Seraphim – Ph.D.

degraded to a Silver award in 1999. From 2000 onwards, following the company’s real commitment to TQM principles, it started its progress.

Thus, the example of the organisation studied confirms the general agreement in the literature that top management commitment is a prerequisite to a successful TQM implementation.

10.1.1.2. Clearly defined Mission, Vision and Values

Following the clear recommendations of the SKIA, one of the first decisions of the company in view of implementing TQM principles was to define its mission and vision statements. This proved effective, as it provided a sense of direction to the organisation. It thus confirms the position of Chinowsky (2001), who states that establishing vision, mission and goals is the starting point for all organisation endeavours, and that it provides each member with a direction to follow in all business practices.

The company then proceeded to define clearly its values. It was decided that in order for all employees to share these values, the appraisal system of the company should be mainly based on the degree of individual adherence to those core values. This proved to be highly effective in promoting these values among employees. By being successful in opting for a management by values, the company’s experience agrees with Dolan and Garcia (2002) claim that management by values is emerging as a strategic leadership tool of tremendous potential, that the essential shared values become critical success elements which revolve around the structuring of objectives as instrumental intermediates, and that management by value is directly oriented towards the redesign of corporate cultures and thus helps leaders to guide strategic change in the company.

Thus, the company’s experience is in total agreement with the definition of Leadership as provided by Oakland et al. (2002), which profess that leadership is developing and facilitating the achievement of the vision and mission, developing the values required for long term success and implementing these through their actions and behaviours.

The company recognises the critical importance of aligning practices with the defined mission, and shares Crotts et al. (2005) point of view in this regards. It has defined a process in order to secure such alignment: The review of the Mission and Vision statement is the first step of the Strategic review; Verification in the Strategic Plan draft that
objectives for all stakeholders’ satisfaction have been defined; Defining or reviewing KPIs according to strategic objectives; Regrouping of KPIs in a balanced scorecard; Accountability, through CI objectives, of process owners in the measurement of, improvement of and progress reporting on KPIs.

While introducing the balanced scorecard concept in the company, the organisation performed an exercise similar to the one suggested by Crotts et al. (2005): It performed an audit of practices against mission and strategic objectives. It identified two major gaps: For around half of the Strategic Objectives defined, no performance indicators were readily available; A lack of balance of the strategy, as one of the four perspectives (innovation and learning) was nearly bare of indicators. These gaps were corrected by the implementation of the BSC system, which helped the company to align its practices to its mission and strategy. The audit performed during the initial introduction of the BSC concept played an important role in this regard. Although alignment mechanisms have been introduced in the company, it would still be interesting to implement the suggestion of Crotts et al. (2005) and to perform an alignment audit in order to assess that the alignment is really as effective as the management believes it is.

As stated by Jaafari (2000), the company experienced that overall improvement could not be reached unless leadership seeks to lay the foundation for transformation, particularly in relation to the creation of a culture for continuous improvement and customer/market focus.

Thus, the study of the company’s success in implementing TQM principles, confirms the general agreement found in the literature that defining clearly mission, vision and corporate values should be the starting point of any attempt to implement TQM principles.

From the onset of the TQM implementation process, the organisation recognised its inability to define a clear strategic vision for the organisation and to create the conditions to achieve that vision. Along with Ireland and Hitt (2005), it recognised that it would increase its chances of success if a team accepted the responsibility to contribute to the formation and achievement of the company’s direction. The original “Executive Staff” team was created for that purpose. Over the years, the company maintained its collegial approach to articulating a tangible vision, values and strategy.
10.1.1.3. Changing the organisational culture

The decision of implementing TQM principles was triggered, in the company, by a general dissatisfaction of all stakeholders, resulting from an important financial crisis. This fostered a consensus that change was needed, and might even be crucial to the organisation’s survival. This consensus and willingness to change was directed by the management towards TQM improvements, and proved to be a major element of the company’s success in this regard. Thus the company’s experience is in total agreement with Deming (1991) who suggests that members of an organisation must experience dissatisfaction with the current situation before they will be willing to change, as well as with Lewin’s (1951) who classifies recognising a need and opportunity for change as the first step in the classic organisational change model of unfreezing, change, and refreezing.

Cultural change in an organisation relies on the people who constitute it. The company was very clear from the start in its attempt to implement TQM principles, that employees were to be the driver of change, and that their improved satisfaction should be central to the change process. This is clearly visible when studying the list of improvements introduced during the first period (see paragraph 6.3.1.5, “Improvements of the period, classified according to the EFQM Model”). This primary importance of internal satisfaction is in accordance with Bansal et al. (2001) who state that to attract and retain customers to ensure a sustainable competitive advantage, organisations must focus their efforts on developing and sustaining an organisational culture that emphasises internal customer well-being as a means to attract and retain external customer patronage.

Jeffries et al. (1996), who define the culture of the organisation as “all the interactions which take place between people, their relationship and the feeling engendered by their behaviour”, agrees with the company belief that the culture is depending on people, and that cultural change cannot be achieved without them.

The organisation under study faced some difficulties linked with the ethnic diversity of its workforce. This was particularly apparent in the differences with which employees from Arab and Asian origins reacted to proposed modifications. For example, workers’ empowerment was more resisted in average by Arabs than by Asians managers. These differences had to be taken into consideration while introducing improvement initiatives. In regards to the above-mentioned example, the researcher tried to involve as much as possible managers from Arab origin in the initiatives aiming for improved workers’
empowerment in order to reduce their resistance. Thus, the company’s experience matches
the view of Kekale et al. (2004) who point out that the existence of subcultures must be
taken into account while implementing a TQM culture change programme.

In the light of the difficulty of any cultural change programme, of the multiple subcultures
existing in the company, and of the initial cultural aspects that were antagonistic to some
TQM critical success factors, the success of the company (even the partial success) in its
attempt at cultural change may be surprising. However, Kekale et al. (2004) also point out
that the change programme faces less resistance when there is a collective feeling that the
change is required in order to save the organisation. There is no doubt that this collective
feeling existed in 2000, and was a major factor of the success of the cultural change
programme attempted.

The company relied heavily on its reward system to facilitate its intended modification of
culture. Core values are included in the appraisal system, and several additional systems
are in place to reward outstanding behaviours in line with the promoted values. The
company attributes a major part of its success in modifying its culture to that reward
system, thus confirming Kerr and Slocum (2005) position that “the reward system
represents a particularly powerful means for influencing an organisation’s culture.”

According to Kotter (1996), the process of change should be divided into eight steps: (1)
establishing a sense of urgency; (2) creating the guiding coalition; (3) developing a vision
and strategy; (4) communicating the new vision; (5) empowering broad-based action; (6)
generating short-term gains; (7) consolidating gains and producing more change; and (8)
anchoring new approaches in the company culture. It appears that the company followed a
change process very similar to the one proposed by Kotter: The sense of urgency was
fostered by the 2000 financial crisis, on which a guiding coalition was based, around the
agreement to use the SKIA recommendations in order to improve. The first steps in this
sense were for the company to define its mission and vision, and a strategic plan, and to
communicate them. The implementation of the defined strategic improvements produced
short-term gains, which were sensible as early as the end of 2001, demonstrating the start
of a recovery. These positive short-term results were used to increase the employees’
willingness to introduce TQM innovations, until the continuous improvement approach
was anchored in the company’s culture.
Kotter (1996) also points out that communicating to employees the need for change and how it can be achieved is critical to the successful management of change. In the case of the company, little communication was required about the need for change, as the overall dissatisfaction had taken care of this issue. Communication of how it could be achieved was attained through explicit mission and vision statements and improvement objectives, and consolidated by regular follow up on achievements and difficulties faced.

The company soon experienced the view of Kekale and Kelale (1995), that the change strategy should take into consideration the present culture of the organisation, and that the “least-resistance” route should be selected, in order to increase the chances of success. It indeed appeared right from the start that “difficulty to implement” according to the present culture of the company, should be one of the major decision factor while selecting improvement projects.

Anchoring a culture for innovation within the company was experienced as the ultimate aim of the change process. In fact, the last case studied ends not with the introduction of new concepts or tools, but with the belief that the culture for innovation has been successfully secured within the company, and that continual improvement is now the normal way of work of the organisation. This agrees with Eckermann et al.’s (2003) belief that whether an organisation is or is not in a conservative industry, it must foster a culture for innovation, and that the development of a culture supportive of innovation is as important as technical attributes, such as products, processes and technologies. One may add in agreement with Eckermann et al. views, that the construction industry is a rather conservative one, but that the building up of a culture of innovation was nonetheless the main reason for the company’s success.

Nwabueze (2001) believes that the cause of many TQM failures lies in the following: Executives are often basing their attempt to implement TQM on generic prescriptions, which heavily rely on mere activities, with limited attention paid to the strategic thinking process, to the conceptualisation of an action plan, and, fundamentally, to the realignment of organisational structures, systems and processes. They do not take into consideration past history, current problems as they relate to strategic issues, market opportunities, and future scenarios when identifying the important features of the extensive culture change that must take place for TQM to succeed. The company was spared this possible reason for failure in its TQM implementation attempt, by the judicious recommendations of the
SKIA, which is clearly placing the definition of a mission and vision and the setup of a clear strategic plan as the starting point of TQM improvements. Following this advice, the company established its mission and vision and its first strategic plan at the beginning of its “Start up to Break out” period. Alignment of the whole company to these key elements of the improvement process was progressive, and can be viewed at totally achieved only during the third period of the company evolution (see paragraph 8.2.3.3, “The Strategic Plan deployment and progress review”). It is reasonable to assume, in agreement with Nwabueze (2001) remarks, that the company might not have been as successful in its attempt to introduce TQM principles, if such had not been the case. It may be added that past history, current problems, market opportunities and future scenarios were examined in-depth by the company during the strategic plan review process.

Thus, the company’s experience is in agreement with the literature opinion as reported by Bourne et al. (2003), which states that for introducing change one should focus on creating dissatisfaction with today and developing a vision of the future, whilst reducing the resistance to change.

### 10.1.1.4. Taking into consideration national environmental conditions

In their study about a proposed model of TQM implementation in the Palestinian context, Baidoun and Zairi (2003) report that there are few empirical studies in the literature that have attempted to identify the essentials of TQM implementation, and that all but four are studies done in developed countries. Clearly, for these authors, the cultural environment must be at the centre of a successful TQM implementation. In agreement with these authors, the company often felt, during its implementation of TQM principles process, that the national environment was determinant in the difficulty or facility of introducing specific improvements in the company. For example, the multi-cultural and multi-national environment of the UAE was a critical factor to take into consideration while attempting to improve communication within the company. The management experienced the hard way the lack of literature recommendations regarding possible ways of accommodating these external factors within the TQM theory, and had to rely on a “trial and error” process.

If the external environment was felt as of importance by the company, so was the internal environment. For example, the fact that the vast majority of employees had been selected for their technical expertise, and that very few of them had a management expertise, certainly influenced greatly the implementation of TQM principles within the organisation.
This coincides with Hill and Collins (2000) belief that both the internal and external environments can influence organisational change strategies and activities.

Therefore, the advice of Temtime (2003) who advocates that TQM implementation should be unique to each company, and that there is no "one-size-fits-all" approach in TQM, appears valid in the light of the cases studied. One can only agree with him that certain quality activities may be more appropriate for some organisations than for others, and with his remark that TQM is neither a canned programme nor a simple sum of quality tools, techniques and practices.

A detailed study of national cultures and of the relevance of these characteristics to the TQM theory, would certainly be useful to organisations that wish to implement TQM principles. Obtained dimensions such as the ones proposed by Hofstede (1980), including individualism-collectivism, power distance, masculinity-feminity and uncertainty avoidance, could be associated with recommendations for successful TQM implantations. One could also provide tools that may help company leaders to characterise the internal environment of the organisation, and associate internal characteristics with TQM recommendations.

Based on the company's characteristics and on the study of Hofstede (Hofstede and Hofstede, 2005), the company identified that its internal culture was characterised by a large "Power Distance" and a high "Masculinity" (see paragraph 5.2.2). These cultural specificities were seen as being unfavourable to 5 of the critical success factors for successful TQM implementation. Based on these assumptions, the company decided to modify its culture (see paragraphs 6.4.1 – 7.4.2 and 7.4.3), and has been partly successful in this regard (see paragraphs 9.2.2 – 9.2.3 and 11.3.4.1). The management of the organisation believes that taking into consideration the specific culture of the company while implementing TQM principles was one of the key factors for its success (see paragraph 11.2.1.3).

One can only agree with Prasad and Tata (2003) belief that international conditions (e.g. socio-cultural, political-legal, economic, and educational factors) have a major influence on how quality management techniques should be adopted, and with their assertion that these issues have been largely unexamined in the literature. Prasad and Tata (2003) state that the UAE employs many semi-literate workers from South Asia, thus making the use of
SPC and quality circles difficult. This opinion is totally in agreement with the company’s viewpoint, which decided against the introduction of quality circles due to foreseen difficulties, and which left the introduction to SPC to the third phase of TQM implementation, and with limited workers’ responsibilities, in contradiction with the SPC theory which recommends a high workers’ involvement.

Lagrosen (2002) highlights that no real effort has been made to study whether quality is, or should be, managed differently in different cultures. In his study about UK, Germany, France and Italy, he proposes different approaches depending on the prevailing national culture. If this is true for major developed countries, this is even more marked for developing countries, and the company felt strongly this lack of specific recommendations.

The company’s experience meets Al-Khalifa and Aspinwall (2000) assertion that the Arab oil producing countries are a long way from maturity in terms of total quality practices and organisational culture and climate that are needed to implement TQM. This is confirmed by the company initial assessment that its internal and external culture and climate were not favourable to TQM implementation (an autocratic management, a very poor level of communication, a next to inexistent knowledge about TQM, etc). Al-Khalifa and Aspinwall express a doubt that TQM can work in an environment in which the systems/practices are hostile to its teaching. The company’s experience, however, does not confirm this. Although its original systems/practices were considered to be hostile to TQM teaching, it managed to transform them into a more favourable environment, in which TQM principles could be successfully implemented.

The survey performed by Al-Khalifa and Aspinwall (2001), which highlighted that the culture of Qatar industries tend to be biased towards a mix of hierarchical (which implies that the leaders tend to be co-ordinators, organisers and administrators) and rational characteristics (characterised as being results-oriented with an emphasis on productivity, performance and achievement), is in accordance with the own perception of the company prior to the introduction of TQM. (Qatari and UAE national cultures have a lot in common). The company, during its journey towards TQM implementation, found out that it was important to take into consideration its current perception of the organisation’s culture, as several of its characteristics would have to be modified at least partially. As noted by Al-Khalifa and Aspinwall (2001), the ideal cultural profile that supports TQM implementation should have group (where the leaders are considered to be mentors, sages
or facilitators who actively participate) and developmental characteristics (dynamic, entrepreneurial and creative place of work where people 'stick their necks out' and take risks). One way of coping with this required change of culture was the 'ease of implementation' criterion, which takes into consideration the cultural difficulties, and thus selects first the improvements which are less antagonistic with the current culture. The implementation of these improvements generates a cultural change which enables the organisation to consider improvements which were thought to be too antagonistic to the initial culture, allowing the organisation to progress gradually towards a TQM culture. This process of cultural change however, was tried out in an experimental way by the company, which implies that some mistakes were made along the way, as trying to introduce a TQM element too soon, or as delaying the implementation of others which in fact could have been introduced earlier. Therefore, additional research on how best to gradually introduce TQM improvements within a hierarchical-rational culture would certainly be helpful to organisations wishing to introduce TQM principles in such context.

The organisation had also to critically examine the improvement tools proposed by the literature and mainly developed for western countries. It is in complete agreement, for example, with Thomas (2002), who notes that in developing countries, labour productivity strategies cannot be easily improved by applying mechanization or equipment, as the low cost of labour means that as much work as possible is labour-intensive, and views a better utilisation of workers as the key to improving productivity. In line with this recommendation, any investment which is thought to be sound in an industrialised country context, had to be critically assessed by the organisation in a developing country and low cost labour economy context, and improvement in labour productivity had to be achieved using a balance (in the UAE context) introduction of process improvement and partial mechanization.

However, the fact that the company, in the context of a developing country and a cultural environment which was not initially favourable to TQM implementation, had been highly successful in its introduction of TQM principles, proves that as long as the cultural and environmental specificity is taken into consideration during the implementation process, TQM principles might be applicable in various environments and cultures. The company's experience, however, would not go as far as Whitney and Pavett (1998) who are of the opinion that there is a universal set of practices that, if implemented, will lead to high
Daniele Seraphim - Ph.D.

performance, because the concept of “adapting” the practices to the context is missing from their statement.

10.1.1.5. Gradual TQM implementations over time

During its process of TQM implementation, the organisation benefited greatly from the measurements provided by the SKIA of its current position, as well as from its advice for improvement, which provided a clear view of what should be tackled first. This avoided the total quality paralysis noted by Oakland (2000) and Kanji (1990) where organisations attempting to implement TQM are confused about where to start, because they are overwhelmed by so many concepts, principles, models and prescriptions. As the company relied initially mainly on the SKIA recommendations, the possible confusion was entirely avoided. When the organisation, after a while, opened its TQM investigations beyond the SKIA, and started to examine the concepts, principles and models proposed by the TQM literature, it was already well on its way towards TQM implementation, and had sufficient knowledge to identify which of these could be useful to it. There is little doubt, in the company's managers mind, that the SKIA acted as a safeguard towards a possible confusion about where to start, and was therefore of invaluable help to the organisation.

Jeffries et al. (1996) claim that TQM implementation requires investment of time and money, whilst recognising that implementation may be difficult or confusing and take time to be understood, and recommend that changes in employee attitude and culture should occur at the beginning of the implementation process. The company's experience can only agree with these authors that TQM implementation does take time and money. However, keeping in view that these time and money consuming activities allowed in a few years' time the company to evolve, from a crisis situation which was putting its existence in danger, to a highly profitable organisation, one cannot deny that these time and money investments were worthwhile. As for the recommendation that changes in employees' attitude and culture should occur at the beginning of the implementation process, the company's experience demonstrates that the change process should indeed be started as early as possible, and should evolve over time, towards a culture increasingly suitable to TQM implementations.

The experience of the company agrees with Goetsch and Davis (2003), who claim that TQM implementation should follow a number of phases and steps, with some of the steps which should last forever, while others should be limited in time. As examined in the case
studies, the improvements introduced by the company during the three periods examined were not identical: In the first period, the accent was placed on defining a strategy and improving people satisfaction. In the second period, while the organisation continued its efforts to increase employees' satisfaction, processes were reviewed for improvement, and external partnerships were actively sought. In the third period, processes were further improved, attention to people and partners further increased, and the company worked on aligning all these elements with its strategy. This confirms the theory that there are phases in the TQM implementation process.

The company’s TQM implementation process is in overall agreement with Hradesky (1995) proposed steps for successful TQM implementation, which run as follows:

1. establish critical success factors in terms of customer satisfaction, growth, competitiveness and profitability;
2. work to change the culture of the organisation through the implementation of values and beliefs for quality;
3. establish internal customer satisfaction agreements;
4. match human resource capabilities with the functional needs of the organisation;
5. design training and awareness programmes for TQM;
6. apply appropriate tools such as ISO 9000, SPC and QFD.

The company established its critical success factors during the first period, within its strategic plan. It is also during the first period that it started to work on changing the culture, through implementation of values and beliefs for quality, linking these to its appraisal scheme. During the end of the first period and beginning of the second one, the organisation worked on matching human resource capabilities with the functional needs. However, training and awareness programmes for TQM were started earlier than proposed by Hradesky. In fact, they were one of the first steps of the TQM implementation programme, and are still going on. ISO certification was already obtained when the company started its TQM implementation programme, but was reviewed for effectiveness during the second period. SPC utilisation started only during the third period, and QFD implementation has not yet started, although its use has been identified as a strategic objective for the coming years.

Harrington (2004) believes that there is no universal best practice combination that is applicable to all organisations. While he reports the limited impact of cultural differences between countries, he highlights the importance of taking into consideration the current
performance level of the organisations. He analyses which TQM practices will be effective for medium, low and high performing companies, and warns that some practices may be detrimental if introduced at the wrong time of the organisation’s evolution. If the company’s experience cannot agree with his statement that cultural differences between countries have a limited impact on TQM implementation practices (it did appear as a critical consideration for the company), the level of current performance was certainly essential to its decision of what TQM improvement should be introduced in each period. In fact, the importance of the “cost of implementation” criterion used by the company to select improvement projects, evolved over time in reverse proportion to the performance level of the organisation (see paragraph 5.1.3.4.3 “The choice factors: Cost of implementation, Ease of implementation, Expected return”). Moreover, the implementations of some TQM recommendations were found entirely inapplicable when the performance level of the company was too low. For example, there is little chance to form successful partnerships with suppliers when the organisation is unable to pay them on time. Thus, the practical experience of the company agrees with Harrington’s view that the current performance level of an organisation is a determining factor in the way in which TQM practices should be introduced.

Thus, the company’s experience is showing that TQM implementation should be gradual, and should take into consideration both the internal and external culture, and level of performance.

10.1.1.6. Strategic Planning

The company has successfully used strategic planning in order to improve its efficiency, and align process improvements with its overall improvement objective. It has been one of the most useful tools introduced by the company. Defining a Strategic Plan has been one of the first steps taken by the company once the decision of implementing TQM principles was made, and the organisation’s strategic planning process has been refined over time. This matches Rigby’s (2003) report that “Strategic Planning” is the first tool used by organisations nowadays (89%), and that it provided the second highest satisfaction, just after “Corporate Code of Ethics”. When asked to assess the importance of 59 improvement initiatives introduced by the company, high ranking employees place “Annual update of the Strategic Plan through a defined process” in third position.
Both the definitions of De Wit and Meyer (1998) who state that “strategy can be broadly conceived as a course of action for achieving an organisation’s purpose” and the one of Quinn (1980) who defines strategy as “the pattern or plan that integrates an organisation’s major goals, policies and action sequences into a cohesive whole”, are acceptable from the company’s point of view.

However, the definition of Johnson and Scholes (2002) which refers to the use of resources and the aim of fulfilling stakeholders’ expectation appears more complete in the context of TQM implementation (“the direction and scope of an organisation over the long term, which achieves advantage for the organisation through its configuration of resources within a changing environment, to meet the needs of markets and to fulfil stakeholders’ expectations.”).

One of the first steps of the company’s Strategic Planning process is to collect the views of all process owners concerning the strengths and weaknesses of their processes, as well as the strengths, weaknesses, opportunities and threats of the whole organisation, and to use these to identify Critical Success Factors. This is in agreement with Price and Newson (2003) who state that strategy implementation is accelerated by ensuring that the whole organisation is aligned with the drivers critical to strategic success. They also specify that effective strategic planning processes must have an in-built flexibility that monitors current and emerging situations with a view to updating the strategic direction of an organisation. This flexibility was obtained by the company through including risks and contingency plans within its strategic plan, and by stating that strategic objectives may be modified by the top management if required, in order to respond with agility to modified circumstances or opportunities.

The Strategic Planning review technique used by the company not only defines the strategic positioning of the organisation as a whole taking into consideration its environment and competition, but also integrates each process strategy towards the overall vision: Strengths and Weaknesses are analysed overall and by process; The list of processes is updated as part of the Strategic Planning review process, and is used as the structure of the Strategic Plan document; Strategic Objectives are defined by process. This technique ensures that the various functional strategies, such as manufacturing, design, marketing, finance and human resources, are all aligned with the strategy and that
knowledge of the capabilities of various functions are taken into consideration while defining the strategy, as recommended by Munive-Hernandez et al. (2004)

A study of the four types of industrial environments proposed by Lei and Slocum (2005) reveals that none of them are matching the specific environment of the company under study. One might be tempted to classify it as Fast Growth, because of the booming market of the precast construction in the UAE. However, this growth is not the result of a new product concept or idea, precast manufacturing companies in the UAE do not compete with “highly differentiated products offerings”, and the product concepts or designs they propose are easily replicated. In fact, when studying further the characteristics of each environment types, the “Steady evolution” one appears the most suited: Industry maturity “characterised by a stable industry structure, where large firms enjoy significant market shares”, where production is often based on standardisation, and where companies are looking for “economies of scale – large size, integrated supply chain, and continuous improvements in process technologies”. However, as its name indicates, the “Steady evolution” environment is not characterised by a booming market. According to Lei and Slocum (2005), “Consolidator” firms would be more suited in a “Steady evolution” environment. However, when detailing the characteristics on consolidators, half of them appear to be matching the company under study, while the other half do not. This is apparent, for example, in the first two sentences used by Lei and Slocum (2005) when describing consolidators: They “are firms competing in mature life cycles that seek to capture the benefits of consolidating their industries in the midst of slow growth. Consolidators are those firms that seek to maximize the benefits of cost and process efficiencies in their attempt to garner industry-wide economies of scale.” If the first sentence does not fit the case of the company, the second does. Thus, none of the proposed market environment types are corresponding to the case studied, and the corresponding strategies are not relevant. The fast growing environment of the Precast Manufacturing Industry of the UAE, is not the result of new technology or product innovation, it is triggered by a booming demand for construction on an otherwise mature industry.

Apart from an in-depth SWOT analysis, the company is basing its Strategic Plan on people, customer and society satisfaction perceptions, benchmarking data, researches and forecasts. Mission and vision statements are reviewed in order to make sure that the strategic objectives are aligned with them. This process is in accordance with the views of
Chinowsky (2001) who states that successful strategic management and planning should be based on the following six areas: Vision, mission and goals; Core competencies; Knowledge resources; Education; Finance; Markets and Competition knowledge, and with his statement that the first step in the process of moving to a strategic management perspective is to determine where current strengths exist, where gaps exist, and where the priorities will be set to build upon these answers.

The strategy defined by the company was integrated, matching Hambrick and Fredrickson’s (2005) recommendation in this regard. Although the questions, which according to Hambrick and Fredrickson (2005), must be considered while defining the strategy, were not explicitly formulated, answers or partial answers were available in the defined strategy:

“Where will we be active?” The Strategic Plan of 2001 clearly stated that the company would first concentrate on its traditional market, the Abu Dhabi Emirate, and its traditional customers. The 2003 one claimed its ambition to penetrate the Dubai market, consider opportunities in neighbouring countries and broaden the product range.

“How will we get there?” The strategic plans explicitly defined that internal development was the choice option, detailing required investments and resources as well as the timeframe for achieving these.

“How will we win in the marketplace?” The company stated that in order to win, it must be successful in implementing TQM principles, and raising the satisfaction of all stakeholders. Detailed objectives and corresponding timeframes were elaborated in this regard.

“What will be our speed and sequence of moves?” This consideration was an integral part of the Strategic Plans, with detailed timeframes for all objectives, and a strategy of long-term incremental improvement on People Management, combined with a staged short-term approach for improvements less in contradiction with the internal culture.

“How will we obtain our returns?” Although not explicitly answered, it is clear from the review of the Strategic Plans that Economic Logic is to be the preferred supplier
due to leading-edge quality of products and services, and to ask for premium pricing accordingly.

It is arguable that the organisation’s strategy could gain in clarity by formally addressing these questions, for example after the SWOT analysis and before defining objectives and targets for each process.

The company is well aware, in agreement with Hamel’s (1996), that the Strategic Planning exercise may run the risk of becoming “a calendar-driven ritual, not exploration of the potential for revolution” and that the company should avoid it to be based on simple rules and heuristics. Until now, it has been successful in avoiding this possible drawback, by basing the process on in-depth researches and reflection on the company’s future and by studying risks and contingency plans as part of the process.

Defining clearly its strategic objectives for the coming years has been a key element enabling the whole organisation to concentrate on the identified improvements. Therefore, the company’s experience does not meet Pelligrino and Carbo (2001) opinion that Strategic Planning should be discarded, because it annihilates strategic thinking due to the usage of cognitive simplification tools and simplified versions of reality which renders strategy shallow and nearsighted. The company’s experience proves that strategic thinking can be central to the strategic planning process, and not antagonistic to it.

The position of the company in this regard is in line with the one of Hambrick and Fredrickson (2005) when they state that a strategy need not be static and can keep multiple options open for added flexibility.

Thus, the company has been successful in developing a Strategic Planning process based on the knowledge and creativity of its people and partners, which has provided clear improvement objectives on which the organisation can concentrate, and which is not a barrier to the company’s ability to react to a fast changing environment.

10.1.2. Quality measurement and benchmarking for continual improvement

The process of continuous improvement as developed by the company, based on strategic objectives and the alignment of continuous improvement objectives for every processes (see paragraph 8.2.8.3 “Alignment within the Quality System”), matches Boer et al. (2000)
definition of Continuous improvement, as the planned, organised and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance.

The concept of “measurable goals for control subjects” proposed by Juran (1989), which highlights the importance of measuring performance, is in accordance with the company’s experience, which set in place a performance measuring system capable of reflecting progress on defined objectives.

This is emphasised by Kaplan and Norton (1992) who express their opinion by saying that “What you measure is what you get”. As the company experienced the central importance of the measuring system in order to drive the continual improvement efforts of the company, it improved it over the years.

The company learnt the hard way that introducing improvement is of limited benefit unless the improvements are sustained, and that an organisation has a tendency to revert to previous ways of working. Thus, the statement of Curry and Kadasah (2002) that sustainability over time is an indispensable factor of the success of total management programmes is confirmed by the company’s experience. Finding and using mechanisms to make sure that introduced improvements are maintained has been one of the challenges faced by the company during its attempt of TQM implementation.

10.1.2.1. Measuring the costs of Quality

The company found difficulties in efficiently using the so-called quality costs as defined by Feigenbaum (1961): Preventive costs; Inspection/appraisal costs; Internal failure costs; External failure costs. The organisation was not able to differentiate between preventive costs and inspection/appraisal costs, and attempted to evaluate these costs as a whole. It also faced difficulties in identifying failure costs, and decided for practical reasons to limit their evaluation to rework and scrap costs.

If the definition of Juran (1989), who states that the cost of poor quality is the sum of all costs that would disappear if there were no quality problems, appeared appropriate to the company, it did not find a way of evaluating these costs.

The company decided to adopt Freiesleben (2004) view that the optimum level of quality is to strive for the best possible quality, rather than to try to determine a possible optimum
Daniele Seraphim – Ph.D.

according to Juran (1951), as the level of quality calculated taking into consideration the failure costs and the costs of appraisal plus prevention. This decision was based both on the inability of the company to reliably measure failure, appraisal and prevention costs, and an intuitive belief that any improvement in quality can only be beneficial to the company.

As reported by Oakland (1995), other organisations faced difficulties in dividing the costs of achieving good quality into prevention and appraisal, because “everything a well managed organisation does is directed at preventing quality problems”.

Freiesleben (2004) notes that poor quality induces a variety of hidden costs that are often neglected in cost calculations. The company’s experience is in total agreement with this statement. There is a belief in the company that these hidden costs might be very high, as well as an inability to evaluate them. However, the management of the company decided to consider that these hidden costs were probably more or less proportional to the costs of rework and scrap. Thus, the company decided to make an effort in evaluating the costs of rework and scrap, using them to apprehend the evolution and characteristics of failure costs.

The company made an attempt to use the definition of Cost of conformance and Cost of non-conformance, as proposed by BS 6143 Part 1 (1992), in order increase its knowledge about quality costs. The recommendation of Aoieong et al. (2002), who propose the use of flow-charting to measure these costs, was adopted. However the organisation was not successful in this attempt, as it soon appeared that as each precast manufacturing project is specific, evaluating “average” costs of conformance and non-conformance was impossible.

Thus, the company limited its effort to evaluating the costs of rework and scrap. Even with this limited objective in mind, it faced resistance from process owners to report non-conformances. It took years for the company and regular reminders from the top management of the importance of the issue, to partially overcome this resistance. This is in agreement with Roden and Dale (2001) account of the difficulties faced while trying to measure quality costs in a small engineering company. They report a strong resistance against quality cost data collection, that was strongly linked to a blame culture, and that could partly be overcome by the involvement of senior management. They believe that the measured quality costs were underestimated, as the study was focusing primarily on identifying failure costs.
The difficulties of the company to measure cost of quality, is in accordance with the research of Oliver and Qu (1999), who while studying cost of quality reporting in the Australian manufacturing industry, noted that only 25.7% of the firms were currently measuring the cost of quality in some form, that among those only 50% calculated costs of prevention and appraisal, and that 84% of these measured both internal and external failure costs.

Thus, although the company limited its attempt to identifying the costs of quality failure to reward and scrap, it still believes that these data provide important indicators of failure costs evolutions, and of their characteristics over time.

10.1.2.2. Measuring Performance

Measuring the level of labour productivity and closely studying its evolution over time, is an activity considered highly important by the management of the company, as it has been noted that the overall performance of the company and its labour productivity level are most of the time following the same trend. This might be an indication that the belief of Chapman and Al-Khawaldeh (2002), who claim a strong link between the level of TQM principles implementation and the level of labour productivity, could be true.

The company’s definition of productivity coincide with the one of Hoffman and Mehra (1999), who define productivity enhancement as a process to achieve higher levels of output while consuming same or lesser amounts of input resources. They also believe that if the same level of output is reached in a shorter time period, it indicates improved productivity.

The organisation believes that productivity enhancements can only be achieved by introducing improvements in the process, or among the inputs of the process. As part of the latter, an increase of employee satisfaction, for example, is thought by the company to have a positive impact on the productivity level. In view of the company’s experience, the claim of Skinner (1986) that management’s definition of productivity programmes is results-oriented instead of process-oriented improvements, and that it is projecting a narrow vision of the organisation, is of little value, as there is no good reason for the productivity to improve, unless the process or its inputs are improved.
During its process of TQM principles implementation, the company deployed considerable efforts to increase its knowledge of the level of customer satisfaction. One of the major elements in this regard, is the introduction of a customer satisfaction survey, providing in-depth knowledge about the performance of the company’s processes, and benchmarks with its competitors. These measures took an increased importance within the strategy of the company, as it shares the belief of Shen et al. (2000) that the quality of a product or service is ultimately judged in terms of customer satisfaction, and that thus customer satisfaction benchmarking can help decision makers identify areas for improvement, make strategic decisions, and set targets on desired satisfaction performance. The company agrees with these authors that it should not only know the customer satisfaction level for its current product or service, but also know the customer satisfaction level of the competitors’.

Jaafari (2000) maintains that by using performance indicators, it should be possible to show to every employee and stakeholder that the organisation is making progress towards its goals. This was experienced by the company, as it used the measures of its main performance indicators in a balanced scorecard format, to communicate its progress to employees and shareholders. It may be noted that other stakeholders were not included in this communication technique.

In agreement with Oakland (1995) who considers performance measurement as a very important factor when comparing and identifying opportunities, performance measures are widely used by the company as inputs to its strategic plan process. The company shares the opinion of Oakland that it has to include both financial and non-financial measures.

Chang & Sinclair (2003) believe that the introduction of total quality-based management frequently requires a change in organisational culture and management style, and that the performance measurement system can be seen either to inhibit or facilitate this. The view of the company in this regard is slightly different, in the sense that it believes that the measuring system has to evolve in line with the changes in cultural and management style, and that the performance measurement system should not be considered as a static parameter. It is true, however, that if the measuring system does not evolve along with TQM improvement programme, it will inhibit the company’s progress.

Kuwaiti (2004) suggests creating a new permanent post dedicated to the performance measuring process, independent from the financial controller, HR and IT functions. He
stresses that the owner of the performance measuring process should have a wide perspective of the organisation and should report directly to the CEO or the general manager. He proposes two roles for the owner: the design of the performance measuring system, and the monitoring and day-to-day management of the performance data. This was not the option selected by the company. The development of the measuring system as well as the task of regularly summarising the company's progress using the measuring system in place was attributed to the Manager in charge of supervising the TQM implementation process. This solution has the advantage that the TQM implementation process and the measuring system can be more easily aligned. As for the responsibility of providing regular and accurate measures, it was attributed to the process owners themselves, under the general supervision of the Manager in charge of TQM implementation supervision. This solution proved to be very effective.

The company's position regarding the development of its measuring system is therefore similar to the one proposed by Niven (2002), who stresses the need for a performance measuring process and process owner to ensure continuous review and update of the measures, in order to remain relevant to strategy. However, unlike Niven's proposal, the company did not include the review of the reward system as part of the performance measurement process, but decided to link the reward system mainly to the adherence to the core values of the company, even if performances as reported in the performance measuring system are considered during appraisals.

Thus, in-built in its reward system, the company used a combination of performance and value adherence assessment to raise the performance of its employees. Taking into consideration the fact that the core values assessed implied a modified work attitude (taking initiative, proposing innovative ideas, active participation, being safety conscious etc) the reward system was based on a performance/learning new values basis. This technique has similarities with the suggestion of Seijts and Latham (2005) who advocate that an organisation should define either performance goals or learning goals, although the learning requested by the company was on values and not processes, and although performance and learning objectives were assigned together, and not one or the other depending upon the circumstances as proposed by Seijts and Latham (2005).

The issue raised by Curry and Kadasah (2002), who claim that when each department is trying to improve performance independently of others, it may lead to a TQM failure, was
partly felt by the company. As managers are expected to demonstrate improvements according to the measuring system of the processes they are in charge of, they sometimes tend to pursue these objectives even at the detriment of the overall benefit of the company. Regular management meetings, in which all process owners can express their point of view, as well as the arbitration of the top management, are helping to overcome this problem.

The organisation has defined a systematic review process of its Performance Measuring System, as advocated by Najmi et al. (2005). The review process has been designed for both effectiveness and minimal time load. For example, one of the objectives while introducing the BSC system was that it should be updated easily (not more than two man-days). This meets Najmi et al.'s (2005) view that “a good PMS review seeks the correct balance between organisational benefits and the efforts required.” These authors identify three types of required reviews: On-going review of operational performance, Periodic review of the strategic indicators, and Overall review linked with the review of overall strategic objectives. The company PMS review process follows the same logic: On-going review of operational data by process owners; Periodic review of KPIs, every three months for BSC indicators, every six months for Strategic Objectives; Annual overall review of all Strategic Objectives, all BSC Key Performance Indicators and all operational indicators, following the annual strategic review.

Thus the company’s experience confirms the literature general agreement regarding the importance of an adequate performance measuring system, and its link to a successful TQM implementation. The alignment of the performance measuring system with the strategy of the company is felt as critical.

10.1.2.3. Benchmarking

The company adopted the definition of the BS7850 standard of benchmarking being the activity of “measuring your process against those of recognised leaders”. In a sense, this definition does not exclude internal benchmarking, as internal benchmarking can be seen as measuring your process against those of recognised internal leaders.

However, many authors, such as Chang & Sinclair (2002) are limiting their definition of benchmarking to comparison with external best performing competitors. They view the aims of benchmarking as to find the best practices in an industry, and to use the obtained
knowledge to bring performance improvements that may not have occurred if only internal performance was monitored. When trying to implement this concept, the company did not face any difficulty in identifying which of its competitors might have, in an intuitive way, the best performing processes. However, identifying what are the best practices implemented by this competitor which enable him to perform better was very difficult if not impossible, and obtaining measurements which could help comparing in detail the two organisations’ performance unachievable, because of the attitude of secrecy of one’s data shared by the great majority of the organisations operating in the UAE.

As the company was in accord with McCabe’s (1998) belief that an organisation needs to make sure it is keeping up with its competitors, ideally by comparing itself against proved performers, and as it was unable to obtain the required data from its competitors, it decided to obtain them in an indirect way, through its customers, asking them to provide comparisons between the perceived company’s performance and the perceived competitor’s performance. The company also used another indirect way of obtaining performance data about the Precast Manufacturing Industry: through its suppliers, who were sometimes willing to share the knowledge they had gained while collaborating with foreign competitors on performance improvement projects. Limited data could be obtained through direct communication with competitors.

Using these indirect techniques, the company has, as suggested by Jaafari (2000), compared its performance with external leaders, identifying gaps in the organisation’s performance, and setting objectives for continual improvement.

The organisation’s experience thus agrees with Oakland’s (2003) claim that there are links between benchmarking and TQM: establishing objectives based on industry best practice can directly contribute to better meeting of the internal and external customer requirements.

The company’s point of view agrees in theory with Goetsch and Davis (2000) who highlight that the rationale for benchmarking is that it makes no sense to stay locked in an isolated laboratory trying to invent a new process that will improve the product, or reduce cost, when that process already exists. This, however, implies that there is an access to the best performing process, in order to it to be studied in depth. According to its own experience, no such access was available to the company, which means that if knowledge
could be obtained that one of its competitor’s processes was performing significantly better than its own, the reasons for this extra performance were not available, and the company had to set up plans for improvements, knowing that these improvements could be achieved, but with little knowledge about how they could be achieved.

Oakland (2003) lists four categories of benchmarking: Internal (the search for best practice of internal operations by comparison); Functional (seeking functional best practice outside an industry); Generic (comparison of outstanding processes irrespective of industry); and Competitive (specific competitor to competitor comparisons for a product or service). In addition to the limited competitive benchmarking data obtained, the company is using other categories of benchmarking. Internal benchmarking is used to compare sites performances as well as factory performances (as a whole as well as by process). Functional benchmarking is very effective in the company, as the SKIA provides in-depth information about world-class best practices, which were successfully used by the company to identify gaps and set objectives for improvement. Generic benchmarking is obtained during the SKIA participation process and through “best practice” workshops organised by the Abu Dhabi chamber of commerce, and in which the company participates regularly, both to learn from other organisations and to present some of its own processes.

Thus, the company’s experience is in agreement with the theory that states that benchmarking can be a powerful tool for comparison, highlighting improvement opportunities. However, it wishes that it could develop a more effective Competitive benchmarking process with its competitors, based on direct data and studies.

10.1.2.4. Balanced Scorecards

The company’s point of view coincides with Bourne et al. (2003b) belief that a company should not limit itself with traditional accounting based performance measures, which have been characterised as being financially based, internally focused, backward looking and more concerned with local departmental performance than with the overall health or performance of the business.

It matches Kaplan’s (1992) claim that no single measure can provide a clear performance target or focus attention on the critical areas or business. Thus, the company decided to adopt Kaplan’s proposal to use the balanced scorecard concept as a way to allow managers to look at the business from four important perspectives, and provides answers to four
Daniele Seraphim – Ph.D.

basic questions: How do customers see us? (customer perspective); What must we excel at? (internal perspective); Can we continue to improve and create value? (innovation and learning perspective); How do we look to shareholders? (financial perspective).

The company’s experience proved, as claimed by Wongrassamee et al. (2003), that the Balanced Scorecard can help to communicate and implement an organisation’s strategy, in a framework containing a set of financial and non-financial measures chosen to aid a company in implementing its key success factors, in line with the company’s strategic vision.

The company has experienced, as claimed by Kaplan (1996), that it is possible to create a strong link between the company’s strategy and its Balanced Scorecard (see paragraph 8.2.9.4 “Alignment within the Quality System”) with measures of Balanced Scorecard objectives being input to the Strategic Plan review process, and Balanced Scorecard objectives output to the Strategic objectives.

Thus, the concept of “strategic framework for action” as defined by Kaplan and Norton (1996) (1- Clarify and translate vision and strategy; 2- Communicate and link strategic objectives and measures; 3- Plan, set targets, and align strategic initiatives; 4- Enhance strategic feedback and learning.), matches the experience of the company.

It is in complete agreement with Robert Kaplan’s (De Waal, 2003) view that the balanced scorecard is effective in closing the gap between the vision and strategy developed at the top and the things people down in the organisation are doing, and that the balanced scorecard can be used as the link between strategy and employee empowerment for continuous improvement. The company recognises its usefulness in translating the abstract strategy into clear strategic priorities and initiatives.

As expressed by Gardner (2002), and in accordance with the company’s belief, the success of improvements can be judged only within the context of the total system, and it is imperative for all improvements to be planned and measured in terms of the total system. The company found out that the balanced scorecard representation of its performance provides a useful and quick view of the performance of its total system.
There is therefore little doubt, as highlighted by Kanji and Moura (2002), of the compatibility between the balanced scorecard concept and total quality management initiatives.

The company noticed that its balanced scorecard approach helped focusing on its TQM improvements in a balanced way, and thus meeting the expectations of the SKIA for Total Quality. This would confirm Wongrassamee et al. (2003) opinion that the balanced scorecard and the EFQM Excellence model, despite having some significant differences, developed from similar concepts.

Bourne et al. (2003c) remark that many organisations have moved from multidimensional views of performance to building success maps that link these views together and that the best of them are now empirically testing the relations in the success map. The company has not reached this stage yet as its utilisation of the balanced scorecard concept is still recent, but it might attempt to do so in the future.

The company did not face any major issue in adopting the balanced scorecard system, as it appeared to complement harmoniously the other elements of its Measuring System, such as strategic planning, measuring system and objectives for continuous improvements, and this new concept was very quickly and without difficulty accepted by the employees. This is in contradiction with Bourne et al. (2003) report that many organisations failed in their attempt to implement the balanced scorecard, and that successful implementation processes may take several years. This divergence between the company’s experience and Bourne et al. report, might be due to the fact that a company which has already implemented some of the TQM principles may find easy the introduction of the balanced scorecard concept as it is in line with its other improvements, while it may be more difficult for others. It could also be linked to the fact that a TQM company is used to introducing changes and will integrate them more easily than a non TQM organisation.

In conclusion, the company has been very successful in introducing the balanced scorecard concept, which proved to be useful in order to focus the employees’ energy towards the strategic objectives, helped the communication within the organisation, and is both in line and complementary of other tools already introduced.
As demonstrated by the cases studied, the participation of the company in the SKIA for Total Quality has been a critical factor helping the organisation to measure its current performance and identify improvements that could be introduced. This coincides with Lee (2002) report that quality awards assist organisations to understand their present performance so that future progress can be targeted, and with his belief that they provide valuable external opinions in the form of feedback from the examiners offering organisations objective information about their current performance and helping them to identify areas of improvement.

As reported by Miguel (2001), in the pursuit of excellence, organisations all over the world began turning to quality award programmes for the evaluation and recognition that such programmes offer. In the case of the company, the SKIA has certainly been very helpful in providing both evaluation and recognition.

The company used the SKIA as a source of knowledge about world-class practices, from which gaps with its own performance could be extracted. It is in agreement with Oakland et al. (2002) view that “Quality awards build a model of criteria and a review framework against which an organisation may face and measure itself, to examine any ‘gaps’”.

If the determining role of the SKIA in guiding the company to implement TQM principles is undeniable, this experience comforts Lee's (2002) beliefs that the growth and adoption of TQM in companies have to be facilitated increasingly by national governments, through the introduction of national quality awards or business excellence awards to recognise deserving companies.

As noted by Miguel (2001), Quality awards are not static; Awards’ criteria are updated periodically by the award administrators in order to represent the most current understanding of organisational quality practice and improvement. This has been the case for the SKIA.

As studied in paragraph 9.3.1 (“Presentation of the Sheikh Khalifa Industry award for Total Quality Management”) the SKIA has its specificities, which is influenced by the UAE environment and culture as well as by international standards and practices. This matches the findings of Tan (2002) who, in his comparative study of 16 national quality
awards, highlights that factors that influence the criteria framework of National awards, such as: The economic and social development of a country; The national culture; And the desire to be in line with international standards and practices.

The criteria used by the SKIA are matching the ones noted by Miguel (2001) as being present in all awards programmes: customer-driven quality through streamlined processes, leadership, human resource development and customer-focused strategic plans, integrated by an information and analysis system, all of them aiming at business results of various categories.

The company’s view point of the SKIA matches Lee’s (2002) view of national quality award programmes: It promotes quality awareness, recognises quality achievements of companies, and provides a platform for sharing successful quality management initiatives.

Conti’s (2004) reports two major elements which were felt as highly important by the company during its partnership with the SKIA: External assessment and self-assessment using the award. The company shares his belief that award-like external assessments are highly beneficial to organisations, as it helps them to get an independent ‘measurement’ of the organisation’s ‘level of quality’, and that once measured, the focus of the company should be on improvement, and to that end “diagnostic self-assessment” is needed.

The TQM implementation process carried out by the company using the guidance of the SKIA, has enabled the company to progress in all aspects of its performance (see paragraph 9.1 “The company’s viewpoint of its progress”). This matches the study of Miguel (2001), who reports that winners of these awards have reported that their implementation has not only improved quality but has led to improvements in market share, sales, profits, employee morale and competitiveness.

If Quality Awards are such help to companies wishing to implement TQM principles, it certainly does make sense, as proposed by Lee (2002), to base a model for business excellence on a quality award framework, taking into consideration that quality awards contain a set of quality criteria that encompass all areas of the organisation’s operation, and that such a premise would require the organisation to consider a holistic view of quality.

During the first phases of its TQM journey, the company relied heavily on the guidance of the SKIA to identify possible improvements. It may be noted that even at that point,
implementations were often specific to the company, taking into consideration its needs and culture. After a while, the company decided to increase its knowledge and to perform researches about best practices as reported by the international literature. Improvement elements introduced during this last period, although still in line with the requirements of the SKIA, are showing an increased differentiation. This matches Conti’s (2004) remark that when quality levels, as assessed by TQM awards, enter the ‘outstanding’ range, positive differentiation is taking place and less traditional approaches start to appear, such as standardisation.

Among the shortcomings of quality awards, the time and effort required to prepare an application is often mentioned (Lee, 2002; Miguel, 2001). The company’s experience during its participation in the SKIA can only confirm this opinion. However, it appears that the said time and efforts are more than usefully employed if the participant is serious about his desire to implement TQM principles: Although knowing that participation in the award takes both time and efforts, the company maintained its involvement over years, as the gains obtained through this participation were thought to be more than worth the effort. One can add that the simplified bronze and silver levels proposed by the SKIA should allow new participants to gain knowledge with a minimum of time investment.

Thus, the company’s experience demonstrates that the participation in a TQM award may be very valuable to a company which desires to implement TQM principles. It provides external measurement, enables it to identify possible gaps through self-assessment and feedback reports, and provides an external recognition of the company’s performance. The company benefited greatly from a real partnership established through repeated participation in the SKIA.

10.1.3. Employee Management

In accordance with Bou and Beltran’s (2005) recommendations, social aspects were given a great consideration and this throughout the three phases of TQM implementation for several reasons: The company assumed that TQM implementation might not be successful without the support of its employees, it perceived that its initial level of performance with regard to employee management was low, and finally it perceived that improvements would involve a modification of culture and thus might take both time and efforts. The experience of the company proved that these initial assumptions were correct.
From the start, it appeared clearly to the company that its people should be central to its TQM implementing process. It shares the belief of Bansal et al. (2001) who states that researchers and practitioners in the field of human resource management emphasise the centrality of employees as a way to procure a sustainable competitive advantage.

Along with Rogovsky and Sims (2003), the company believes that the management practices should be people-centred in order for the organisation to be more successful.

It adopted the point of view of Vora (2004), who states that “without looking after the well-being of your own people through trust and care, do not expect your employees to help your customers”.

10.1.3.1. Training and education

The company was convinced from the early days of TQM implementation that training was a condition for its success. However, the financial crisis it was facing limited the expenses it could spare for training and education in the first years. During this period, the organisation used two techniques in order to provide adequate training: Utilisation of the training budget funds as judiciously as possible; Selection of low-expenses training techniques, such as internal training, free of cost suppliers training etc, whenever possible.

Once the organisation recovered financially, expenses on training were increased, but the attention of making sure that the training budget was wisely spent remained. Henderson and McAdam (2003) define a learning organisation as one which strives to make learning central rather than an accidental activity which often goes unused. In this sense, the company can qualify as a learning organisation, as the importance of effectiveness in training has been central to its TQM implementation initiative.

If training is central to the organisation, so is learning. Several initiatives acted on the strong belief that TQM improvements could only be introduced if the employees were willing, in fact eager, to learn new concepts and techniques and to experiment them in their work. In order to promote learning, the organisation had to develop effective communication processes. This is in agreement with Henderson and McAdam (2003) view that a learning organisation is dependant on an expansive, reliable and efficient communication process to support the movement of knowledge from one part of the organisation to another and to ensure that relevant knowledge finds its way to organisational units that need it.
Experience proved that the claim of Galbreath (2002) who state that “just sending someone to train on the latest technology or tool is not sufficient unless it fits the employee’s broader personal goals”, is justified. The additional knowledge gained during training has to be useful to the organisation, because if such is not the case, it will not be used, and will soon be forgotten. Thus, the company set as a rule that training should be granted only if it is relevant to one or several of its strategic objectives. It also requires the employee to be willing to acquire and use the knowledge gained, and the company made sure that sure was the case, through granting training on a voluntary basis.

The TQM implementation process, as described in the cases studied, involves many changes in the organisation. First of all, changes in the culture of the company, which implies changes in its constitutive elements: its employees. It also involves rapid changes in processes and techniques. As well as adaptation to a fast growing company. In such a fast changing environment, the view of the company is in accordance with the one of Goetsch and Davis (2003), who link training and education to adaptability to rapid and continual change, and highlight that knowledge and skills that are on the cutting edge today may be obsolete tomorrow, and that it is critical that employees be updated constantly.

The company’s views are in agreement with Bryn (1995), who believes that education and training must be life-long, for the individual, employer and society. The organisation both recognises how important it is for its employees to progress constantly as they are the driving force for change and improvement, as well as its responsibility in providing them with the means to progress. Programmes such as the “continuous learning scheme” or participations in conferences and exhibitions are aimed towards fuelling their desire to improve or widen their knowledge, and direct these desires towards knowledge that is useful to the organisation.

The company found out that two elements are required in order to maximise the chance of training to be effective: First, the training should be aligned with one or several strategic objectives of the company (this guarantees that the employee will have the opportunity of using the knowledge gained). Second, the employee should be willing to undertake the training. (If such is not the case, he will resent being sent on training, will not try to gain as much as possible from it, and is very unlikely to use it in his work.) In order for these two elements to be matched, the company used the following technique: Prepare a list of
possible training schemes corresponding to the strategic objectives of the company, and
missing knowledge to meet them. Circulate a training survey for employees to select
training they would be interested in. Plan the training programme according to company
requirements and employee wishes. This coincides with Oakland’s and Oakland’s (2001)
research on successful and award-winning organisations, which highlight the ongoing
commitment to investing in the provision of planned, relevant and appropriate training of
these companies, and note that training is carefully planned through training needs analysis
processes that link the training needs with those of the organisation, groups, departments,
divisions and individuals.

The company believes, along with Jaafari (2000), that training and education are at the
heart of success in any innovation that involves human factors. This was confirmed, in the
company’s experience, by the fact that innovations introduced without sufficient training
and education resulted in imperfect products and unsatisfied customers. This was the case,
for example, of the introduction of the Hollowcore product in the company in 2000 with
insufficient training. In order to reverse the trend of poor quality noted in this product, the
company had to heavily invest in Hollowcore training in 2002. If sufficient training had
been provided when the new product was introduced, the cost of training would certainly
have been lower, and the company’s reputation would not have suffered from imperfect
production. As the pace of innovations introduced in the company increased, the training
and education programme of the company followed it.

Apart from identification of training needs through its annual survey, the company also
uses direct observation of the employees by their supervisors in order to identify training
needs. This routinely results in joining two employees in a trainer-trainee relationship,
either to perfect a skill, or to acquire a new one (in accordance with the policy of
encouraging multiple skills promoted by the organisation). This position matches Goetsch
and Davis (2003) point of view that training needs assessment, and that it can be done at
two levels: Observation is one method used by managers who work closely enough with
their team to detect possible needs for training; A more structured way to assess training
needs is to ask employees to state their needs.

Therefore, the company’s point of view and experience matches the general agreement in
the literature, that training and education are central to the organisation’s adaptability to
introduce change, its agility and innovation level.
The company identified early in its road to TQM implementation, that the communication system in place was not effective enough, and that it should be improved. It shared Henderson and McAdam (2003) belief that effective communication and the achievement of transparency is likely to facilitate the culture change cited as being pivotal in delivering the desired organisational transformation. However, the original communication system of the company was mainly verbal, both because the company was used to verbal communication when its limited number of employees rendered it still effective, and because many of its employees were not at ease with written communication for the following reasons:

1. English, which is the most shared communication language among staff, or is not the native language of any of the company’s employees, and many of them do not feel as easy with written English communication.

2. Some staff do not have any knowledge of Arabic, and thus its utilisation is limited.

3. Literacy among workers is more an exception than the rules, which renders any type of written communication with workers poorly effective at best.

4. When literate, workers seldom know the written English language, which is the written language most used for communication among staff. Apart from written communication in Arabic, the company does not have any means of easily translating a message in another language (there are a multiple number of languages used by Indian workers for examples), and outside translation is very expensive.

Moreover, if the company experiences difficulties in written communication, it also faces difficulties in verbal communication:

1. If verbal English communication is possible among all staff, many of them do not feel at ease with it, and during staff meetings, several different languages are often used, rendering attendants unable to understand parts of the discussion.

2. There is no verbal language understood by all workers. Communication often takes place in broken Arabic or broken Hindi or Urdu, mixed with a high number of
gestures. Communication with some employees has to be done through a translator (only one of the Chinese workers can speak English, which renders the communication with the 50 Chinese employees difficult).

3. As the management does not share, in the vast majority of the cases, any way of communicating with workers apart from gestures and sometimes a limited number of words, the communication system between Management and workers has to rely on verbal translation, sometimes with several number of “translators” involved.

However, as the company shares the view of Henderson and McAdam (2003) that managing people successfully requires communication and that quality of communication between people within an organisation is a crucial variable determining organisational success, improving its communication system was not an option for the company, but had to take into consideration the known difficulties.

Along with Dervitiotis (2002) view that human communications are crucial when seeking to develop and implement viable strategies for sustainable high performance, the company has deployed and is still deploying considerable efforts to improve its communication system. However, difficulties of communication are still remaining, which have to be taken into consideration when introducing TQM elements. Although the current communication system, and its transparency, can be qualified as satisfactory among staff, the communication management-workers and workers-management can still be qualified as poorly effective if compared with performances in developed countries, although definitely improved if compared with the situation prior to the TQM implementation initiative.

The study of Oakland and Oakland (2001) among award-winning organisations, places effective communication as an essential facet of people management, be it communication of the organisation’s goals, vision, strategy and business policies, or the communication of facts, information and data. The improvements in its communication system introduced by the company, has taken into consideration these two aspects. It worked on ameliorating the communication of its strategic objectives by defining clear mission and vision statements, by establishing a strategic plan, and by assigning measurable objectives to process owners in line with the strategic objectives defined. It also improved its performance measurement system, and established a central IT communication system from which data may be easily retrieved.
However, the experience of the organisation under study proves Sandhu and Gunasekaran (2004) right, when they differentiate information from knowledge. Experience proves that providing information does not necessarily improve knowledge. In order to extract knowledge from IT information, the company proceeded in two phases: In the first phase, IT experts proposed possible analyses of data to process owners, who reviewed and improved them in order to extract actionable knowledge. In the second phase, process owners were trained to perform these analyses themselves, as well as trained on tools that would help them devise new analyses, using the support of the IT experts if and when required.

This latest improvement may be the starting point for the introduction of knowledge management in the company as defined by Alazmi & Zairi (2003) as making knowledge available to the right people at the right time. However, the limitations of the company’s communication system, should, here also, be taken into consideration. The “right people at the right time” in a developed country may not be the same in the company’s environment.

If, as pointed out by Voelpel et al. (2005) the main reason for knowledge-sharing systems failure is that organisations did not consider the organizational cross-cultural factors, a specific approach might be required in the environment of the construction industry in the UAE, with minimal reliance on written literature, and maximum utilisation of measured data and graphical representation, which are universally understandable. This is the option favoured by the company under study so far.

Thus, the company agrees with TQM authors that TQM cannot be achieved without an effective communication system. Although it devoted considerable efforts in this sense, improving the company’s communication system proved difficult, and the level of effectiveness obtained is still far from being perfect, particularly when considering management-worker communication. It is however undeniable, that the current level of communication in the company is much higher than it used to be prior to the introduction of TQM principles as a guideline.

10.1.3.3. Employee participation, involvement and empowerment

As highlighted by Bou and Beltran (2005) the company experienced that a raise in employee participation, involvement and empowerment implied a change of organizational
culture. Thus, a long-term relentless incremental effort was deployed in order to improve in this regard.

The company has been highly successful in raising the participation, involvement and empowerment of its staff, but only moderately so at the workers' level.

When examining the opinion of Ang (2002) in this regard, one may notice that several elements which render workers' involvement and empowerment easier in developed countries, may be missing in the UAE environment: Ang notes that with the workforce today being better qualified and educated, more aware of the choices open to them for work and career development, and with greater mobility arising out of globalisation, one can expect employees today to be more demanding and, at the same time, willing, able, and ready to take part in the workplace improvement, problem solving and decision making. In the UAE, the situation is drastically different: Workers do not have any choice of mobility apart from going back to their native country; Workers education level is very low, and literacy is the exception rather than the rule. Communication barriers, particularly with workers, as noted in the previous paragraph, have prevented the company to reach a level of participation, involvement and empowerment of its workers, similar to what can be set in place in developed countries. It strives, however, to increase it, being well aware of the importance and potential for improvement of such participation.

The company strongly believes along with Bryn (1995), that quality can only be achieved by involving all employees. It adheres to his statements that “if quality is to be achieved it has to become the way of life for all. Everyone must be committed and involved. It cannot be left to quality experts. They cannot achieve quality, their role is to ensure that others understand and live quality”.

The company under study deployed considerable efforts, throughout its three phases of TQM implementation, to shift from its initial culture of control and management of the workforce, towards one more in line with Pfeffer's (2005), who advises to see “the workforce as a source of strategic advantage, not just as a cost to be minimized or avoided.”

Communication is at the centre of Evans and Lindsay (1999) view in this regard. They argue that the concept of TQM will be effective only when all employees are involved, thus emphasising the need for horizontal integration, communication and co-operation.
using techniques such as quality circles, self-directed teams and steering committees. However, communication with the workforce being a main difficulty in the company, some elements of employees' empowerment and involvement were not introduced: The company introduced steering committees, which are deemed very effective, but no workers are members of these committees. However, the company did not introduce self-directed worker teams, as management communication with the team members would be very difficult. A supervisor who can converse with his team members stays the only effective way to transmit clear instructions. The company also decided against the introduction of Quality Circles because of the communication issue.

Rapp and Eklund (2002) propose to use suggestion schemes as an effective way of employee participation, and highlight the following characteristics for their successful implementation: The suggestion scheme should be simple and easy to adjust to new circumstances. It cannot interfere too much or take too much time of the employees involved. Thirdly, managers committed to improvements are important. Fourthly, the feedback is important. The company decided to use this technique to collect employee suggestions, and found it very effective. However, it required a strong communication effort, using translators in several languages, in order to make the scheme understood by every employee. Difficulties were also faced in translating and understanding received suggestions. This rendered the scheme much more time demanding than expected, and the suggestion competition was limited to once every two years. Written feedback took time, and as it was decided that it was too complicated to contact verbally each correspondent using a translator if required, was probably not entirely effective. However, even considering these difficulties, the scheme has triggered a high number of improvements which were successfully introduced, and managers' commitment to the scheme stay high.

The company believes, along with Scarnati and Scarnati (2002), that empowerment provides significant advantages throughout the organisation: First, it makes people feel vital to the success of the organisation; Second, empowerment builds commitment and a sense of belonging; Third, empowered people join in creating their own destiny. In order to encourage empowerment of employees at all levels, the company introduced the "initiative / innovative ideas" criterion among the criteria for appraisal. Thus, even if a suggestion for improvement made by a worker does not reach the top management because of language...
and hierarchical barriers, he will be rewarded by his supervisor during the appraisal process, and will be encouraged in his participation.

Oakland (2003) reports three initiatives used by organisations wishing the empowerment and involvement of their employees: 1- Corporate employee suggestion schemes, which provide a formalized mechanism for promoting employee empowerment and involvement; 2- Company-wide culture change programmes, in forms of workshops, ceremonies and events to raise awareness and empowerment to practice continuous improvement; 3- Measurement of KPIs such as labour turnover, accident rate, absenteeism and lost time through accidents, in order to identify areas for improvement. The company used all of these three techniques successfully.

Bou and Beltran link employees’ involvement and commitment to higher job satisfaction. This matches the company’s experience, and the 3% increase in job satisfaction noted from 2002 to 2003 might reflect the progressive improvement of the company in modifying its culture for an improved involvement and empowerment.

Thus, the company recognises the primary importance of employee participation, involvement and empowerment. It has deployed considerable efforts in this sense, and been successful in promoting these among employees, although communication barriers with the workers rendered initiatives more complicated and less effective.

10.1.3.4. Team working

Goetsch and Davis (2003) define a team as a group of people with a common, collective goal. They highlight that the collective goal aspect of teams is critical. Teams can outperform individuals, provided they are properly handled. Goetsch and Davis propose the following conditions: Agreement exists as the team’s mission; Members adhere to team ground rules; Fair distribution of responsibility and authority exists; People adapt to change. In agreement with these views, the company has been highly successful in introducing team working. It experienced all three conditions as expressed by Goetsch and Davis (2003) as being critical to the success of the team work.

In the company’s experience, forming teams around employees from different positions, departments and activities, proved to be effective, as claimed by Kondo (2002). One can however note the restricted number of teams in which workers were members, due mainly
to the communication problems examined earlier. As highlighted by Kondo, the imperative to the team success that all the members of the group should fully understand and accept the group’s common aims, proved true. It was often felt, in agreement with Kondo, that group members having slightly different standpoints and outlooks did make it easier for good creative ideas to surface.

It is of major importance for the team’s common goal to be aligned with the policy and strategy of the organisation. As pointed out by Box and Platts (2005), “if teams consist of individuals aligned with one another, and if they are aligned with the goals of the organisation, then their fullest potential can be deployed.” At the creation stage of the team, the alignment of its goal with the policy and strategy of the company is generally satisfactory. However, it is valuable to check this alignment at regular intervals, as the team’s goal may evolve, and as the organisational strategy may evolve.

This experience is in agreement with Oakland and Oakland (2001) study on award winning organisations, which shows that leading organisations place great emphasis on the value of people working together in teams.

Team working has been found by the company to be an effective way to prevent departments to work in isolation, with little regard to the difficulties and successes of other units. This matches Dean and Evans (1994) view that team-working is relevant to the TQM principle of the interdependence of different parts of the organisation, because they support such interdependence.

The company’s experience is in total agreement with Oakland (2003) views, who regards teamwork throughout any organisation as an essential component of the implementation of TQM and process management, which builds trust, improves communications, develops interdependence and the free exchange of ideas, knowledge, data and information.

The company has applied the advices given by Oakland, and for most of its teams is selecting team members both inside and outside the process or the problem under study, is defining clear objectives and an agenda for each meeting, is assigning tasks to team members, is striving to create a climate for creativity and support within the group, and finally is providing the team with regular feedback on progresses and implementations so far.
In some of the teams set in place in the company, the team-leader is more characterised by a “boss” approach of the team, while others are more of a “coaching” concept. It has been noted that some of the former are running the risk of communication being more and more one way (boss to members), with a declining participation of the members. In such cases, the “boss” has to be informed of the danger his team is facing (in some cases he was not aware of the phenomenon), and asked to revert to a more “coached” approach. This experience matches Goetsch and Davis (2003) view that a critical success factor for effective team working is that teams should be coached and not bossed.

Thus, the company is in agreement with the general view that team working is central to TQM, and that a team can outperform individuals. It agrees with the primary importance of clearly defining the team’s goals. The diversity of the members proved to be an element of richness to the teams, and team working proved to enhance trust, communication and interdependency.

10.1.3.5. Working environment

The company has made an attempt to introduce the 5-S concept, as a means to improve its working environment, and has been fairly successful in doing so (see paragraph 7.2.6.5 “Housekeeping evaluation”). This improvement is perceived as being compatible both with the ISO requirements and the TQM concepts. This is in agreement with Pheng (2001) views, who notes the similarities between 5-S principles and ISO requirements, and states that implementing 5-S principles not only promotes good housekeeping but also regular maintenance as well as constant review and evaluation of implemented quality management system.

The company also introduced part of the total productive maintenance concept, by allocating some of the preventive maintenance responsibilities to the workers in charge of operating the equipment. It is thought that total productive maintenance improves working environment, safety and process performance. The success of this technique increased when the company linked it to a measured evaluation and a reward system (see paragraph 8.2.21.6 “Crane operators evaluation”). The company’s success in implementing the total productive maintenance concept is in agreement with Ferrari et al.’s claim that total productive maintenance had a significant impact on all organisations which implemented it.
The company shares the belief of the ISO 9001:2000 (Section 6.4) standard that providing a suitable work environment is essential in order to achieve quality.

Along with Rao et al. (2004), the company placed, from the start, safety as part and even as central of its TQM implementation programme. It agrees with Rao et al. belief that “By showing the employees that they could change things to improve their work environment, management was gaining trust, which laid the groundwork for employee involvement in other areas.”

Although providing a suitable working environment for the employees is rarely mentioned by TQM authors as critical, it was felt by the company to be of importance. Several initiatives were taken in this sense such as 5-S and total productive maintenance. Unlike many TQM authors, the company has placed safety in the centre of its TQM improvements, and strongly believes that it has been right in doing so.

**10.1.4. Process management**

*10.1.4.1. Quality Engineering*

TQM combines both ‘soft’ aspects of TQM such as Quality Management, and ‘hard’ aspects such as Quality Engineering. Quality Engineering is characterised by the utilisation of tools, such as statistical process control (SPC), quality function deployment (QFD), and design of experiment (DoE) Taguchi methods (Hassan et al., 2000). The company recognises the importance of using Quality Engineering tools in order to improve its processes. However, it believes that in order to successfully introduce these tools, the culture of continuous improvement should be in place, which explains why a programme of introducing Quality Engineering tools had only been launched during the third period of TQM implementation.

The company has learnt the hard way the primary importance of the design phase in producing quality products. In 2000, as a means to shorten the design time, the company decided to reduce design verifications (see paragraph 5.1.3.1.5 “A decrease in the Quality of the production”). This resulted in an important decrease of products’ quality. This experience supports the claim of Hassan et al. (2000) who are of the opinion that the emerging quality paradigm calls for quality to be “designed into the product” rather than “inspected on the product” and of Scarnati and Scarnati (2002) who state that eliminating defects in the design stage, before they appear, is vital for quality. However, the company
Daniele Seraphim – Ph.D.

did not discard its product inspection activities entirely, and is still viewing them as important in order to ensure high product quality, to identify possible problems, as well as possible areas for improvement. This might be due to the fact that each product design and production is different for each project, and that the aim of quality production cannot be to eliminate product variability as in mass production, but to eliminate variability in reference to changing specifications.

Quality engineering tools have been initially developed for the industrial mass production. The fact that the company was successful in adapting some of them to a non-mass production reinforces Hassan et al. (2000) study, which reports the following advances in quality engineering tools and techniques: Application of Quality Engineering tools and techniques has broadened to non-manufacturing areas; Quality tools and techniques have been enhanced and modified to suit new challenges in manufacturing and to satisfy the emerging quality paradigm; Significant interest is growing in the use of information technology to enhance the effectiveness of quality engineering tools and techniques; Integration of the tools is becoming prevalent.

It is still early days to claim total success in applying Quality Engineering tools in the company’s processes, as introduction of these tools is very recent. However, first results, in particular about the introduction of SPC, are very encouraging. Among the strategic objectives defined by the company for the forthcoming years, is the introduction and generalisation of Quality Engineering tools utilisation.

10.1.4.2. Six Sigma

Henderson and Evans (2000) note that the Six Sigma phenomenon has followed the TQM movement as the latest thrust for many companies seeking to improve their performance and effectiveness. The company believes however, that in essence, TQM and Six Sigma are compatible.

The company views on Six Sigma meet those of Scarnati and Scarnati (2002), who define “six sigma” as an industry standard for defect free products. They say that although six sigma is a strategy and a philosophy by itself, it is not a quality process programme. Scarnati and Scarnati (2002) highlight that the standards established for profitability are compatible with quality programmes because they ultimately lead to a vast improvement of
products and services, and that the problem solving strategy incorporates detailed data-
gathering and statistical analysis to identify sources of error and ways to eliminate them.

The company views Six Sigma as very similar to TQM, in the sense that it has both a ‘soft’
component (it is a philosophy, and it relies heavily on employees’ training involvement
and empowerment) and a ‘hard’ component (it promotes the utilisation of problem
preventing and problem solving tools). In that, it matches Ingle and Roe (2001) view that
although technically Six Sigma means a product defect rate of 3.4 parts per million, the
introduction of a Six Sigma quality programme means much more than just measuring
failure rates; Its philosophy is to continuously reduce product and process variation; It aims
to find out, control and eventually eliminate all root causes of variation in the
manufacturing process, by using statistical process control (SPC), computer simulation,
short cycle manufacturing, part standardisation and supplier qualification, supplier
statistical process control, participation management practices, design of experiments,
measurement system analysis and failure mode and effect analysis.

In its decision to assume that the optimum level of quality is to aim at reducing as much as
possible product defects, the company has adopted a view very similar to the Six Sigma
one (as reported by Freiesleben (2004)), which is based on the assumption that the most
economical quality level is very close to perfection, and that organisations should aim to a
defect level smaller than 3.4 parts per million.

Instead of opposing TQM and Six Sigma, the company is of the opinion, along with Lucas
(2002), that Six Sigma is a prime ingredient of TQM.

The company believes that Six Sigma is more consistent with the continuous improvement
concept of TQM than with the radical innovation approach of BPR. This matches Jay
Desai (Flaherty, 2004) view that “Six Sigma does not create innovation” and that “Six
Sigma is not a solution for new products or a breakthrough strategy”. However, the
introduction of TQM in the company has fostered rapid and extensive improvement of
effectiveness, in direct contradiction with the TQM theory in this regard (see paragraph
11.4). It is yet to be proven that the introduction of Six Sigma would not have the same
type of effect in an environment similar to the one of the organisation.

Coronado and Antony (2002) report that six sigma projects can lead to a complete waste of
effort, time and money, if any of the CSFs are missing during the implementation phase.
He views the required success factors as: Management involvement and commitment; Cultural change; Communication; Organisation infrastructure; Training; Linking six sigma to strategy, customers, human resources and suppliers; Understanding tools and techniques within six sigma; Project management skills and project prioritisation and selection. When studying the list of CSF for a successful six sigma implementation, as provided by Coronado and Antony, it is apparent that a TQM company would have a higher chance of introducing it than a non-TQM one.

The company is currently studying the implementation or further development of some of the elements of Six Sigma, such as the Quality Engineering tools. It is currently studying in detail some other constitutive elements, such as employee training and the project approach to improvements, in order to introduce the ones which are compatible with the company’s culture, and it strongly believes that the TQM orientation of the company can only facilitate their introduction. Training about “what is Six Sigma”, has started.

10.1.4.3. Process mapping

The company found out, while mapping its main processes that the exercise allowed to clarify the processes, their inputs and outputs, as well as some of their weaknesses. It thus partially matches Gardner’s (2002) view that significant improvement comes from making enhancements to an organisation’s core value creating processes, and that this process starts by identifying, classifying and mapping the key processes used by the organisation. However, the process mapping initiative of the company, was not, as recommended by Gardner, one of the first steps of the company’s TQM implementation process, but was carried out during the third period only. This was certainly due to the fact that process owners believed that they had an excellent knowledge of their processes, and that little could be gained by mapping them. This assumption proved to be wrong, and the company could certainly have benefited from introducing its processes review using flow-charting earlier.

Not only did process flow-charting enable the company to highlight some possible improvements, it also soon appeared that it was a good communication tool, which enabled managers to grasp at a glance the functioning of the company, and external bodies and new comers to acquire easily the basic knowledge about the company’s operations. This meets Reding et al.’s (1998) opinion that the fundamental advantage of process flowcharts over other forms of documentation is that they provide a graphic representation of how these
elements interact, and that carefully prepared flowcharts provide valuable insights about how to optimise process performance in terms of quality, cost and time.

The company’s flowcharting exercise, which was partly based on Telford’s (1996) recommendations in this regard, provided the benefits that he claims it would: it helped the company to understand the complete process and show how steps relate; It was useful in streamlining the process by eliminating redundant steps and non-productive loops; It clarified responsibilities; It showed what the inputs and outputs of each step are; And identified bottlenecks and weaknesses in the process.

The methodology adopted by the company was the one proposed by Telford (1986): Define the process; List the steps involved; Identify responsibilities and subsidiary steps; Draw the diagram; Analyse the flowchart; Further analyse each step, highlighting responsibility, inputs and outputs, customers and suppliers, and measurements.

The company did not have the opportunity to use this exercise in order to compare its functioning with other UAE based companies producing similar products. It tried to take advantage of the study of Sacks et al. (2004) who used flow-charting in order to capture detailed information flows in order to explore operational process differences between several Precast manufacturers, but the flowcharts obtained by the company appeared quite different from the ones reported in that study. Sacks et al. report that companies participating in this study were able to examine their practices in fine detail, in many cases leading to reengineering of their processes. Although the company’s experience in this regard was positive and lead to improvements, it did not trigger a reengineering of its processes.

One of the difficulties faced during process flow-charting was to decide when further detailing was needed, and when to stop. The team had to rely on its intuition and common sense in this regard. This is in line with the remark of Balasubramanian and Gupta (2005) who state that formal analysis of business processes is not easy, and that “among other things there is no one-way to represent processes and there are no standards on granularity of activities and the information that needs to be captured.”

As highlighted by Sandhu and Gunasekaran (2004) the company experienced the fact that “processes involve cooperation, dependencies, different roles, and the various contributions of people, resources and information”, and that when stringent performance
goals are set, individuals have a tendency to concentrate exclusively on their goal achievement, losing focus on the whole process and the common goal. This is true for individuals operating within a process, but also for the different processes within the organisation. Stringent process performance objectives might trigger process owners to take decisions that will positively affect the performance measures of their process, but negatively affect the overall performance of the organisation. Team working is used by the company to counter-balance this negative effect of performance goals, as well as introducing some "interaction" performance goals on top of process performance goals.

It is possible that the flow-charting exercise undertaken by the company would have been even more beneficial by using a process simulation software, as proposed by Greenfield (2002). He advocates using such software to understand complex processes and identify the optimal way to serve customers and shareholders, and defines simulation as a technology which enables the accurate analysis of business processes, through the computerised version of a flowchart design format. The possibility of using such software was examined but rejected for the following reasons: The cost of the software is important; it is often advocated that the process mapping exercise should be carried out by external facilitators, experts in helping companies to communicate and map processes using the mapping software, which is an additional cost.

Thus, the process mapping exercise was beneficial to the company, clarifying processes and their interactions, highlighting possible improvements, and proved to be a useful communication tool. It could have been introduced at an earlier stage of its TQM implementation process. No benchmark information of the company processes against competitors could be obtained using this technique, and it did not lead to process reengineering.

10.1.4.4. Business Process Reengineering

The company was very interested by the BPR concept introduced by Hammer (1990), in his article "Reengineering work: Don't automate, obliterate". Hammer's opinion is that in the fiercely competitive environment of the 1990s, most businesses adopt measures such as rationalisation and automation to improve their organisation, or spend millions of dollars to improve or implement new information technology. He believes that these efforts do not truly improve business operations, but serve only to strengthen false working processes.
However, Maull et al. (2003) report that some studies are showing failure rates as high as 70 per cent and Valentine and Knights (1998) claim that “survey evidence has revealed a failure-rate of anything between 25 per cent and 70 per cent”, rendered the management doubtful that a concept associated with such high risk should be implemented at all.

The management’s point of view matched Selladurai’s (2002), who reports that “TQM takes a moderate amount of risk by working with existing processes whereas BPR assumes a high risk in its efforts, including doing away with the existing methods of operation”. Thus, the holistic low-risk TQM approach was perceived as a more reliable improvement approach, position which was reinforced by the availability of TQM external guidance.

This “jump in the unknown” which was feared by the company, is well expressed by Goetsch and Davis (2003) when comparing benchmarking and reengineering. They state that benchmarking involves partnering with the owner of a best-in-class process so that the organisation might adopt or adapt that process without having to spend the time and energy to try to design a duplicate of the superior process, while process reengineering requires the organisation to do the latter on its own. In their view, process reengineering should only be used when benchmarking is impossible.

The company was not, at first, convinced by Hill and Collins (2000) suggestion that both approaches can be integrated and complementary, and that BPR requires a culture which questions conventional mindsets and fosters the ability to be self-critical, as well as the maturity and creativity to learn from, and act on, what is discovered, which can emanate from a TQM foundation.

However, when reflecting on the improvement initiatives introduced by the company over time, and based on Hill and Collins (2000) view that TQM is an incremental approach to change while BPR is a radical innovation change strategy, several of the company’s initiatives appear to be more related to the BPR approach than to the TQM approach:

- The improvement in the Strategic Planning process introduced during the first period (see paragraph 6.2.2.2), is more a radical innovation than an incremental improvement. (Subsequent improvements introduced during the third period however, are more of an incremental nature.)
The complete review of the organisation's structure (see paragraph 6.2.2.12) has a lot in common with the BPR concept.

Improvement in the Quality Control (see paragraph 6.2.2.19) and in the Planning processes (see paragraph 7.2.6.8), are radical changes to the previous process operations.

Thus, although the company decided to base its improvement programme on TQM principles and not on BPR, some of the process improvements introduced were radical ones, while others were more of an incremental nature. However, the BPR approach used by the company was limited to specific processes, while the overall improvement strategy remained TQM oriented.

This matches the view of Hill and Collins (2000) that both approaches can be integrated and complementary, and Selladurai (2002) belief that TQM and BPR together rather than separate would be more beneficial to an organisation.

While during the first and second period the BPR characteristics of some radical process improvements were not identified by the organisation, the BPR concept and its relevance to the company was explicit during the third period.

The company found an original way of reconciling TQM and BPR, using the advantage of its fast growing characteristic. In-depth studies of current processes could be the basis for both TQM improvements of the examined process, and BPR for similar processes to be set up in new locations. Results are proving that this approach works: current processes are improved; processes in the new locations are showing break-through enhancements.

The company believes that its TQM culture is an important factor of its success in implementing this original approach to the simultaneous utilisation of TQM and BPR. Its experience is thus in favour of McCabe's (1998) belief that business process reengineering is complementary to TQM.

The experience of the company matches Valentine and Knights (1998) view of the "second-generation versions of BPR", characterised by a closer alignment between "human" and "technological" issues and the taking into consideration the cultural context of the organisation.
During the third period, the company started following Greasley (2003) proposal of using Business Process Simulation in order to carry out scenario analysis (see paragraph 8.2.19.4.6).

10.1.4.5. Formal documented quality management system

The company’s experience of ISO certification, is that it can either help a company to perform better, or it can be a hindrance to improvement, depending on the circumstances. This is consistent with Bryn’s (1995) view that standards are tools that do not achieve quality, but can provide the means to achieve quality when properly applied.

During its history, the company experienced both the ISO as a driving force for improvement, and as a withholding force against improvement, which may explain why Martinez-Costa and Martinez-Lorente (2003) noticed the dissentions in the literature between authors who report the positive impact of ISO certification on firm performance, and those who report the lack of correlation between those two elements.

The company believes that the possibility of ISO being a hindrance to effectiveness was more likely to occur with the 1994 version than with the 2000 version. This can be linked to Pheng and Fond (2002) report that previous versions of ISO 9000 were criticised by many as being too quality control oriented and behind the times in its quality management concepts. The company’s experience agrees with their view that if positive impact of ISO 9000:1994 upon firms’ competitiveness were often reported, some negative effects were also highlighted, such as ‘unnecessary’ bureaucracy and paperwork, increased costs and stifling of innovation.

The company believes, along with Pheng and Fond (2002), that the introduction of ISO 9001:2000 should act as a better foundation for firms to head towards TQM, and that the eight quality management principles on which the version is based are in line with the TQM concepts: Customer focus; Leadership; Involvement of people; Process approach; System approach to management; Continual improvement; Factual approach to decision making; Mutually beneficial supplier relationship.

The company’s perception of the new version of ISO matches Conti’s (2004), who notices that ISO 9001:1994 has a high standardisation and a low TQM content, while ISO 9001:2000 has still a high standardisation but a higher TQM content. He also notices that
ISO 9004:2000 (on which the latest version of the SKIA is based) has a lower standardisation and a high TQM content, which matches the company's view.

This is confirmed by Curry and Kadasah (2002) claim that there is now a stronger correlation between ISO 9000 and TQM.

Originally, the ISO 9001:1994 certification of the company brought very positive impacts to its management system. However, as time passed and as the company viewed its certification as a commercial move only, it locked the company in a set of practices which no longer added any value to its processes. When the company decided to implement TQM principles, the inefficiency of its ISO procedures was highlighted, and it was decided to correct this situation. The company has been successful in this attempt, and its ISO 9001:1994 was again acknowledged as having a positive impact on the company's performance, and was very useful when introducing TQM improvements. This possible usefulness of ISO certification in the TQM implementation process is reported by Chapman and Al-Khawaldeh (2002) in their study of Jordanian industrial companies. They view ISO 9000 as an excellent, perhaps essential, foundation for TQM principles because it provides management and employees with the knowledge and expertise to build, improve and maintain the total quality approach, and they emphasise the complete compatibility of the ISO 9000 approach and the total quality philosophy.

The company's view of ISO is similar to the one expressed by Scarnati and Scarnati (2002), who see the ISO certification process as a precursor to quality, because it requires an organisational effort to define policies and procedures that may lead to excellent products or services, and because ISO certification requires that employees be empowered in the design and implementation of procedures that map practices for the delivery of products and services.

As the company acknowledges the determining importance of its participation in the SKIA during its TQM implementation process, it can only support Conti's (2004) suggestion to harmonizing the ISO 9001 certification and the awards assessment, in the sense that the standard should quantify the degree of compliance of the assessed system using a reliable scoring system. Conti's (2004) proposal that ISO assessments should at least propose a rudimentary measuring system, in the form of four quality ranges: insufficient, sufficient, good or outstanding, is backed up by the company as worth studying. He points out that
precise assessment procedures and scoring standards would also be beneficial to assessor, helping them to better articulate their judgement.

Thus, the company’s experience proves that ISO certification can be either positively or negatively linked to the organisation performance, depending on the way it is used, which might explain the dissention noted in literature. It strongly believes that there are less chances of misusing the 2000 version of ISO, which is closer to TQM principles. It experienced that when properly used, ISO certification can be very useful to a company wishing to implement TQM principles.

10.1.5. Supplier Management

The company’s experience matches Goetsch’s and Davis’ (2003) point of view that it is important to switch from an adversarial relationship with suppliers to a partnership one. It agrees with their definition of traditional relationship with suppliers as characterised by adversarial activities such as low-bid process, in which at least one and often both parties lose: Buyers use their leverage to force suppliers to absorb costs to win the low bid, and suppliers look for ways to minimise their losses by barely meeting the buyer’s specifications.

Along with Oakland (2003), the company noted that purchasing in partnership requires an increased level of communication with external suppliers. However, the company did not entirely reject the inspection-oriented quality system for brought-in parts and materials, as advocated by Oakland, but favoured spot-checking, with in-depth review of supplier’s performance both internally and with the suppliers themselves. The company also decided against single sourcing which is recommended by Oakland as the best basis for partnering, as its usage proved that it left the company too vulnerable to suppliers’ decisions.

If the company’s view is in agreement with Sadler’s (1995), who states that an important aspect of the overall change brought about by a TQM approach is a changed relationship with suppliers, it noted that partnering with suppliers could not be successfully implemented unless the organisation is in a financial position that allows it to meet the payment agreements made with its suppliers.

The view of Gordon (2005) who highlights the importance of aligning the performance goals of the supply chain is shared by the company. It undertook to foster such alignment
by inviting its key suppliers to TQM training. However, it is not in a position to impose its continuous improvement programmes and methodologies to its suppliers (as a huge automotive organisation could do for example), but has to rely on increasing the knowledge of its key suppliers to the advantages of its improvement choices.

Along with Poirier and Houser (1993), the company believes that the price-only approach to buyer-supplier negotiations should be eliminated, and that product features, quality, and delivery issues should also be part of the negotiations.

As a company who requires high quantities of heavy and voluminous raw material such as sand, cement or aggregates, in order to perform its production process, the company had been, from a long time, aware of the inconveniences of holding large stocks. It had adopted the concept of 'just-in-time' delivery of raw material, even before starting on its TQM implementation process. This experience corresponds to Oakland’s (2003) view that organisations should set in place processes in order for suppliers to make frequent on-time deliveries of small quantities of material, parts or components. He highlights that it requires an effective supplier network that can be trusted to conform to the real requirements (Oakland, 2003).

The company experienced the drawbacks reported by Beckford (2002) of using single sourcing: The buying organisation may close itself off to other options, and may reduce its leverage in price negotiation with the supplier, particularly when supplier power is high. It becomes vulnerable to changes in strategy, tactics or performance by its supplier. After a few problems with single source suppliers which provoked complete halts of production, the company decided to revert to multiple sourcing. Recently, however, the company is aiming to define formal partnerships with some of its suppliers, which should eliminate possible negative effects of single sourcing, while enhancing its positive effect.

Thus, the company’s experience confirms that partnership relationship with suppliers is highly beneficial. However, these can be developed only once the organisation can reliably carry out its payment commitments, and keeping in mind that the relationship should be mutually beneficial in order to be successful. The organisation attempts to influence its key Suppliers towards adopting TQM principles, through training. Several experiences led the company to reject single sourcing whenever the day-to-day production could be affected.
by a supplier's lack of delivery, but recent efforts of defining formal supplier partnership agreements may lead the company to revise its position.

The company is currently considering a supply base rationalisation process, as advocated in the April 2005 issue of “Supplier selection & management report” (Ioma, 2005), based on the analysis of current spend data, on segmentation in spend categories, and on specific supply strategy for each category. The advise of Clarke American (2001 Malcolm Baldrige Award Recipient) (Ioma, 2005a) to complement internal segmentation with “Supply Preferencing” is also under study.

Taking into consideration Bowon and Heungshik (2005) claim that a decision-making process dominated by one party in the supply chain is not sustainable, and that partners can expect better performance from their collaboration when both of their perspectives are accommodated equally, partnership agreements are mostly developed with companies having a power leverage similar the company under study.

When studying the CSF for a successful supply chain project proposed by Favilla and Fearne (2005) (1 – The right leadership. 2 – The right business focus. 3 – The right approach. 4 – The right results. KPIs to measure project’s performance), it appears that a TQM company would have a greater chance of success in the implementation of a supply chain project than a non TQM organisation, which is a further argument in favour of the strategic deployment of such a project in the company under study.

As supplier management improvements could only be initiated during the last phase of TQM implementation project, the company cannot yet demonstrate success or failure in this regard.

However, it is of interest to note that some of the issues identified by the Supply Chain Management literature are similar to internal issues faced by the company. For example, Simatupang and Sridharan (2005) identify disintegrated measures of performance as a deficiency in the supply chain, and define it as a situation where chain members measure their performance according to “individual metrics isolated from the entire goal because each player has been managed as a single entity”, which occurs because of the flawed assumption that “the sum of local optimisation taken by individual members is equal to the total improvement”. A similar situation was faced internally by the company when it was identified that departments had a tendency to concentrate exclusively on process measures.
loosing track of overall company measures, creating organisational dysfunctions, highlighting that the sum of process optimisation is not equal to the total improvement of the company as a whole. Similarly, the antidotes used by the company are close to the ones proposed by Simatupang and Sridharan (2005), even if the environment is internal and not external: Provide process owners with performance measures of the entire organisation (the Balanced Scorecard system was of valuable use in this regard); Define some inter-process measures, such as the measure of the satisfaction of other processes with a given process.

10.1.6. Awareness and concern for the needs of the society

Following the point of view of the SKIA, the company has linked its TQM implementation with its social accountability. It shares the belief of Gentili et al. (2003) who state that TQM, corporate social responsibility and strategic performance, can be successfully interlinked, and that only then can the organisation create economic, social and environmental value.

The position of the company in this regard was strongly influenced by its participation in a TQM award, which matches the Corporate Social Responsibility concept of the EFQM Excellence model, and is described as the engagement of the organisation to meet and exceed the expectations and regulations of the local and global community, and the awareness of the organisation’s impact on both the current and future community.

The company shares Oakland’s (2003) belief that environment and corporate responsibility should be part of the policies and strategies of a TQM organisation.

The company trusts, along with Ahmed and Machold (2004), that ethics and organisational morality should be an integral part of quality management. It seconds their suggestion that TQM must embed more deeply and firmly the issue of virtue and social responsibility within its domain of content, as quality and ethics are intimately related.

Thus, although corporate social accountability is rarely mentioned in the literature as a critical successful factor for a TQM implementation, the company believes that it is important to TQM implementations, because it matches the concept that the existing aim of a company is not only to satisfy its shareholders, but to satisfy all its stakeholders, including the society in which it operates. It also believes that employee satisfaction is
positively influenced by the knowledge that the organisation they work for is providing value to the society.

10.1.7. Customer and market focus

One of the primary aims of the company in embarking in its TQM implementation process was to improve its customer satisfaction to a level that would induce its customers to develop or maintain privileged relationships with the company, and attract new customers in order to sustain its growth policy. Its view about customer satisfaction is thus similar to the one expressed by Galbreath (2002) in his article examining success in the Relationship age, in that being merely "satisfied" implies that the customer is sitting at the point of indifference which is not enough, and that an organisation should strive to enhance customer loyalty, because loyal customers not only buy again and again, but they tend to be less price sensitive because they perceive more than just dollars-and-cents value from the relationship.

Galbreath (2002) also highlights the importance of knowing the customers, position which is shared by the company, which deployed considerable efforts in collecting and analysing customer satisfaction indicators.

The importance of knowing the customer, and particularly customer expectations, as noted by Bryn (1995), is evolutionary. "What they were pleased with yesterday, they will complain about tomorrow. To achieve quality consistently it is necessary to research and anticipate their needs." Thus, the company shares Bryn’s belief that market research needs to be part of the quality system as well as Goetsch’s and Davis’ (2003) claim that continual communication with customers is essential in a competitive marketplace. Following their lead, the company established an effective mechanism for facilitating communication with its customers and making sure such mechanism is used to set improvement objectives. It also set in place a mechanism for systematically collecting market data, and uses it to attempt to anticipate the evolution of the market, and of its clients’ requirements.

One of the shortcomings of the company’s former quality system was its inability to report truthfully customer complaints, or to use complaints data to introduce improvements. The company actively fought to make this element of its Quality System effective, as it believes along with Bryn (1995), and has proved right in this belief, that encouraging customers to express their complaints as well as effective and timely resolution of these
complaints are vital to retain customer loyalty. Bryn states that “research indicates that among those who are not happy and don’t complain, over 90 per cent do not come back. Among those who do complain and have their complaints resolved quickly over 80 per cent return.”

The company’s experience is consistent with Karapetrovic (2003) viewpoint of the expansion of the old meaning of quality as the ability to satisfy the customer, in two directions: The ability to deliver excellence to all interested parties. Thus, a TQM company should not aim to deliver satisfactory products to its customers, but excellent products, and should not limit its objective to providing high satisfaction to its customers, but extend it to all its stakeholders. The company, however, would add a third expansion on the old meaning of quality by stating that it should not only deliver excellence to all interested parties, but also strive to identify what will delight them tomorrow.

In order to improve its knowledge of customer satisfaction, the company has introduced a customer satisfaction survey. Results from this tool are successfully used to set strategic objectives and measure company progress in this regard. This comforts Building Magazine’s (2002) report that regular measures of customer satisfaction is an effective way of keeping track of what clients really value and ensuring the focus on often rapidly changing needs. Analysing its difficulties to collect survey answers, the company decided on the second year of running of the scheme, as advocated in this article, to collect answers through independent people (a summer student in the company’s case) using a one-to-one basis interview process. This collection process proved highly effective, increasing the number of collected answers as well as the knowledge obtained through each answer, and projecting the image of an organisation which deeply cares about the opinions of its clients.

Allen et al.’s (2005) survey proves that measuring customers’ perception is of the highest importance, or a company might be misled to overestimate customer satisfaction.

Craig and Roy (2004) believe that customer-satisfaction measurement is one of the primary means for focusing an organisation on the customer, and that those measures should be used to identify priority areas for improvement. The company’s experience agrees with the importance of customer-satisfaction measurements, and believes that a TQM company should strive to improve its customer-satisfaction measuring system. It also agrees that
strategic objectives for improvement should be drawn according to the knowledge obtained.

The company also sets some of its objectives for continual improvements on the belief that internal customer satisfaction leads to external customer satisfaction. Ishikawa (1985) defined the concept of internal customer as “the next process is your customer”, and Bryn (1995) states that in an organisation each individual should consider the relationships with those around in terms of supplier-customer links, which matches the company’s opinion.

The company’s position is similar to Vora’s (2004) who claims that employee satisfaction is a prerequisite to achieving customer satisfaction, as “without looking after the well-being of your own people through trust and care, do not expect your employees to help your customers”.

There is little doubt, thus, that customer and market focus is highly important, that a TQM company should strive to gain a good perception of its client’s satisfaction, should use the obtained measures to set improvement objectives in this regard, and should try to anticipate future customer requirements. The company establishes a strong link between internal customers’ satisfaction and external customers’ satisfaction, as well as between employees’ satisfaction and clients’ satisfaction.

10.2. Specific issues in the Construction industry

10.2.1. The specificity of construction projects renders some of the TQM tools difficult to implement in the construction industry.

During its TQM implementation process, the company had to take into consideration that, as stated by Chini and Valdez (2003), the construction end product is not a repetitive unit, but an endeavour that may be unique in its design and composition, and that by this characteristic it defers considerably from the mass production industries in which TQM principles were first implemented.

This difficulty is also reported by Jaafari (2000), who notes that if the concept of TQM is particularly suited to manufacturing and similar operations where the production cycle is repetitive and one is able to establish feedback loops, the opportunity to apply TQM in the construction industry is limited, due to the fact that construction operations are typically short lived and diverse. However, the company’s experience proved that if TQM
implementation is not as straightforward for a company which operates in the construction industry than for one which operates in mass production, its principles can still be successfully applied, even if it means selecting the tools which have the higher chance of being useful, and in some cases adapting them to the specificity of the construction industry.

The difficulties faced by the company are in line with Chini’s and Valdez’s (2003) survey of U.S. Construction industry, which highlights that Construction companies have experienced difficulties in implementing ISO 9000, generally related to documentation requirements, which is perceived as slowing down the construction process and generating bureaucratic procedures, but that those which decided to implement this standard have generally found it applicable for construction firms.

The difficulties faced by the company in rendering its ISO Quality System effective, may be partly linked to the construction characteristic of “one project, one design, one production”. This would account for Jaafari’s (2000) report that the imposition of QA standards has not necessarily improved the construction industry’s capabilities to meet the needs of its customers more cost effectively, nor has it led to any product cycle time reduction or cost savings. The experience of the company proves, however, that if there is no certitude that an ISO 9000:1994 leads to increased performance in the TQM sense, particularly for non-mass producing organisations, this standard can be successfully used to increase performance if the applicant has decided to use it in this sense. The company also believes that with the 9000:2000 standards, the link between certification and increased performance in the TQM sense should be stronger.

As examined in paragraph 8.2.11, the company faced difficulties to measure quality cost, and finally decided to limit itself to partial measures of costs of prevention and appraisal, and a partial measure of costs of failure. Similar difficulties are noted by many construction companies, and Aoieong et al. highlight that due to the complexity of construction processes, measuring quality costs is often difficult, and often limited to failure costs. They report that a recent survey carried out in Hong Kong indicates that the respondents do not measure costs related to defects.

The company also faced difficulties to obtain detailed benchmarking data about competitors, both locals and internationals. This difficulty is confirmed by Love et al.
Daniele Seraphim – Ph.D.

(1999), who state that a lack of available benchmark metrics in the Construction industry has made it difficult, if not impossible, for organisations to identify areas to target for process improvement, and by Jaafari (2000) who claims benchmarking is difficult in the construction industry, where project orders are highly diverse, the best practice is also dependent on the unique characteristics of a project under consideration, including the project environment, owner expectations, and other situational variables.

Although the company is not very satisfied by its partial measures of costs of scrap and rework, it appears that this limited achievement is however better than the normal practises uncovered by Love et al. (2000) in their study about construction organisations, who report that rework costs are very rarely, if ever, measured in this industry.

The discovery of the usefulness of the BPR theory in the company’s context, was made more by chance than by a managerial wish to try and apply its principals. It was effective only because the company was in a period of rapid growth, and that processes were regularly set in place in new locations, which enabled the company to use the positive principle of rethinking entirely a process, without its negative counterpart of having to destroy it first. It is very doubtful that without this context of rapid growth, the company would have used the BPR concept at all. This is in line with Jaafari (2000), who reports that the BPR movement has had little impact on the construction industry to date, and that many construction management writers are sceptical about BPR application to construction projects.

Thus, the uniqueness of construction projects renders some of the TQM tools harder to implement. This does not mean, and the company’s experience is a proof of it, that the whole TQM concept is not applicable to and cannot be effectively used in the construction industry. It merely means that the specificity of the construction industry has to be taken into consideration when introducing TQM tools.

10.2.2. Working conditions: the critical importance of Safety

At noted earlier, the issue of safety is rarely quoted in the TQM literature as a critical success factor. However, the company decided to place safety improvements at the centre of its TQM implementation process, feeling that the importance of this issue in the company’s context justifies such central place, and that safety is a critical element of TQM. This is in agreement with Koeln et al.’s (2003) study about Construction Engineering.
which highlights that quality, environmental and safety programmes not only assure a quality product but also reduce costs, and enhance productivity.

Governments have also been taking strong views about the importance of safety, and in the United Kingdom, for example, the government initiatives towards reduction of accidents are a driving force towards a safe construction working environment, and reports such as "Zero Injury Techniques" are providing companies with studies and help in this regard. It may be noted that the UAE government is increasingly concerned about safety issues, is starting to reinforce laws and recommendations in this regard, and is increasing its checks that these are implemented. It may be noted that according to the company's experience, the safety level in the UAE is lower than in the west, and the UAE government has an important role to play in raising it.

Not only does the company take initiatives in order to increase the safety level in the organisation, but it has also placed safety among its core values. Thus, safety is the criterion or part of the criteria examined for several schemes (safety representatives, crane operator evaluations, employee of the month...), and adherence to the safety core value of the company is also examined during appraisal. This identification of safety as a core value is very similar to the concept of 'safety culture' which has gained international popularity over the last decade. Mohamed (2002) views safety culture as a subfacet or organisational culture, which affects workers attitudes and behaviour in relation to an organisation's ongoing safety performance.

The company is currently starting to implement the risk assessment tool proposed by Jannadi and Almishari (2003) in order to increase safety. It is basing this improvement on the authors' definition, and on the formulas they propose to use, in order to decide which action to implement:

\[
\text{Risk Score} = \text{Severity} \times \text{Exposure} \times \text{Probability} \\
\text{Justification Factor} = \frac{\text{Risk Score}}{[\text{Cost Factor} \times \text{Degree of Correction}]} 
\]

The proposal of Mohamed (2003) of adopting the balanced scorecard tool to measure the safety culture in construction, based on the argument that it would ensure that a holistic view of safety is used for strategic reflection and implementation, is currently under study.

The company believes that increasing the safety level should be an essential part of the TQM implementation process for any organisation which operates in the construction
industry. It also believes that the TQM theory as a whole should emphasise more on the safety issue.

10.2.3. Construction Process performance: Waste reduction

If one of the TQM principles is to reduce or eliminate waste, this concept has had a large resonance in the construction industry, in which wastage is reported as exceptionally high. Formoso et al. (2002) estimates that considerable savings could be made through waste reduction in the construction industry. The concept of Lean Management often appears in the Construction literature as Lean Construction. Ball and Maleyeff (2003) define Lean Management as "a total business approach designed to identify and eliminate forms of waste in the process of producing goods, services, or combinations of both. Formoso et al. (2002) define waste as the loss of any kind of resources – materials, time (labour and equipment), and capital – produced by activities that generate direct or indirect costs but do not add any value to the final product from the point of view of the client.

Santos et al. (2002) propose to reduce waste by reducing processing variability and flow variability. The company examined how this concept could be used to its benefit. In order to answer this question, it first had to find out what kind of wastage it generated.

Material wastage was initially thought to be mainly linked to the production of non-conforming products, and other material wastage was thought to be limited: in the factories, wastage was thought minimum as the production is more controlled than an ‘in-situ’ site construction can even be; on site, limited materials are used apart from the Precast panels sent by the factories. Thus, the company deployed efforts to reduce non-conforming products, and was highly successful in this regard.

In parallel, the company decided to try to reduce other material wastage by observing employees at work, by raising their attention to the importance of limiting wastage to a minimum, and by measuring material consumption per cubic meter produced, highlighting and communicating progress in wastage reduction. This initiative is in line with Richard O’Connor’s (Pedder, 2002) advice who proposes applying the lessons of the automotive industry to the construction industry, and to reduce waste by observing employees at work and eliminating resource bottlenecks. The company was more successful in this attempt than it originally thought it could be, and managed through reduction in non-conforming
By observing work on site, it soon appeared that another type of wastage was critical to the company’s performance: wastage in manpower. Workers spent long hours waiting because one element critical to their trade was missing (the crane was not available, panels did not arrive on time, the site was not yet ready for erection, etc). Whenever these ‘waiting reasons’ were dependant of the company (other processes mostly), the company deployed important efforts to improve its logistic. However, many of the ‘waiting reasons’ were not dependant of the company. The company adopted the view of Thomas et al. (2003), who suggest that reducing workflow variability does not necessarily lead to better performance, and that in the construction industry, better labour performance occurs when the variability of workflow is matched by the requisite flexibility (variability) in labour flow. He maintains that as variability in construction output at the crew level is inevitable, even on high performing projects, changes in workflow should be matched with flexible work assignments. He suggests that multi-skilled labourers, allocation of labourers to other production tasks when required, and overtime may be used to match the variability of the sites.

Thus, in order to limit sites manpower wastage, the company decided to adopt Thomas et al. (2002) recommendations, of assessing the daily amount of work available and adjusting work hours accordingly, in order to maintain low variability in labour productivity, using the following techniques: “Work hours can be adjusted by reducing crew sizes, shortening workdays, or making alternate work assignments.”

Surprisingly, studies demonstrated that waiting time in factory processes were also important (see paragraph 8.2.19.4). In order to reduce manpower wastage, the company decided to encourage multiskilling, matching the view of Haas et al. (2001) in this regard: They report that several researches have demonstrated the benefits of multiskilling, including labour cost saving, reduction in required total hires, increase in average employment duration for workers per project, improved quality, improved safety and the added flexibility in assigning tasks by field managers. Using these techniques, the company could considerably reduce manpower wastage, and increase its productivity.
Thus, the company’s experience is in accordance with the literature which states that wastage in the Construction Industry is high. It demonstrated that both material wastage and manpower wastage could be successfully reduced.

10.2.4. Primary importance of Product Design

In the construction industry, the design of each project is unique. For the company, a project is a set of panels having an average of 120 different types, each type having a separate design, which when fitted together should form or match the design of the construction edifice. The company’s experience is showing that any design mistake in a panel type or in the overall design might have important repercussion on the quality of the project, and on its cost. This matches the importance of the design process in the construction industry, reported by many authors: Cnudde (1991) researched the origin of failure costs in the construction industry, and reported that 46% of total deviation costs were created during design, compared to 22% ascribed to construction deviations, which were due to poor execution of work; Koskela (1992) suggests that it “sometimes seems that the wastes caused by design are larger that the cost of design itself”; In their study about direct failure rework costs in Swedish Construction companies, Josephson et al. (2002), measured that design-related causes are the largest contributor to the overall rework costs, with a percentage of 26%.

The importance of the design stage has brought forward the concept of Value management in the construction industry. Barton (2000) defines Value Management as “a structured, facilitated, process in which decision-makers, stakeholders, technical specialists and others work collaboratively to bring about value-based outcomes in systems, processes, products and services”. This concept implies an in-depth study of what are the values of the stakeholders, and how best to fulfill them at the lowest cost. This technique is seldom used in the UAE, although emerging in recent years. In the vast majority of the cases, the client selects a design proposed by architects. A bill of quantity is then elaborated and sent to the subcontractor. Very little efforts are made to enhance values through alternative designs.

When Value Engineering concepts are used, the company is often viewed as a possible partner because of its reputation for Quality. It believes that Value Engineering concepts will be increasingly employed in the UAE, and that the TQM culture in place in the company should allow it to play an active part in their establishment.
Daniele Seraphim – Ph.D.

The company is internally using the concept on a limited scale: The client’s values are deemed to be the ones represented by the architectural drawings provided to the company. While respecting the architecture the company is routinely studying alternative panel designs that will maintain these values while limiting the production costs. This technique, although increasing design costs, decreases production costs. Design employees coming out with original suggestions are rewarded for their participation.

A second partial utilisation of the value engineering concept is sometimes implemented by the company: While studying tender documents, it happens that the commercial and technical team finds out that there is an alternative solution, not mentioned in the tender, which would preserve and sometimes enhance the client’s values, and reduce the production cost. If this is the case, the company may propose this alternative solution to its potential customer. However, it happened that the client, seeing the potential opportunity of the alternative proposed, would re-tender it to all precast subcontractors, and thus the efforts deployed by the company in proposing it are not beneficial to the organisation. Thus, the company tends to limit such initiatives to clients with whom it has developed a partnership relationship.

In brief, the company’s experience matches the construction literature opinion about the primary importance of the design stage, and of the quality of construction products being strongly linked to their design. Value Engineering, which is viewed by the literature as a valuable tool in enhancing the design qualities, is only emerging in the UAE, and the company is willing to play an active role in its success in the Emirates context.

10.2.5. Project Partnering

Partnering, which is not specific to the Construction industry, has been viewed as one of the most innovative developments in delivering a construction project efficiently and reducing construction disputes (Chan et al., 2004). However, this concept is still rarely being used in the UAE.

Its acceptance in developed countries appears to be linked to government initiatives. As an example, reports such as “Constructing the Team” (Latham 1994) and “Rethinking Construction” (Egan 1998), have encouraged U.K. based construction companies to adopt this concept, which is based on a preliminary agreement among all parties of a construction project, including all suppliers and customers, to shift from the traditional adversarial
relationship to cooperation, through increased communication in view of selecting synergic solutions in an atmosphere of mutual trust. The company is of the opinion that unless the UAE government takes an active interest in the partnering concept, there is little chance that it may generalise in this country. However, if it did decide to promote it, and because of the important number of construction government projects, it may considerably modify the construction industry of the Emirates.

One of the benefits of partnering would be to minimise or even eliminate claims between clients and construction companies, which are antagonist to the TQM concept of customer focus. Mitropoulos and Howell (2001) are reporting the mechanism used by partnering in order to prevent disputes and/or minimise their costs: (1) reduce uncertainty, (2) reduce contractual problems, (3) increase ability to resolve problems, and (4) establish alternative dispute resolution mechanisms. In its efforts to implement TQM principles, the company noticed that a claim with a client destroys trust and partnership, and very often results in the supplier’s elimination from the ‘selected suppliers’ list of the client. Therefore, important efforts were deployed in order to prevent claims (see paragraph 7.2.12.4). The use of partnering as a means of avoiding claims and promoting cooperation would certainly be welcomed by the company, and would be aligned with its TQM philosophy.

On a smaller scale, the network of supplier and client partnerships developed by the company would be useful in partnering projects. The concept of partnership developed by the company appears to be relevant to Telford (1996) definition of alliancing (or partnering) as the business relationship between customers, contractors and suppliers working together on a project (or several projects), sharing the risks and rewards. However, as the company is generally employed as one of the subcontractors, it is not in a position to promote such type of contract, even if it is more than willing to participate, when one of its clients is expressing such wish (only twice so far, both projects being still at a preliminary stage).

The advantages of partnering, as expressed by Chan et al. (2004) (it lowers the risk of cost overruns and delays; it increases the cost control over the project; it increases the opportunity for innovation; it improves open communication and promotes trust among project parties), is in line with the culture of a company promoting TQM principles.
Thus, the company believes, along with McCabe (1998), that business process partnering is complementary to TQM.

Walker and Keniger (2002) report that the decision of adopting project alliancing is generally made by the client, and that the partnership is formed on this basis. Thus, in order for partnering to emerge in the Emirates, knowledge about this concept and its relevance in the UAE context should be made available.

Thus, the company believes that introducing partnering in the UAE can be beneficial to the Construction Industry. The company is more than willing to participate in such initiatives, and trusts that its TQM culture is a plus to the partnering success. The initiative, however, has to come from the clients, and the government should take an active participation in promoting such contracts.

**10.2.6. Clients as the driving force towards Quality**

In the literature concerning quality in the construction industry, it is often mentioned that the client is holding part of the responsibility for quality. Some authors, such as Cnuddle (1991), are even going as far as suggesting that clients are responsible for ensuring quality and economy in their construction projects. This is rather in contradiction with the quality issue views in other industries, where clients' active role is generally limited to a purchasing (or lack of purchasing) action, which is thought to be linked at least partially to the quality (or the lack of it) fixtures of the offered product or service. However, the literature sometimes gives a more determining role to the client. For example, it is generally admitted that client's pressure is one of the main reasons for organisations to aim for ISO certification. However, the conviction shared by several authors that clients are responsible for quality of their construction projects is quite unique to the construction industry.

This unique place of the client is also noted by Shen and Liu (2003), who identify the driving force for the utilisation of value management as the client, and is present in the “Accelerating change” report issued by the strategic forum for construction, in which client leadership is identified as a key element towards a more successful UK construction industry. This is in contradiction with the situation in the Emirates, in which the client generally takes a narrow responsibility towards quality, limited to the selection of suppliers.
which are deemed to be able to deliver quality, and a close verification that the agreed
quality is provided.

This unwillingness of construction clients in UAE to take a more active responsibility
towards quality may explain why techniques, which are at the basis of the positive changes
noted in the construction industry in developed countries over the last few years, are only
emerging in the Emirates.

10.3. Specific issues in the Precast Manufacturing industry

From 2003 onwards, the company performed a TQM literature review in order to identify
possible TQM improvements that had not been highlighted by its participation in the
SKIA. It soon appeared that the subject of TQM in the precast manufacturing industry has
received very little literature coverage. This is in line with Sacks et al. (2004) affirmation
that work on management practices in the precast construction industry is sparse.

This may be due to the low percentage of utilisation of precast manufacturing in the
construction industry as reported by Sacks et al. (2004), who claim that although precast
concrete offers significant potential advantages in quality, speed of erection, and cost, its
share of the overall construction market in North America is very low (approximately
1.2%), and around 18% in average across the European Union. The company could not
obtain figures about the importance of the precast manufacturing sector over the UAE
construction industry, but its experience makes it believe that it is very probably lower than
10%.

10.3.1. Possible higher quality of Concrete Products

Mike Dowing (2002) reports that on site, quality can be a hit-and-miss affair, while in the
factory, quality control is the number one priority. Everything is under control, from the
raw materials, to the mix design, formwork, finishing and curing. The opinion of Mike
Dowing is consistent with the company’s experience. The company set in place in the
factory a control over received material and over production processes at all stages,
minimising the risk of non-conformance. In the event of a product presenting a quality
issue, it is in most of the cases detected on the factory ground, and seldom reaches the
construction site, if the Quality Control set in place is effective. Therefore, the company
shares Mike Dowing’s opinion that precast concrete products are of higher quality than
most site-produced ones. This doesn’t mean however, that a precast manufacturer should
not strive to increase further the quality of his products, and the company’s historic evolution proves that the quality of precast products can be significantly improved by improving processes and increasing quality prevention activities.

Although precast manufactured elements are often more expensive than cast-in-situ, it is often preferred by the client when panels have to assume a decorative purpose on top of their structural one (or when decoration is their only purpose). This experience reinforces Walker’s (2003) claim that precast concrete structures can simultaneously serve both an engineering and a decorative purpose, and that skilled workmanship in factory conditions results in a very high quality, accurate finish.

While the company strove to implement TQM principles, it found out that the high level of rationalisation advocated as a critical success factor for mass-production industries, could be only partially achieved in the case of a precast production. However, it appears that the level of rationalisation possible is higher than when construction is performed in-situ. This is in accordance with Christa’s (1999) report that the moving of production into the factory helps to get higher rationalisation.

If control over processes results in less non-conforming production, final inspection of products before leaving the factory grounds, reduces even more the chances of a non-conforming product reaching a site. This is reinforced by the possibility given to the client to perform quality checks prior to site delivery, in addition to the company’s own controls. There is little doubt, therefore, as stated by Dowling, (2002) that precast concrete increases the certainty of quality.

The company identified that Precast production is favoured over in-situ production in the following cases: The high number of similar elements to be produced provides a cost edge over in-situ casting. Construction time is a critical issue for the client. Construction quality is a critical issue for the client. The project cannot be executed in cast in-situ. This last case is reported by Friedrich, (2003) who states that “what is very difficult or impossible to create using site concrete can easily be produced using a special form of construction for prefabricated element panels”.

The company’s experience proves that if the quality obtained using precast manufacturing can be higher than when using in-situ techniques, precast processes and production still need to be controlled, and further quality improvements are possible and desirable. If a
Daniele Seraphim – Ph.D.

When comparing its usage of labour on sites and in the factories, the company found out that the labour-force wastage on site is higher, because there are more possible causes of work interruption which are not under control of the company on site, than in the factory. This would confirm Mike Dowling (2002) claim that factory manufacture is much more efficient in its use of labour. However, detailed analysis of workflows in the factories demonstrated that there is fair ground to believe that labour efficiency may be improved, even in a factory environment. The efficiency of the site erection part of the precast...
manufacturing process, can also be improved both by minimising work interruption which are controllable by the company, and by adopting labour flexibility policies.

One of the reasons for a client selecting a precast construction solution rather than a cast-in-situ one, is the possibility of reducing significantly production time. *Homes Magazine* (2003) reports that building time using precast manufacturing is faster by 40 to 60% compared with traditional construction methods. When analysing the answers to its customer survey, the company uncovered that the perceived ability to complete a project on time, is the major factor considered by a client while selecting a Precast Manufacturer. Thus, a key element of its success should be its ability to propose to its clients both rapid completion, and reliable delivery schedules. This requires reliable planning activities. As historically its performance in this regard was often less than satisfactory (cf the 2000 crisis), one of the major improvements introduced by the company during its TQM implementation process was to improve its planning abilities (see paragraph 7.2.6.8). Further improvements are still to be implemented in this regard. The company considers (along with its clients) that delivery on time is part of the quality services expected from a TQM company. If the claim of Walter (2003), that one of the benefits of prefabrication is a greater certainty of programme, can neither be confirmed nor refuted by the company’s experience, both the importance of this factor and the necessity of improving in this regard have been demonstrated by the company.

A better planning of precast manufacturing activities can also significantly reduce the required time for site erection, and help implementing the just-in-time concept to panel site deliveries. *Dowing* (2002) claims that erection of precast elements can be carried out by a limited team on a just-in-time basis, and the resultant speed of construction is several times faster than traditional construction (*Dowing*, 2002). The company’s experience of just-in-time site delivery demonstrates that it reduces wastage in labour-flow, and increases the speed of site erection.

Thus, there is little doubt that material, time and manpower savings, can be made by selecting a precast casting solution over a cast-in-situ one. The company results prove that precast manufacturers can enhance even more these advantages by adopting and implementing TQM principles.
10.3.3. Precast manufacturing provides a safer working environment

The techniques of precast manufacturing reduce to a minimum the on-height working time, while a higher percentage of the process is performed in the controlled environment of a factory premises. These characteristics are certainly in favour of Mike Dowing’s (2002) beliefs that factory manufacture offers a much safer and more acceptable working environment, and that dust, noise and waste are much reduced.

Walker (2003) claims that better health and safety records and less pollution can be obtained through precast manufacturing. The company did not have the opportunity of benchmarking its safety data against those of cast-in-situ companies, but it believes that the above statement is probably true. By comparing its safety records before the implementation of TQM principles and these obtained three years later (see paragraph 9.1.3.3), it can however demonstrate that the adoption of TQM principles may lead to a better level of safety.

The company’s experience matches the general agreement found in the literature that construction production in a factory environment has a positive effect on safety, due to the limited duration of working on-height, and to increase safety measures that can be implemented in a permanent work location. It also matches the company’s belief that all construction companies (whether traditional or precast manufacturer) should place safety at the centre of their quality system, and that major improvements in safety levels can be gained by doing so.
11. **DISCUSSION AND ANALYSIS OF OVERALL FINDINGS**

11.1. *Limitation of research*

The current research is based on the TQM implementation experience of a construction company in the UAE. As the organisation considered was representative, at the onset of the TQM implementation project, of the construction sector of the United Arab Emirates, the research findings are relevant to any construction company in the UAE, wishing to implement TQM principles.

TQM implementation in the company was greatly influenced by its main cultural specificities (see paragraphs 5.2; 6.5; 7.5; 9.5 and 11.3), namely a large 'Power Distance' and a high 'Masculinity' in the sense of Hofstede (Hofstede and Hofstede, 2005), and a multi-national and multi-lingual workforce. Therefore, elements of this study would also be of interest to organisations sharing these cultural specificities, and wishing to implement TQM principles.

There is a high probability that a company operating in the industrial sector in the UAE is characterised by cultural specificities somewhat similar to the company under study. This is confirmed by the personal experience of the researcher, who, as senior assessor and team leader for the EFQM model, was given the opportunity to study the operating systems of other Abu Dhabi based industrial companies. Therefore, many of the findings of the present research may provide valuable knowledge for these organisations, to consider when embarking on TQM implementation.

Other Arab Gulf countries share the same characteristics of large 'Power Distance' (Hofstede and Hofstede, 2005) as the UAE. In the construction, and in fact in the whole industrial sector of these countries, the workforce is often multi-national and multi-lingual, and the 'Masculinity' culture of these countries (Hofstede and Hofstede, 2005) is reinforced by the low percentage of female employees. The findings of this research therefore have relevance to construction companies in other Arab Gulf countries, and even to organisations operating in the industrial sector of these countries.

Finally, an organisation wishing to implement TQM principles, and fearing that part of its cultural identity might interfere with some TQM Critical Success Factors, might be
interested to find out how the organisation under study was able to successfully implement TQM principles, despite five of the CSFs being identified as conflicting with its specific culture.

The present research shares the characteristics of all researches based on case studies: The findings of a specific case is not a proof that if the same methodology was applied on another organisation, the outcome would be identical. However, it is an indication in this sense, and a proof that specific outcome are possible.

11.2. Critical appraisal of the evolution of TQM in the company

The success of the company in implementing TQM principles has been demonstrated, both through its own performance indicators and through the external assessment of the Sheikh Khalifa Industry Award, and that the Critical Success Factors identified in the literature have been commented upon in the light of the company’s experience. It is important to use these elements in order to critically appraise the evolution of TQM in the company, and provide advice to organisations wishing to embark on such a journey.

11.2.1. Overall recommendations for TQM implementation based on the company’s experience

11.2.1.1. Securing guidance on TQM implementation

The first conclusion that can be drawn out of the company’s experience is that it owes part of its success in implementing TQM principles to its participation in the SKIA. In doing so, it gained valuable guidance by providing an initial starting point for development. Thus, a company wishing to introduce the TQM concepts in its management system, could check whether a government based TQM body provides a scheme similar to the one proposed by the SKIA in the environment in which it operates. If it is available, the subject company’s experience demonstrates that participating in such a scheme would be valuable.

If such government body is not available, the organisation wishing to implement TQM principles could draw knowledge about its current position and possible improvements though self-assessment with a recognised TQM model, such as the EFQM model. However, in order for the self-assessment to be valuable, the individual or the team performing it should have a sufficient knowledge about both the award principles and the
assessment technique. This would probably require training on these issues prior to the original self-assessment.

A company may not feel at ease with the guidance drawn from an internal assessment, even if the internal assessors have undergone an initial training in this technique. It may consider that external guidance may be more effective in gaining the active participation of the company management. If such is the case, external guidance could be obtained through hiring the services of a consultancy firm specialised in TQM. This solution should not, however, be selected if the organisation is under financial restrictions. It may result in an additional burden which may exacerbate problems in the company before any results of TQM implementation (which is on a more long term basis) can be felt.

An organisation seeking TQM implementation could use guidance from literature. It may be noted that the company examined was successful in this regard, but introduced a literature review late in its TQM implementation process. An organisation seeking literature guidance in order to start its TQM programme could well be overcome by the volume available, and be at a loss about where to start, preventing it starting at all. This could be prevented by an initial decision of the organisation, to follow the recommendations of a particular TQM author.

Once an organisation reaches the phase of TQM maturity, however, the recommendations provided by a TQM governmental award body are less beneficial, and additional sources of knowledge should be looked for. When an organisation starts to feel that additional knowledge gained through participation in a TQM award has its limits, it should launch a programme of active study of innovative international best practises to uncover new possible areas of improvement. The benefit to be gained by performing an extensive Literature Review will, in the maturity stage, overcome the benefit of participation in a TQM award, although both approaches might be maintained in parallel.

**11.2.1.2. Securing management commitment for a TQM cultural change**

Another important element of the company's success in implementing TQM principles was the management commitment to introducing TQM improvements. This was fostered by the crisis in the year 2000, which led managers to acknowledge that the company would not survive unless it changed.
Thus, paradoxically, an organisation in crisis may be more successful in implementing TQM principles than one which does not face any financial difficulties.

On the other hand, an organisation facing financial difficulties will not be able to implement all TQM principles immediately (one cannot, for example, develop partnerships with suppliers unless one is perceived as a reliable client), and would have to select TQM tools carefully, taking into consideration implementation costs, in order not to aggravate its financial situation. These difficulties could however be counterbalanced by the possibility of using the dissatisfaction generated by the financial crisis towards a consensus of the importance of introducing changes, and of TQM being an acknowledged concept that may guide the organisation in its change process.

Thus, a company facing a financial crisis should drive its management to acknowledge its inability to solve the crisis without change, and get individual agreements about using TQM principles in order to guide the organisation out of the crisis. It is also of major importance to communicate progresses as soon as they are perceivable, in order to nourish the management willingness to follow the TQM road lead by the Top Management.

It will probably be more difficult for an organisation which does not face a financial crisis to foster the consensus around the implementation of TQM principles. However, there is little doubt that this consensus is required, and the Top Management will have to convince its management that TQM implementation must be achieved. This can be done through awareness campaigns demonstrating that the current financial performance may not be maintained as the competition intensifies, by highlighting the weaknesses of the organisation’s current management system, and by an intensive training about TQM principles and their foreseen benefits.

The company benefited from its financial crisis in two additional paradoxical ways:

1. The TQM implementation programme was launched on the basis that all costs involved should be justified, and the outcome of improvement initiatives assessed.

For example, the researcher was granted a very limited budget for training in 2000 (20,000Dhs which was equivalent to 3,200 Pounds Sterling, for 480 employees). However, the budget was used to provide 2,900 hours of training during that year, on subjects that were selected by the management, but also by the workforce itself.
through the implementation of training suggestions received through the suggestion competition and the training survey. This resulted in significant measured improvements in the safety level and in employee productivity level. Assessment and review of the outcome of this first training programme demonstrated that the safety level of the company was favourably influenced even by a limited number of hours and limited cost of safety training, while a similar limitation of hours and cost on language training did not perceptibly influence the level of communication. Thus, in the following years, investments in safety training will be increased, while other means will be sought to improve the communication level.

Thus, due to the financial difficulties of the company, the cost and foreseen benefit of each improvement initiative was examined in detail, and outcome measurement was the condition to get additional funding for the initiative. Although this can be viewed as a limitation, it is also a great strength. Not only does it reinforce management commitment in the TQM implementation programme, because it keeps it informed and involved, but it also spreads a culture of assessment and review, based on measurement and learning activities.

Because of the financial difficulties of the company, some costly improvement initiatives were not open to it. For example, it could not start its TQM implementation process by performing a company-wide TQM training awareness programme, nor hire an external consultant to set up its Strategic Plan or its Balanced Scorecard system. It had to rely on its internal resources, and on free-of-charge external resources (such as the assessment of the SKIA team for example). Because of these constraints, it designed tools which were tailored to its own requirements.

For example, although the first Strategic Plan was far from being perfect, it summarised the suggestions of the entire management team, and linked them in a structure that was the company’s internal structure, and its managerial commitment was high. It is debatable whether such results may have been obtained if an external consultant had been hired to design a Strategic Plan. There is a high chance that the obtained document would be more academically flawless, but the commitment would in all probability be reduced. It is remarkable that although the performance measuring system of the company was of poor quality at that time, the organization...
still managed to achieve 69% for the 41 milestones defined for the period by end of 2001.

The Balanced Scorecard improvement initiative is another illustration that a limited implementation budget is sometimes an asset. From the onset of the initiative, it was decided that the financial and time investment for this initiative was to be kept to a minimum. There is little doubt that if an external consultant had been hired to set up a BSC system in the company, the obtained document would be of a higher academic quality than the initial one drawn by the organisation. However, it is probable that the relevance of the obtained document to the operating system of the organisation would have been lower, rendering it difficult to maintain. A “perfect” Balanced Scorecard, with limited correspondence to the actual situation of the company may very well never be updated because the company does not have the means to update it, and it will remain a “wishful thinking”.

If an external consultant had been hired to develop the BSC system, it is doubtful that the learning gained by the organisation would have been as high. The internal implementation of a “simple” version of the BSC has triggered an assessment process of the measuring system of the company, and uncovered weaknesses have triggered implementation of valuable improvement initiatives.

It highlighted an important dysfunction in the strategic deployment process: for around half of the Strategic Objectives defined, no performance indicators were readily available. This prompted the company to improve its strategic alignment system and set up new measurement tools.

It revealed an unbalance in the organisation’s Strategy: while indicators on several perspectives had to be trimmed in order to retain only key ones, one of the four perspectives was nearly bare of indicators: The innovation and learning perspective, which had been next to forgotten during the previous review of the Strategic Plan, while the emphasis was placed on managerial and process improvements. Several indicators of innovation and learning activities were immediately elaborated, initial measures taken and targets set. During the following review of the Strategic Plan, it was verified that objectives in regard to innovation and learning were set.
Thus, the financial difficulties of the organisation reinforced the need for assessment and review, which in turn triggered learning and improvement. As improvements introduced were assessed and measured, both internally and externally, and proved to be largely beneficial to the organisation, the initial management commitment was renewed and reinforced during the TQM implementation phases.

There is little doubt that, whatever the financial situation of the organisation wishing to implement TQM principles, the Top Management owns the responsibility of focusing the willingness (existent or created) to introduce change towards TQM principles, and to maintain this path, particularly as it may take some time to achieve demonstrable improvements as a result of TQM based changes.

Assessment, review and measurement activities are critical to maintain and reinforce managerial commitment, which might wear away due to lack of proven success record. An external assessment, through TQM award participation for example, might be valuable, as it ensures the objectivity of the assessment.

11.2.1.3. Taking into consideration the organisation’s culture

The company’s experience demonstrates that it is of major importance for an organisation wishing to implement TQM principles, to take into consideration its cultural identity. The specific culture of the organisation determines which TQM element should be introduced, and when.

It was identified that three factors, which are dependant on the cultural specificity, should be considered before introducing a TQM improvement: Cost of introducing the element; Difficulty of introducing the element; and Possible benefit of introducing the element. For an organisation which does not face a financial crisis (a financial crisis can be considered as a characteristic of its internal or external environment), the first factor is of limited importance. The second and third factors, however, are critical to all organisations, and are strongly related to the company’s culture. It may be noted that the culture of the organisation will be influenced by the improvements introduced so far, and that there may later be the possibility of introducing an element, which was decided against, at an earlier stage.
It is important, however, not to limit the decision on introducing TQM improvement to the sole perceived difficulty linked to the prevalent culture, but to balance it with the foreseen benefits. For example, although the company examined decided not to introduce Quality Circles because it felt that their successful introduction would be difficult in view of its current culture, it decided to improve its level of communication, while being fully aware that it would face difficulties in doing so. It was felt that unless the company could improve its communication system, it may well be frustrated in its TQM implementation process. Hence, it should be introduced as early as possible, and pursued vigorously.

Thus, the company adopted a hybrid position in regard to selection of improvement initiatives and their estimated compatibility with its current culture:

- It identified TQM Critical Success Factors in contradiction with its culture. The organisation believed that, unless these CSF were at least partially met, the TQM implementation process would fail. Thus, related improvement initiatives were relentlessly introduced throughout the three periods of TQM implementation, with the intelligence that they were in contradiction with the organisation's culture, and that no breakthrough improvements may be expected. However, the company felt that it had no choice but to improve on these critical aspects.

  It can be noted that among the improvement initiatives in contradiction with the organisation's culture, some were less incompatible and selected early in the TQM implementation process, while others were selected at a later stage, once the culture was already partially modified, facilitating their introduction. Thus, although improvements related to CSF in contradiction with the culture were relentlessly introduced throughout the three periods with the objective of incremental slow improvement, the selection of initiatives was based on "minimal incompatibility" with the prevailing culture. In cases where the company underestimated this incompatibility (the first suggestion competition for example), the resistance to the initiatives was high.

- Improvement initiatives, that were not identified as in contradiction with the organisation's culture, were introduced over a shorter period of time, and sometimes engendered breakthrough improvements. The most successful ones were fine-tuned at a later stage, as other initiatives allowed possible additional
improvements and necessitated alignment adjustments. The “difficulty of introducing the element” criterion, in such a case, was more related to the current system already in place, than to an incompatibility with the culture. For example, the introduction of the BSC would be less successful if the Strategy of the organisation is not clearly defined.

Fine-tuning improvements were introduced to benefit from improvements in the system since the initial introduction. For example, the first Strategic Plan introduced during the first period could not be based on research data, as no research data were available at that time. During the third period, the fine-tuning work on the Strategic Plan capitalised on all improvements introduced during the second period.

As there is little guidance in the literature about which TQM element to introduce, depending on the culture prevalent an organisation (particularly for poorly researched environments such as the United Arab Emirates), the organisation had to rely on its own perception, which increases the risks of introducing an improvement too early, or delaying one which could have been successfully introduced earlier. In the case of the company, for example, it is believed that SPC could have been successfully introduced earlier.

11.2.1.4. Placing employees at the centre of the change process

A main factor of success of the company in introducing TQM principles was its resolve to place employees at the centre of its process. It appeared as self evident, from the start, that selected improvements would have to be supported by employees, and that unless the company demonstrated its willingness to take care of its people as part of the TQM implementation process, employees would show limited willingness to follow the lead of the management.

It is important in order for any TQM implementation programme to be as successful as possible, to be perceived as being improvement by the people, for the people, even if it generates increased satisfaction for all the stakeholders. This viewpoint is slightly different from the traditional one, in which TQM is defined as primarily customer focused. This conclusion is based on the assumption that an organisation which demonstrates to its employees the strong link between TQM implementation and employee satisfaction, will be able to count on their willingness to participate actively in the improvement programme.
This, as a result, will generate increased satisfaction for all stakeholders, among which are the customers.

The experience of the company in this regard may seem paradoxical: It took the decision to place people at the centre of its TQM implementation process, in spite of the fact that 4 of the 5 CSF in contradiction with the organisational culture were related to Employee Management. This meant that People improvement initiatives might face high resistance, and might provide incremental rather than breakthrough improvements, which proved to be the case.

When reviewing the experience of the company under study, it is surprising to note the speed of transformation achieved by the organisation, as measured through its overall performance and the satisfaction of its stakeholders. In three years, the company evolved from an organisation in crisis, to a highly successful and profitable one, in which stakeholders' satisfaction had been boosted, and which was evaluated as the best performing industry in the Abu Dhabi Emirate by a governmental TQM award body.

One of the reasons for this fast success is that the TQM implementation clearly provided an edge to the company over its competitors. At the onset of the TQM implementation project, the company was fairly representative of construction companies in the UAE. The incompatibility between TQM and the prevailing culture in the industry, in particular in regards to Employee Management, was widespread. Thus, the success of the company in modifying its culture by placing its employees at the centre of the TQM improvement process, although far from a world-class standard, still provided a major competitive edge against local competition. This accelerated the positive outcomes from a successful TQM implementation.

The experience of the company demonstrates that the gap between market performance and internal performance is of more critical importance than the level achieved. In order to maximize this gap, an organisation should strive to identify the prevailing market culture, and to differentiate itself by improving on unfavourable Success Factors.

In the case of the company, Employee Management had been identified as the area in which, through relentless incremental improvements, the company could create a differentiation between its internal culture and the market culture, which might not be easily imitated. The author is of the opinion that any industrial company operating in Arab
Countries would benefit from such Strategy. However, the TQM theory is a holistic one, and concentrating on a cultural differentiation area should not prevent from progressing in other areas, in particular those that might bring fast and breakthrough improvements.

When the area for differentiation between its internal culture and the market culture is not Employee Management, should employees still be placed at the centre of the change process? The experience of the company demonstrates that the implementation of TQM principles requires constant and multiple efforts over an extended period of time. It also implies constant critical review of the current performance, which is at times difficult to accept. This cannot be achieved by an individual, or even a team. It requires support from the entire organisation, at all levels. In order to gain this support, employees must be aware that their work and input are valued, and that themselves, as individuals, are valued by the company.

Thus, programmes for improvement in employee satisfaction should be introduced as early as possible in the TQM implementation process, should be highly visible, and their link to TQM concepts explicit. A good technique for a high visibility is to officially request the participation of the employees in identifying possible employee satisfaction improvements, along with other TQM improvements. Among these programmes, safety issues should be treated as a priority, if the organisation operates in an industry ‘at risk’, such as the construction industry.

11.2.1.5. Defining a strategy and aligning the organisation to this strategy

Introducing TQM principles cannot be achieved overnight. Different improvements are introduced over time, and the success of their implementation depends of the cultural specificity of the organisation, and how it had been taken into consideration during the introduction process. All these activities should be coordinated in order for the organisation to progress towards its overall objective, and for all employees to have a clear knowledge about what is expected from them.

A company should first clarify where it intends to go, (this may be defined in mission and vision statements), and which actions might enable it to progressively reach the set goals (this may be defined in a strategic plan). It must then make sure that the whole organisation is directing its efforts towards the set objectives in a coherent way (this may be achieved
Daniele Seraphim – Ph.D.

by deploying the strategic objectives to a process level, linking strategic objectives with employees' activities.

In order to do so, the company has defined over the years, a process that enables the efforts of the whole organisation to be coordinated and aligned with its overall objective. Using a similar process could certainly be useful to other organisations wishing to implement TQM principles.

At regular intervals the organisation should:

1. Review its mission and vision statements.

2. Prepare its Strategic Plan by collecting data such as current performance, strength and weaknesses of all processes, SWOT analysis of the company, financial forecasts, market data, benchmarking data, stakeholders' satisfaction data etc.

3. Define its strategic objectives by processes, including the degree of importance, a time frame, responsibilities for implementation, resources needed, risks, CSF and contingency plans, taking into consideration the data mentioned in point 2, as well as the improvements objectives suggested by process owners and improvement teams.

4. For each process, verify that the measuring system in place can measure progresses on defined strategic objectives. If such is not the case, develop the measuring system that can.

5. For each process, define one or several objectives for continuous improvement in line with the strategic objectives, with specified targets to be achieved on a defined date. If needed, develop a detailed action plan in order to meet the CI objective.

6. Review the list of key performance indicators selected in the balanced scorecard in the light of the strategic objectives defined, and define targets according to objectives.

Steps 1 to 2 should be performed by the management. Step 3 should involve the management as well as all process owners. and all employees should have the chance of commenting on strategic objectives. When processes involve a large number of employees,
study teams should be formed. Step 4 should be examined by process owners and the department in charge of TQM implementation. Step 5 should be performed by process owners and verified by the Top Management. Step 6 should be performed by the Department in charge of TQM implementation and by the Top Management.

It is important that progress on objectives (strategic objectives, balanced scorecard objective and CI objectives) should be monitored at regular intervals, and that a department should be in charge of verifying that the monitoring is performed and of highlighting possible deviations from targets.

Visibility of objectives as well as of performance to date, should be as high as possible.

More than three years were necessary for the company to successfully implement the methodology described, as it proceeded progressively, adding new elements when identifying that these were missing. An organisation, wishing to apply the same methodology could certainly reduce the length of the implementation period, because it would benefit from a clearer preceding knowledge of what should be achieved. The length of the period would depend on the internal and external environment of the organisation which will influence its readiness to implement the different phases.

Because diverse improvement initiatives are introduced over time, an organisation should periodically, during the course of its TQM implementation process, perform a review of all recent initiatives, and examine the following issues:

- Evaluate, either objectively, if a corresponding measuring system is in place, or even subjectively, if the initiative has been successful.

- In case it has not been successful, reflect on the possible causes behind this lack of success, and decide whether a modified implementation should be attempted, or whether the initiative should be dropped altogether. Even if the initiative is dropped, it is critical to gain some learning from that failure, as the obtained knowledge may be used to increase the chances of success of subsequent initiatives.
In case it has been successful, consider whether the initiative could be fine-tuned in order to enhance this success, or whether the current level of satisfaction with the outcome of the initiative is deemed satisfactory.

In case a modified implementation or a fine-tuning is decided upon, the review team should decide whether an immediate implementation is possible or not. The responsibilities for immediate implementation and for follow up must be clarified, and the relevant individual(s)/team(s) should receive all corresponding information. If a delayed implementation is decided, it should be placed on a list (such as the SAGA list used by the company) that will be examined during the next strategic review.

The relevance of the improvement initiative should also be examined in the context of the overall quality system of the organisation. Other elements of the quality system may need to be adjusted or improved in the light of the new initiative. For example, the introduction of the BSC in the company under study triggered improvements in the Strategic Planning process and in the Continuous Improvement process.

The organisation must also verify if the measuring system is adequate to assess the outcome of the improvement initiative. Adjustments and improvements may be required. If such is the case immediate versus planned implementation must be considered, and responsibilities' attribution or addition to the list of further improvements must be allotted.

A new initiative, even when successful, might be overlooked if no mechanism is in place to make sure it is systematically deployed as part of the system. The company under study has successfully used several mechanisms to that effect:

- The initiative may be documented in the Quality Procedures of the company. This ensures regular reviews through internal and external audits.

- A Continuous Improvement objective based on the regular measurement of the improvement outcome might be set.
Based on the perceived/measured importance of the initiative, the outcome of the initiative might be considered as a Key Performance Indicator, and reported on the Balanced Scorecard. This will ensure a high visibility, and may or may not be combined with a continuous improvement objective.

Further improvements triggered by the learning activities following the initial implementation of the initiative, may be selected as Strategic Objectives. This will ensure that assessments, reviews and measurements are performed at regular intervals.

Although a systematic and regular review of improvement initiatives recently introduced ensures that assessment and learning activities are taking place, and that valuable initiatives are retained and deployed within the Quality System, it is not enough to ensure the overall alignment of the system.

If a review process of the overall alignment of the system is not regularly performed, elements of the system might drift apart over time.

For example, a Continuous Improvement objective might be set, in line with a defined Strategic Objective. During ulterior Strategic reviews, the initial Strategic Objective might be significantly modified or even dropped. However, the process owner responsible for the CI objective may not modify it according to the new strategic orientation.

It may be argued that if the communication system of the organisation is effective, the process owner should be aware of the new strategic orientation, should be aware of his responsibilities in regard to the implementation of the strategy, and thus should spontaneously propose to align the CI objective to the Strategic objective.

However effective the communication system, it cannot be assumed that all employees will fully understand the relevance of a document like a strategic plan, and take adjustment actions accordingly. This has to be reviewed and followed up.

For some individuals, work habits are difficult to modify. Unless prompted to review, they will go on performing their work in a way that has proved successful and appreciated in the past, even when the revised Strategic Objectives appear to be in contradiction with current work habits.
The experience of the company proves that sending a Strategic Plan document, or even inviting process owners to an explanation/review meeting, is not sufficient to ensure complete alignment.

An alignment review mechanism should be in place, and should include at least the following elements:

- Verification of the alignment between the draft of Strategic Plan and the Mission and Vision statements. Although the review of the Mission and Vision is the starting point of the Strategic review process, a rapid check that the Mission's declared commitment towards all stakeholders has received sufficient coverage may prove useful. (In the case of the company under study, such verification highlighted that partnership with suppliers had received minimal attention in the draft of the Strategic Plan, while it was identified as a key element of success in the Mission statement.)

- Complete review of Key Performance Indicators following the Strategic Plan review. This covers two aspects: Review of the indicators themselves (new indicators may be added while others may not be useful any longer), and review of the target value and date of still relevant indicators. If a Balanced Scorecard system is in place, the BSC must then be updated accordingly.

- Complete review of the CI objectives. It is of major importance to perform this review work with the concerned process owners. The team/individual supervising the overall alignment review should play a facilitator role, but not a decision making role. Both the relevance of the objectives themselves and of the target value and date should be considered during this review. KPIs defined in the BSC may be selected as CI objectives. Symmetrically, process owners may suggest modifications to KPIs target value or date, or even to the indicators themselves. If aligned with Strategic Objectives, these suggestions must be considered, keeping in mind that process owners are best suited to identify operational means of achieving strategic objectives. Thus the review of the CI objectives may trigger a minor review on the BSC.

Once the Performance Measuring System is aligned with Strategy of the organisation, the deployment of that Strategy is facilitated.
It may be noted, through the study of the company presented, that it started introducing soft components of the TQM theory first, and introduced selected hard ones during the last period only. This was based on the belief that unless soft elements of TQM principles are in place (such as a culture of continuous improvement, employee participation and involvement, training etc) the company might run the risk of failing in its attempts to introduce quality engineering tools.

The company’s experience certainly underlines the importance of the TQM culture to be rooted in the organisation before introducing hard elements. This matches the current increase in interest in hard elements, such as in the Six Sigma theory. If Six Sigma is emphasising the importance of using hard elements (such as SPC, QFD or Design of Experiment), it is however generally described as a philosophy, and highlights that soft elements (such as training and employee empowerment) are to be set in place before introducing hard ones.

The company’s experience demonstrates both that soft elements should be introduced before hard ones, and that possible gains of introducing hard elements may be important. There is also a suspicion that quality engineering tools might have been introduced successfully slightly earlier. This delayed introduction was partly due to the original belief that hard elements, which were historically developed for the mass production industry, have little relevance to the precast manufacturing industry. It appears however, that once the company started examining seriously the possibility of using them, several of them were deemed to be of potential use to the company, and that the results of pilot studies to date are highly promising.

The recommendations that can be drawn by this experience, and could be useful to an organisation wishing to implement TQM principles are the following: Soft elements of the TQM theory will favourably influence the introduction of hard elements, and the organisation should give first priority to the former if not already present in its system. The organisation should not beforehand reject the possibility of introducing hard elements, based on the ground that they are relevant only to the mass producing industry. If it is true that they may be more relevant to mass production, they can still be very useful to other types of organisations (QFD for example has been successfully used in Services).
They should study the quality engineering tools available, select those that appear relevant, view how they can be adapted to the specificity of the organisation, and plan their introduction carefully along with prerequisite soft elements.

11.2.1.7. ISO certification and TQM

The company’s experience demonstrates that ISO certification can be useful to a company wishing to implement TQM principles, but only when the aim of the organisation is to use it in this sense. There is a possibility of ISO certification (at least the 1994 version) being a hindrance to improvements, and if this is the case, the organisation should correct the situation at the earliest opportunity.

The ISO system has been successfully used by the company to sustain the improvements introduced, and any organisation already ISO certified, wishing to implement TQM principles could benefit from such technique.

It does not appear that ISO certification is a prerequisite to TQM implementation, but if already obtained and if used efficiently, it can certainly help an organisation that wishes to implement these principles.

If an organisation successfully implements TQM principles, gaining ISO certification should be a straightforward exercise, requiring little or no modification to its quality system. If it provides a commercial advantage to the company, it would thus make sense for such organisation to apply for certification.

11.2.2. Critical appraisal of the company’s improvement initiatives

The company used three criteria to decide which improvement initiatives to introduce: Cost of implementation, Ease of implementation, and Expected return (see paragraph 5.1.3.4.3).

Depending on the implementation period, the weight of each criterion differs. For example, while the “Cost of implementation” criterion is of major importance during the first period, it is of less importance during the third one. Based on the experience of the company, the researcher has given importance weights for each of the three criteria depending on the three periods as follows:
Table 84 Weight of criteria for selecting TQM initiatives, over the three periods of TQM implementation

<table>
<thead>
<tr>
<th></th>
<th>Crisis to Break out</th>
<th>Quality Integration</th>
<th>Refinements in the Quality system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of implementation</td>
<td>50%</td>
<td>38%</td>
<td>20%</td>
</tr>
<tr>
<td>Ease of implementation</td>
<td>30%</td>
<td>25%</td>
<td>15%</td>
</tr>
<tr>
<td>Expected return</td>
<td>20%</td>
<td>37%</td>
<td>65%</td>
</tr>
</tbody>
</table>

Although these importance rates were not determined in a scientific way, they reflect the criteria used by the company to decide when and what initiatives to introduce.

Looking back on the initiatives introduced by the organisation over its three phases of TQM implementation, and having additional experience-based knowledge about the cost and ease of implementation and the expected returns (which were very roughly estimated at the time of implementation), it is possible to better evaluate which initiatives should have been introduced first during each implementation period.

This post-implementation knowledge could be used to propose guidance to organisations, similar to the one described in this study, wishing to implement TQM principles.

The “Expected return” criterion can be appraised using the 2005 survey, during which 12 high ranking employees were asked to evaluate the improvements achieved by the organisation over the last five years, regarding 59 improvement initiatives.

The “Cost of implementation” and “Expected return” criteria are best evaluated by the Department in charge of supervising the implementation process: The Support and Development Department, headed by the researcher. Other employees, even high ranking ones, would have only a partial view of the overall efforts that had to be deployed in order to implement the initiative (both within the SD department and within other departments), as well as the overall cost (estimated both in terms of time spent by the SD team and by other departments and in terms of material costs) of the implementation.

Thus, the SD department evaluated the “Cost of implementation” and “Expected return” criteria using a 1 to 5 scale. The “Expected return” criterion was deduced by the average of answers given by high ranking employees during the 2005 survey. It has to be noted that answers could not be used directly, as they ranged from 3.42 to 4.73 (averages generally reduce gaps), while the other two criteria were ranging from 1 to 5. A mathematic formula was applied to the set of data, in order to transform the 3.42 average in a 1 value, the 4.73.
average in a 5 value, and to maintain the relative positions of intermediate values (for example, a 4.07 value which is in the middle of the 3.42 to 4.73 range of obtained values, is equivalent to a 3 value in the new 1 to 5 scale).

According to the weight of criteria depending on the period (given in table 84) an overall score (on a scale from 1 to 5) was computed for each implementation period, where 5 represent the highest possible value.

The following scores were obtained:

<table>
<thead>
<tr>
<th>Initiatives</th>
<th>Low Cost of implementation</th>
<th>Ease of implementation</th>
<th>Expected return</th>
<th>Crisis to Break out</th>
<th>Quality Integration</th>
<th>Refinements in the Quality System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual review of Mission and Vision statements</td>
<td>5.00</td>
<td>5.00</td>
<td>2.78</td>
<td>4.56</td>
<td>4.18</td>
<td>3.00</td>
</tr>
<tr>
<td>Regular review of Quality Policy statements</td>
<td>5.00</td>
<td>5.00</td>
<td>3.03</td>
<td>4.61</td>
<td>4.27</td>
<td>2.86</td>
</tr>
<tr>
<td>Annual update of the Strategic Plan through a defined process</td>
<td>3.00</td>
<td>3.00</td>
<td>4.82</td>
<td>3.36</td>
<td>3.67</td>
<td>2.29</td>
</tr>
<tr>
<td>Increased Employee Participation in the elaboration of Strategic Objectives</td>
<td>3.00</td>
<td>2.00</td>
<td>2.53</td>
<td>2.61</td>
<td>2.58</td>
<td>3.14</td>
</tr>
<tr>
<td>Defined Strategic Plan deployment process and Regular review on progresses</td>
<td>3.00</td>
<td>3.00</td>
<td>2.78</td>
<td>2.96</td>
<td>2.92</td>
<td>2.80</td>
</tr>
<tr>
<td>Regular review of Key performance indicators</td>
<td>4.00</td>
<td>4.00</td>
<td>2.78</td>
<td>3.76</td>
<td>3.55</td>
<td>2.52</td>
</tr>
<tr>
<td>Continual improvement objectives defined for each process</td>
<td>3.00</td>
<td>2.00</td>
<td>2.78</td>
<td>2.66</td>
<td>2.67</td>
<td>2.77</td>
</tr>
<tr>
<td>Balanced Scorecard used to grasp the Company's overall performance</td>
<td>5.00</td>
<td>3.00</td>
<td>2.50</td>
<td>3.90</td>
<td>3.58</td>
<td>3.57</td>
</tr>
<tr>
<td>Annual review of the organisation chart</td>
<td>5.00</td>
<td>4.00</td>
<td>2.53</td>
<td>4.21</td>
<td>3.84</td>
<td>3.53</td>
</tr>
<tr>
<td>Annual review of role, responsibility and job description of key Employees</td>
<td>5.00</td>
<td>3.00</td>
<td>2.02</td>
<td>3.80</td>
<td>3.40</td>
<td>3.77</td>
</tr>
<tr>
<td>Training Survey &amp; Programme</td>
<td>2.00</td>
<td>3.00</td>
<td>3.03</td>
<td>2.51</td>
<td>2.63</td>
<td>4.10</td>
</tr>
<tr>
<td>Evaluation of Training Effectiveness</td>
<td>5.00</td>
<td>2.00</td>
<td>1.51</td>
<td>3.40</td>
<td>2.96</td>
<td>2.85</td>
</tr>
<tr>
<td>Regular Staff meetings (RSC, OST...)</td>
<td>3.50</td>
<td>3.50</td>
<td>3.54</td>
<td>3.51</td>
<td>3.51</td>
<td>3.35</td>
</tr>
<tr>
<td>Job Satisfaction Surveys and Employee Surveys</td>
<td>3.00</td>
<td>3.00</td>
<td>2.53</td>
<td>2.91</td>
<td>2.83</td>
<td>2.77</td>
</tr>
<tr>
<td>Suggestion Competition</td>
<td>2.00</td>
<td>1.00</td>
<td>2.53</td>
<td>1.81</td>
<td>1.95</td>
<td>2.91</td>
</tr>
<tr>
<td>Suggestion Boxes</td>
<td>5.00</td>
<td>5.00</td>
<td>1.76</td>
<td>4.35</td>
<td>3.80</td>
<td>4.06</td>
</tr>
<tr>
<td>Magazine and articles circulation</td>
<td>4.00</td>
<td>4.00</td>
<td>2.78</td>
<td>3.76</td>
<td>3.55</td>
<td>3.24</td>
</tr>
<tr>
<td>Improved Inter-departmental Communication</td>
<td>5.00</td>
<td>2.00</td>
<td>4.31</td>
<td>3.96</td>
<td>3.99</td>
<td>3.17</td>
</tr>
<tr>
<td>Increased multi-departmental team working</td>
<td>4.00</td>
<td>2.00</td>
<td>4.31</td>
<td>3.46</td>
<td>3.61</td>
<td>4.06</td>
</tr>
<tr>
<td>Improved involvement/empowerment of the workforce</td>
<td>4.00</td>
<td>1.00</td>
<td>1.95</td>
<td>2.69</td>
<td>2.49</td>
<td>4.25</td>
</tr>
<tr>
<td>Team building activities (such as Raft race, Appreciation day, Bowling day, etc)</td>
<td>3.00</td>
<td>3.00</td>
<td>2.27</td>
<td>2.85</td>
<td>2.73</td>
<td>3.30</td>
</tr>
<tr>
<td>Hiring policy giving priority to Employees' family</td>
<td>5.00</td>
<td>5.00</td>
<td>2.27</td>
<td>4.45</td>
<td>3.99</td>
<td>2.95</td>
</tr>
<tr>
<td>Social activities for the workforce</td>
<td>2.50</td>
<td>3.00</td>
<td>1.00</td>
<td>2.35</td>
<td>2.07</td>
<td>2.23</td>
</tr>
<tr>
<td>Salaries paid on time</td>
<td>2.00</td>
<td>5.00</td>
<td>3.80</td>
<td>3.26</td>
<td>3.42</td>
<td>3.14</td>
</tr>
<tr>
<td>Annual Appraisal of employee performance</td>
<td>3.50</td>
<td>2.00</td>
<td>4.31</td>
<td>3.21</td>
<td>3.42</td>
<td>1.99</td>
</tr>
<tr>
<td>Bonus sharing</td>
<td>2.00</td>
<td>4.00</td>
<td>3.80</td>
<td>2.96</td>
<td>3.17</td>
<td>2.64</td>
</tr>
<tr>
<td>Increased utilisation of contract work</td>
<td>4.00</td>
<td>4.00</td>
<td>3.34</td>
<td>3.87</td>
<td>3.76</td>
<td>2.29</td>
</tr>
<tr>
<td>Medical clinic in the labour camps</td>
<td>3.00</td>
<td>2.00</td>
<td>1.67</td>
<td>2.43</td>
<td>2.26</td>
<td>2.26</td>
</tr>
</tbody>
</table>
Procedure set in place for solidarity among employees (fund collection)

<table>
<thead>
<tr>
<th>Initiatives</th>
<th>Crisis to Break out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Safety reviews and improvements</td>
<td>2.00</td>
</tr>
<tr>
<td>Safety Representatives</td>
<td>3.00</td>
</tr>
<tr>
<td>Housekeeping evaluation</td>
<td>4.00</td>
</tr>
<tr>
<td>Reviewing processes using flow-charting</td>
<td>3.50</td>
</tr>
<tr>
<td>Improved Departmental measures of processes performance</td>
<td>3.50</td>
</tr>
<tr>
<td>Emergence of Value Engineering and Partnering</td>
<td>3.00</td>
</tr>
<tr>
<td>Improved Clarification of Contractual Specification</td>
<td>4.00</td>
</tr>
<tr>
<td>Improved IT Integration</td>
<td>1.00</td>
</tr>
<tr>
<td>Generalisation of Recruitment tests</td>
<td>4.00</td>
</tr>
<tr>
<td>Improvements in Planning Activities</td>
<td>3.00</td>
</tr>
<tr>
<td>Detailed accounting provisions for the year</td>
<td>3.50</td>
</tr>
<tr>
<td>Hollowcore Quality Improvement (through X-Tec training etc)</td>
<td>2.00</td>
</tr>
<tr>
<td>Quality Control Department independent from the production processes</td>
<td>2.00</td>
</tr>
<tr>
<td>Increased Quality Prevention activities performed by the Quality Control team</td>
<td>4.50</td>
</tr>
<tr>
<td>Non-Conformances and actions to prevent recurrence openly discussed</td>
<td>4.50</td>
</tr>
<tr>
<td>Customer Satisfaction Survey used to analyse satisfaction and benchmark processes</td>
<td>4.00</td>
</tr>
<tr>
<td>Increased Internal benchmarking (comparisons between departments/processes performance)</td>
<td>4.00</td>
</tr>
<tr>
<td>Increased knowledge of Manpower productivity</td>
<td>2.50</td>
</tr>
<tr>
<td>Quality Documentation reflecting the actual situation of the Company</td>
<td>3.50</td>
</tr>
<tr>
<td>Updates on the Quality System using feedback on audits</td>
<td>4.50</td>
</tr>
<tr>
<td>Improved assessment of Failure cost (NCR analyses)</td>
<td>5.00</td>
</tr>
<tr>
<td>Market Share, Market Size and Competitor Pricing Analyses</td>
<td>3.50</td>
</tr>
<tr>
<td>Increasingly basing investments on feasibility studies</td>
<td>3.50</td>
</tr>
<tr>
<td>Increased research on state-of-the art facilities</td>
<td>3.00</td>
</tr>
<tr>
<td>Employee involvement in cause related initiatives</td>
<td>5.00</td>
</tr>
<tr>
<td>Participation in construction exhibition</td>
<td>4.00</td>
</tr>
<tr>
<td>Improved relations with Suppliers</td>
<td>4.00</td>
</tr>
<tr>
<td>Student Summer Training</td>
<td>4.00</td>
</tr>
<tr>
<td>Company’s WEB Site</td>
<td>3.00</td>
</tr>
<tr>
<td>Improved marketing tools (brochures, promotional films etc)</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Table 85 Estimated values of Improvement Initiatives over the three TQM implementation periods

By selecting the 15 most valued initiatives of the “Crisis to Break out” period, the following list is obtained.
Updates on the Quality System using feedback on audits

Suggestion Boxes

Annual review of the organisation chart

Non-Conformances and actions to prevent recurrence openly discussed

Procedure set in place for solidarity among employees (fund collection)

Employee involvement in cause related initiatives

Improved Inter-departmental Communication

Balanced Scorecard used to grasp the Company’s overall performance

Increased utilisation of contract work

Improved assessment of Failure cost (NCR analyses)

Annual review of role, responsibility and job description of key Employees

Regular review of Key performance indicators

Table 86 Fifteen highest ranking improvement initiatives - “Crisis to Break out” period.

The first 2 initiatives are very valuable to a company starting on its TQM implementation process, because unless it clearly defines its aims, there is a low chance that it may fulfil them.

Initiatives 3, 5, 8, 9 and 12 are simple tools to start raising the satisfaction of Employees. Initiatives 3, 8 and 12 are relevant to “care about employees’ well-being” while 5 and 9 can be used as a first step towards employee participation, although their effectiveness are limited. As the company’s experience has highlighted, the Employees should be in the centre of the TQM implementation project from the onset.

Initiatives 4, 7 and 13 were aimed at improvements in the Quality System. According to the company experience, it is of major importance that the ISO system does not prevent the organisation from improving, and is used to highlight possible deficiencies.

Initiatives 6 and 14 are also relative to employee management. Their aim is to align the organisation structure with the overall objectives of the company, and to clarify what is expected from key employees.

Initiatives 4, 5, 7, and 10 were aimed at improving communication. One of the main difficulties faced by the organisation under study, was its poor communication system, due to its specific characteristics and culture. Thus, introducing initiatives aiming at communication improvement as early as the first phase, was of major importance.

Finally, initiatives 11, 15 lead the organisation to check what KPIs are currently available, and in which area additional ones are required. The Balanced Scorecard was incomplete at that time, with areas partly blank, but it gave the organisation a good sense of what was...
missing in terms of KPIs. This work prepared the ground for major improvements in the Measuring system, to take place during subsequent phases.

Overall, a company wishing to implement TQM principles and currently in its “Crisis to Break out phase” would benefit from implementing the above mentioned initiatives.

During the second period, the pace of improvement accelerated. Thus, 25 higher scoring initiatives will be considered.

<table>
<thead>
<tr>
<th>SN</th>
<th>Initiatives</th>
<th>Quality Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Updates on the Quality System using feedback on audits</td>
<td>4.27</td>
</tr>
<tr>
<td>2</td>
<td>Regular review of Quality Policy statements</td>
<td>4.27</td>
</tr>
<tr>
<td>3</td>
<td>Annual review of Mission and Vision statements</td>
<td>4.18</td>
</tr>
<tr>
<td>4</td>
<td>Non-Conformances and actions to prevent recurrence openly discussed</td>
<td>4.08</td>
</tr>
<tr>
<td>5</td>
<td>Improved Inter-departmental Communication</td>
<td>3.99</td>
</tr>
<tr>
<td>6</td>
<td>Hiring policy giving priority to Employees’ family</td>
<td>3.99</td>
</tr>
<tr>
<td>7</td>
<td>Annual review of the organisation chart</td>
<td>3.84</td>
</tr>
<tr>
<td>8</td>
<td>Improved assessment of Failure cost (NCR analyses)</td>
<td>3.81</td>
</tr>
<tr>
<td>9</td>
<td>Suggestion Boxes</td>
<td>3.80</td>
</tr>
<tr>
<td>10</td>
<td>Increased utilisation of contract work</td>
<td>3.76</td>
</tr>
<tr>
<td>11</td>
<td>Detailed accounting previsions for the year</td>
<td>3.68</td>
</tr>
<tr>
<td>12</td>
<td>Annual update of the Strategic Plan through a defined process</td>
<td>3.67</td>
</tr>
<tr>
<td>13</td>
<td>Procedure set in place for solidarity among employees (fund collection)</td>
<td>3.65</td>
</tr>
<tr>
<td>14</td>
<td>Increased multi-departmental team working</td>
<td>3.61</td>
</tr>
<tr>
<td>15</td>
<td>Balanced Scorecard used to grasp the Company’s overall performance</td>
<td>3.58</td>
</tr>
<tr>
<td>16</td>
<td>Regular review of Key performance indicators</td>
<td>3.55</td>
</tr>
<tr>
<td>17</td>
<td>Magazine and articles circulation</td>
<td>3.55</td>
</tr>
<tr>
<td>18</td>
<td>Increasingly basing investments on feasibility studies</td>
<td>3.54</td>
</tr>
<tr>
<td>19</td>
<td>Regular Staff meetings (RSC, OST ...)</td>
<td>3.51</td>
</tr>
<tr>
<td>20</td>
<td>Market Share, Market Size and Competitor Pricing Analyses</td>
<td>3.51</td>
</tr>
<tr>
<td>21</td>
<td>Increased Quality Prevention activities performed by the Quality Control</td>
<td>3.46</td>
</tr>
<tr>
<td>22</td>
<td>team</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Employee involvement in cause related initiatives</td>
<td>3.43</td>
</tr>
<tr>
<td>24</td>
<td>Annual Appraisal of employee performance</td>
<td>3.42</td>
</tr>
<tr>
<td>25</td>
<td>Hollowcoore Quality Improvement (through X-Tec training etc)</td>
<td>3.42</td>
</tr>
<tr>
<td>26</td>
<td>Salaries paid on time</td>
<td>3.42</td>
</tr>
</tbody>
</table>

Table 87 Twenty-five highest ranking improvement initiatives - “Quality Integration” period

Initiatives 1 to 10, 13, 15, 16, and 22 are follow ups and further improvements on initiatives introduced during the first period. They aim at developing a clear knowledge of the organisation’s overall aims, developing an effective Quality System, improving communication and care for employees, and improvements in the Measuring System.

Initiatives 11, 12 and 20 are major initiatives towards an improved Measuring System, complementary to the regular review of KPIs.
Initiative 12 allow the organisation to define in detail its improvement objectives, and is the supporting stone of the Measuring System.

Initiative 14, 17 and 19 are additional ones, aiming towards further improvements in the communication system, which is one of the key elements without which the TQM implementation might fail.

Initiatives 18 and 20 are related to improving the company’s knowledge in regard to its investments and to the environment in which it operates. These are keys to the company’s success, and are a base for informed business expansion.

Initiatives 21 and 24 aim towards improved Product Quality. A performing Quality System allows the organisation to highlight areas of low performance, and corresponding improvement actions can be initiated accordingly (in the case of the company, it consisted of Hollowcore Quality Improvement, but it might be any area(s) of low product performance for another company).

Items 23 and 25 are major initiatives towards improvement of employee satisfaction, which cannot be significantly raised unless they are implemented (due to financial reason, these initiatives could not take place during the first phase).

Overall, the selection of initiatives for the second period matches the researcher’s perception of important initiates to be carried out during the second period of TQM implementation.

<table>
<thead>
<tr>
<th>SN</th>
<th>Initiatives</th>
<th>Refinements in the Quality System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Detailed accounting previsions for the year</td>
<td>4.25</td>
</tr>
<tr>
<td>2</td>
<td>Annual update of the Strategic Plan through a defined process</td>
<td>4.18</td>
</tr>
<tr>
<td>3</td>
<td>Updates on the Quality System using feedback on audits</td>
<td>4.10</td>
</tr>
<tr>
<td>4</td>
<td>Improved Inter-departmental Communication</td>
<td>4.10</td>
</tr>
<tr>
<td>5</td>
<td>Hollowcore Quality Improvement (through X-Tec training etc)</td>
<td>4.06</td>
</tr>
<tr>
<td>6</td>
<td>Non-Conformances and actions to prevent recurrence openly discussed</td>
<td>4.06</td>
</tr>
<tr>
<td>7</td>
<td>Increased multi-departmental team working</td>
<td>3.90</td>
</tr>
<tr>
<td>8</td>
<td>Annual Appraisal of employee performance</td>
<td>3.80</td>
</tr>
<tr>
<td>9</td>
<td>Improved assessment of Failure cost (NCR analyses)</td>
<td>3.77</td>
</tr>
<tr>
<td>10</td>
<td>Regular review of Quality Policy statements</td>
<td>3.72</td>
</tr>
<tr>
<td>11</td>
<td>Salaries paid on time</td>
<td>3.62</td>
</tr>
<tr>
<td>12</td>
<td>Increasingly basing investments on feasibility studies</td>
<td>3.57</td>
</tr>
<tr>
<td>13</td>
<td>Increased utilisation of contract work</td>
<td>3.57</td>
</tr>
<tr>
<td>14</td>
<td>Annual review of Mission and Vision statements</td>
<td>3.56</td>
</tr>
<tr>
<td>15</td>
<td>Market Share, Market Size and Competitor Pricing Analyses</td>
<td>3.53</td>
</tr>
</tbody>
</table>
Daniele Seraphim – Ph.D.

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Regular Staff meetings (RSC, OST...)</td>
<td>3.53</td>
</tr>
<tr>
<td>17</td>
<td>Bonus sharing</td>
<td>3.47</td>
</tr>
<tr>
<td>18</td>
<td>Increased knowledge of Manpower productivity</td>
<td>3.35</td>
</tr>
<tr>
<td>19</td>
<td>Improvements in Planning Activities</td>
<td>3.30</td>
</tr>
<tr>
<td>20</td>
<td>Increased Quality Prevention activities performed by the Quality Control team</td>
<td>3.24</td>
</tr>
<tr>
<td>21</td>
<td>Annual review of the organisation chart</td>
<td>3.24</td>
</tr>
<tr>
<td>22</td>
<td>Hiring policy giving priority to Employees’ family</td>
<td>3.23</td>
</tr>
<tr>
<td>23</td>
<td>Safety Representatives</td>
<td>3.22</td>
</tr>
<tr>
<td>24</td>
<td>Magazine and articles circulation</td>
<td>3.21</td>
</tr>
<tr>
<td>25</td>
<td>Regular review of Key performance indicators</td>
<td>3.21</td>
</tr>
<tr>
<td>26</td>
<td>Quality Control Department independent from the production processes</td>
<td>3.17</td>
</tr>
<tr>
<td>27</td>
<td>Improved relations with Suppliers</td>
<td>3.14</td>
</tr>
<tr>
<td>28</td>
<td>Improved Clarification of Contractual Specification</td>
<td>3.14</td>
</tr>
<tr>
<td>29</td>
<td>Balanced Scorecard used to grasp the Company’s overall performance</td>
<td>3.06</td>
</tr>
<tr>
<td>30</td>
<td>Improved marketing tools (brochures, promotional films etc)</td>
<td>3.06</td>
</tr>
<tr>
<td>31</td>
<td>Regular Safety reviews and improvements</td>
<td>3.06</td>
</tr>
<tr>
<td>32</td>
<td>Generalisation of Recruitment tests</td>
<td>2.97</td>
</tr>
<tr>
<td>33</td>
<td>Procedure set in place for solidarity among employees (fund collection)</td>
<td>2.91</td>
</tr>
<tr>
<td>34</td>
<td>Customer Satisfaction Survey used to analyse satisfaction and benchmark processes</td>
<td>2.91</td>
</tr>
<tr>
<td>35</td>
<td>Suggestion Boxes</td>
<td>2.81</td>
</tr>
<tr>
<td>36</td>
<td>Company’s WEB Site</td>
<td>2.81</td>
</tr>
<tr>
<td>37</td>
<td>Defined Strategic Plan deployment process and Regular review on progresses</td>
<td>2.81</td>
</tr>
<tr>
<td>38</td>
<td>Quality Documentation reflecting the actual situation of the Company</td>
<td>2.81</td>
</tr>
<tr>
<td>39</td>
<td>Training Survey &amp; Programme</td>
<td>2.81</td>
</tr>
<tr>
<td>40</td>
<td>Participation in construction exhibition</td>
<td>2.81</td>
</tr>
</tbody>
</table>

Table 88: Forty highest ranking improvement initiatives of the “Refinements in the Quality System” period

Initiatives 1 to 16, 20 to 22, 24, 25, 29, 33 and 35 are follow ups and further improvements on initiatives introduced during the first and second periods.

Initiative 17 aims towards improved Employee Satisfaction.

Initiatives 18, 34 and 37 aim towards further improvements in the Measuring System.

Initiatives 19, 26, 28 and 30 aim towards the improvement of some low performing processes. For another company, processes requiring improvements may be different.

Initiatives 28, 30, 34, 36 and 40 focus on the customers. The aim is to present an enhanced image of the company, and to increase the company’s knowledge about customer satisfaction and requirements.

Improved safety and training is the aim of initiatives 23, 31 and 39. It may be noted that the company under study introduced these initiatives earlier during its TQM implementation process.
Initiative 27 focuses on Suppliers. In the company’s experience, relationship with suppliers cannot be improved until the organisation has recovered sufficiently to be considered a financially trustworthy partner.

Overall, the above study of the initiatives selected as relevant to the third period is satisfactory. However it is of interest to check the main differences between the theoretical model of initiatives introduction described above, and the actual experience of the company. Among the differences between the timing of the company’s initiatives and the theoretical timing proposed by the above model, it is interesting to mention:

- Improvements in the Quality System took place for the company during the second period. The model proposes to start improving it during the first period. It is probable that the company would have benefited from starting its Quality System improvements earlier.

- Regarding improvements in Employee Satisfaction, the model proposes only easy-to- implement tools during the first period, while the company used a mix of easy and more difficult initiatives during that period.

- The company started improving its Measuring System during the second period. The model proposes to start on some initiatives during the first period: reflection on KPIs and first introduction of BSC. This is a valuable advice: the company implemented the BSC concept in its third period only, not because it was thought to be difficult to implement, but because it became aware of this concept only during its third period. Introducing it earlier on would have certainly been valuable.

- The model proposes the introduction of Strategic Planning during the second period, while the company introduced it during the first period. As the company was successful in this initiative and valued its outcome, the researcher believes that its introduction should be kept in the first period because of its high impact on the company’s overall performance, even though its introduction is not straightforward.

- The model proposes the introduction of “Detailed accounting previsions for the year” during the second period, while the company introduced it during the third period only. Introducing this initiative earlier would certainly be beneficial, if reliable provisional figures could be calculated. The possibility of providing
reliable accounting provisions is correlated to having reliable knowledge of projects to be executed during the coming year. It is doubtful that such knowledge would be available at the onset of the second period. It is probable that reliable accounting provisions for the year would only be computed at the onset of the third period.

The model proposes to introduce improvements on market knowledge during the second period, while the company introduced them during the first period. The difficulty of implementation would certainly justify leaving this implementation to the second period. However, collecting market data is a long process, and starting on it during the second period only might withhold critical data on which the company can base its third phase expansion. Thus, the findings are inconclusive as to whether introduction of this initiative is most effective during the first or second phase.

The model proposes improvements on low performing processes during the third period, while the company started on them during the second period. Part of the reason why these improvements are left so late in the model, is because the improvements obtained on these processes are often incremental only, and not break through, because of the difficulty in improving their performance (planning process for example in the case of the company). However, a few low performing processes might drag the whole company's performance down. Therefore, the researcher would leave initiatives for improving low performing processes to the second phase.

Initiatives in view of improving safety and training appear during the third phase in the model, while they were introduced during the first or second phase by the company. The researcher is of the opinion that even if these initiatives bring slow incremental improvements only, they should be initiated during the first and second phase, and not left to the third phase, particularly the safety initiatives.

Customer focussed initiatives, such as CSS, marketing improvements, WEB site etc, are introduced during the third period in the model, but were introduced during the second period by the company. In this regard, the position of the researcher is that, as there is a lag between the moment these initiatives are introduced and the
moment positive benefits resulting from their introduction are felt, it would be best to keep their introduction to the second period.

Finally, the researcher would advice removing from the lists of initiatives any item with an “Expected Return” below 2, even if their implementation is not costly and easy to achieve.

Thus, the revised list of initiatives by period would be as follows:

<table>
<thead>
<tr>
<th>SN</th>
<th>Initiatives</th>
<th>Crisis to Break out</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regular review of Quality Policy statements</td>
<td>4.61</td>
</tr>
<tr>
<td>2</td>
<td>Annual review of Mission and Vision statements</td>
<td>4.56</td>
</tr>
<tr>
<td>3</td>
<td>Hiring policy giving priority to Employees’ family</td>
<td>4.45</td>
</tr>
<tr>
<td>4</td>
<td>Updates on the Quality System using feedback on audits</td>
<td>4.38</td>
</tr>
<tr>
<td>5</td>
<td>Annual review of the organisation chart</td>
<td>4.21</td>
</tr>
<tr>
<td>6</td>
<td>Non-Conformances and actions to prevent recurrence openly discussed</td>
<td>4.11</td>
</tr>
<tr>
<td>7</td>
<td>Procedure set in place for solidarity among employees (fund collection)</td>
<td>4.10</td>
</tr>
<tr>
<td>8</td>
<td>Improved inter-departmental Communication</td>
<td>3.96</td>
</tr>
<tr>
<td>9</td>
<td>Balanced Scorecard used to grasp the Company’s overall performance</td>
<td>3.90</td>
</tr>
<tr>
<td>10</td>
<td>Increased utilisation of contract work</td>
<td>3.87</td>
</tr>
<tr>
<td>11</td>
<td>Improved assessment of Failure cost (NCR analyses)</td>
<td>3.86</td>
</tr>
<tr>
<td>12</td>
<td>Annual review of role, responsibility and job description of key Employees</td>
<td>3.80</td>
</tr>
<tr>
<td>13</td>
<td>Regular review of Key performance indicators</td>
<td>3.76</td>
</tr>
<tr>
<td>14</td>
<td>Annual update of the Strategic Plan through a defined process</td>
<td>3.36</td>
</tr>
<tr>
<td>15</td>
<td>Safety Representatives</td>
<td>3.07</td>
</tr>
<tr>
<td>16</td>
<td>Regular Safety reviews and improvements</td>
<td>2.31</td>
</tr>
</tbody>
</table>

Table 89 Revised list of improvement initiatives - “Crisis to Break out” period.
Daniele Seraphim – Ph.D.

Table 90 Revised list of improvement initiatives - “Quality Integration” period

<table>
<thead>
<tr>
<th></th>
<th>Market Share, Market Size and Competitor Pricing Analyses</th>
<th>3.51</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Increased Quality Prevention activities performed by the Quality Control team</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Annual Appraisal of employee performance</td>
<td>3.46</td>
</tr>
<tr>
<td>22</td>
<td>Hollowcore Quality Improvement (through X-Tec training etc)</td>
<td>3.42</td>
</tr>
<tr>
<td>23</td>
<td>Salaries paid on time</td>
<td>3.42</td>
</tr>
<tr>
<td>24</td>
<td>Improved Clarification of Contractual Specification</td>
<td>3.27</td>
</tr>
<tr>
<td>25</td>
<td>Participation in construction exhibition</td>
<td>3.23</td>
</tr>
<tr>
<td>26</td>
<td>Customer Satisfaction Survey used to analyse satisfaction and benchmark processes</td>
<td>3.05</td>
</tr>
<tr>
<td>27</td>
<td>Quality Control Department independent from the production processes</td>
<td>3.00</td>
</tr>
<tr>
<td>28</td>
<td>Improvements in Planning Activities</td>
<td>2.92</td>
</tr>
<tr>
<td>29</td>
<td>Company's WEB Site</td>
<td>2.92</td>
</tr>
<tr>
<td>30</td>
<td>Training Survey &amp; Programme</td>
<td>2.63</td>
</tr>
<tr>
<td>31</td>
<td>Improved marketing tools (brochures, promotional films etc)</td>
<td>2.57</td>
</tr>
</tbody>
</table>

The list of improvements initiatives of the “Refinements in the Quality System” is not modified. Thus, Table 88 remains applicable.

It may be noted that the above lists are not complete, as initiatives recently introduced, or applicable to one department and with limited impacts on other departments, were excluded from the original list of initiatives.

It is also limited to initiatives selected by the company under study, and is therefore not exhaustive.

Finally, the scores attributed to each initiative on each criterion are directly relevant to the company’s experience, which is linked to its specific characteristics and culture. Thus, they are valuable guidance to an organisation wishing to implement TQM principles and having characteristics and cultural specificities close to the company under study. The greater the disparity in characteristics and cultural specificities, the less valuable the above mentioned classifications of initiatives.

11.3. Final reflection on the Research Hypotheses

11.3.1. Likelihood of successful TQM implementation in the UAE Industrial sector

The first research hypothesis is that it is possible to implement Total Quality Management in the industry sector of the United Arab Emirates.

This research has demonstrated through a case study that it is possible to implement successfully TQM principles in the UAE Industrial sector.
However, the difficulties faced by the company during its implementation process were major ones, mostly linked to the important gap between the ideal cultural profile that supports TQM implementation and the specific culture of the company (see paragraph 5.2.2).

Thus, an organization operating in the UAE Industrial sector and wishing to implement TQM principles will certainly be encouraged by the knowledge that such implementation is possible, and that it can foster the benefits claimed by the TQM literature such as the increase of the overall effectiveness and the raise of the satisfaction of all stakeholders.

It will also benefit from the guideline of the successful approach described in this study (see paragraph 11.3.2). Such guideline was not available when the company started its implementation process, and was thoroughly missed.

The revised lists of improvement initiatives to be introduced during the three periods (see table 89, 90 and 88 and paragraph 11.2.2) will also provide a useful “roadmap” for TQM implementation in such environment.

Therefore, not only does the present study provide a proof that a successful TQM implementation is possible in the UAE Industrial sector as stated by the first hypothesis, it also increases the likelihood of such success by providing practical guidance.

11.3.2. Specific approach for TQM implementation in an “unfavourable” cultural environment

The second research hypothesis is that a specific approach must be deployed in order to allow a successful implementation of TQM in an “unfavourable” environment.

The company studied the Critical Success Factors for successful TQM implementation and compared the ideal cultural profile that supports TQM implementation with its own specific culture.

At the onset of the TQM implementation project, five CSFs had been identified as in direct conflict with the organisation’s specific culture (see paragraph 5.2.2).

In order to increase its chances of successful TQM implementation, the organisation decided to try to modify its initial culture, in order to improve on its performance in regard to the five Critical Success Factors at risk.
Throughout its three implementation phases, it progressed slowly but steadily towards this aim, increasing its performance over time (see paragraphs 6.4.1, 7.4.1 and 8.4.1), but often not reaching the level it wished to acquire.

This approach was triggered by failures or difficulties of the company during implementation of TQM initiatives which involved one or several of these Critical Success Factors. This was experienced for example by the total lack of answer when employees were asked for their suggestions in order to improve the organization’s contribution to society and environment (see paragraph 5.1.2.4.3), or when first asked to identify their training needs. These two failures of TQM improvement initiatives were reflecting the deficit in the communication system, the lack of employee participation, the low concern for needs of the society and for the working environment and conditions.

The difficulties faced by the first Suggestion Competition launched at the onset of the TQM implementation process (see paragraph 6.2.1.1.2) was also an opportunity to learn that the cultural gap between the prevalent culture and the ideal culture for TQM implementation could not be ignored (see paragraph 6.2.1.1.4).

Based on these failures and difficulties, the company decided to select as a priority for each of its implementation stage the modification of its culture, in order to better match the critical success factors which are unfavourably influenced by the company’s culture.

Another way used by the company to take into consideration its cultural specificity was to review each of its improvement initiatives against three criteria (see paragraph 5.1.3.4.3), one of which being directly linked to cultural issues: “Ease of implementation” (see paragraph 5.1.3.4.5).

The organisation had also to use techniques, which were sometimes contradictory, in order to counter some of its cultural specificities which were preventing the implementation of its improvement initiatives.

Such was the case of the “forced participation” (see paragraph 6.1.4.2) technique used during the set up of the first strategic plan or to collect training requirements. This appealed to the propensity of the workforce to obey instructions and allowed employees to start considering participation and communication as part of their duties.
Such was also the case of the extensive use of sketches in order to convey safety instructions or of graphical representations in order to communicate performance progresses as a means to limit communication difficulties.

Another example of such techniques was to invite the senior staff who showed a marked reluctance towards workers' participation in the first suggestion competition to be active members of the evaluation committee of the second suggestion competition (see paragraph 7.2.8.9).

This approach triggered a modification of culture (see paragraph 9.2 for the internal perception of cultural change) which was sufficient to raise the performance of the company on the five CSFs, and allowed it to successfully implement TQM principles.

Thus, the second hypothesis which states that a specific approach must be deployed in order to allow a successful implementation of TQM to the specific environment is verified, and the approach used by the company was based on the following:

- Selection of “modification of culture” as a priority for each implementation stage (see paragraphs 6.1, 7.1 and 8.1).
- Evaluation of the cultural aspects of each improvement initiative, as part of the “ease of implementation” criterion.
- Use of techniques, sometimes contradictory, to ease the implementation of improvement initiatives.

11.3.3. Adaptation of TQM tools to the company's specific environment

The third research hypothesis is that the implementation of TQM principles in the specific environment in which the company operates requires an adaptation of some of the tools proposed by the TQM theory.

Most of TQM tools implemented by the company were more or less adapted to suit its specific environment. However some are considered to be best practise in the region, and therefore deserve to receive a special attention, as they could be used as model for UAE organisations.
11.3.3.1. Strategic Planning and Strategic Alignment

The Strategic Planning system introduced by the company is the core of its success, as it links together all improvement initiatives in a coherent and organized way. The decision to introduce a Strategic Plan was one of the first improvement initiatives introduced by the company during the first period (see paragraph 6.2.2.2). The success of this first implementation was undeniable, and was recognized by the TQM award body which invited the organization to present its Strategic Planning system during a best practice workshop in the Abu Dhabi chamber of commerce.

The company could have been satisfied with this patent success, and could have renewed it over the years without further improvements. However, the benefits gained from the implementation of such a tool were thought to be of such importance by the company that it decided to further refine its implementation and follow up system during the third period of TQM implementation (see paragraph 8.2.3).

11.3.3.1.1. Strategic Plan and Employee participation

One of the first characteristics of the Strategic Planning system set in place by the company is that it involves an important participation of the employees (see paragraphs 6.2.2.2.1 and 6.2.2.2.2 for the employee participation in the first Strategic Plan, and 8.2.3.1.2 for the participation in the refined Strategic Plan), which is a major achievement taking into consideration the difficulties of communication and the propensity of non-participation which was prevailing in the organization.

In order to foster such employee involvement, several techniques were used, such as "forced participation" which consists of requesting employees to reply to sent documents such as "Mission and Vision" or "draft of Strategic Plan" even if only to acknowledge the document and state they do not propose any modifications. Another technique is to avoid sending a blank page, which, given the difficulty of most of the employees to communicate by writing would block willingness to participate. Instead, drafts are sent, comments are compiled, and staff meetings organized to discuss the possible options.

11.3.3.1.2. Defined simple Strategic Plan process

The process of the first Strategic Plan was based directly on the recommendations of the SKIA (see paragraph 6.2.2.2), whenever possible. Some recommendations such as using
market research data as an input to the Strategic Plan was not possible, as no such data were available at that time. However, even that incomplete process was powerful enough to help the company define its recovery strategy.

During the refinement of the Strategy performed during the third implementation phase, the process was further defined and fine-tuned (see Figure 54), but still kept the characteristics of a simple process that could be implemented easily using the human resources already available in the company. No additional expensive software or manpower was required.

Inputs and outputs to the process were clearly defined, as well as the process itself. Implementation responsibilities were various, but a specific department (in the case under study, the Researcher's) was in charge of verifying its deployment progress.

The obtained process is a low cost, low time consuming process that may be implemented by any company with minimal means.

11.3.3.3. Strategy Deployment process

A major reason for the success of the Strategy system used by the company is its ability to follow up on the deployment of its plan. The Strategic Plan is not an additional system to be added to the already existing ones, but the overall quality system should be used to deploy the defined strategy (see paragraph 8.2.3.3 and Figure 55).

The alignment of the entire quality system to the Strategy is of critical importance, and this cannot be achieved without regularly verifying that this alignment is maintained.

This is particularly important when the organisation is characterised by a high power-distance. When a specific strategic objective is defined, the department in charge of follow up of the strategy deployment sets up, with the corresponding process owners, a corresponding measuring system, and assists them to define measurable objectives. The high loyalty and propensity to obey order of a large power-distance culture is an asset during deployment, as employees will attempt to achieve the set objectives. However, the alignment must be verified each time the Strategy is modified, as employees have a tendency to carry on their set assignments and may not have the required initiative to adapt them to the modified Strategy.
11.3.3.2. The Balanced Scorecard system

The Balanced Scorecard concept was implemented by the company to better align its performance measuring system to its strategy. It was to be the “dashboard” of the company, allowing decision makers to grasp easily the performance of the system and of its constitutive elements, in order to direct their efforts meaningfully. It is considered as best practice in the UAE Industrial sector (see paragraph 8.2.9).

The company decided to implement the initial BSC on data already available in the organisation, to progressively improve the system, and to limit the time and cost linked to the implementation. In this sense, the technique used is thus very similar to the Strategic Plan implementation one.

The straightforwardness and practical implementation brought a number of advantages. It enabled the company to assess the adequacy of its measuring system (see paragraph 8.2.9.7.1), to assess and improve the balance of its Strategy (see paragraph 8.2.9.7.2), to improve the alignment of the Quality System with the strategy (see paragraph 8.2.9.4, paragraph 8.2.9.7.3 and Figure 60) and to improve the communication system (see paragraph 8.2.9.7.4).

It must be noted that the implementation of the Balanced Scorecard system, as proposed by the company, did not conflict with any cultural specificity. However, its low-time low-cost “simple” implementation is well adapted to the UAE Industrial environment, as its implementation does not require any prerequisite level of TQM implementation. It uses the current data available in the organisation, and highlights areas for improvement. In the revised list of improvement initiatives (see Table 89), it is introduced during the first period of TQM implementation. It is doubtful that a best practice European BSC, with a high number of sophisticated indicators for each perspective, could be successfully introduced in a company operating in a developing country, where a limited measuring system is generally available, as the gap between the tools as used in developed countries and the reality would be too high.

The company was the first to implement the Balanced Scorecard concept (uncovered through literature review) in the Abu Dhabi Industrial sector. This initiative was perceived, both internally (4.11 on the 5 point Improvement scale) and externally (by the ISO and SKIA auditors) as successful, important and innovative.
11.3.3.3. Suggestion Competition

At the opposite of the BSC implementation, the Suggestion Competition was in conflict with numerous aspects of the specific culture of the company. It is however considered as best practice in the UAE Industrial sector (the company presented it during a best practice workshop in the Abu Dhabi chamber of commerce) as the company managed to partially overcome its numerous implementation difficulties and to use the suggestions to trigger numerous improvement initiatives. Thus, the benefits prevailed over the difficulties of implementation.

It may be noted that the first suggestion competition was launched at the beginning of the first TQM implementation period, and that the difficulties faced triggered the company’s reflection upon its specific culture and its gap with the ideal cultural profile that supports TQM implementation. It led the company to define its three criteria assessment scale of possible improvement initiatives, among which the “ease of implementation” one which takes in consideration cultural aspects.

Thus, the first suggestion competition was a success as it both triggered major improvement initiatives, and major learning opportunities.

A second suggestion competition was launched during the second phase of TQM implementation (see paragraph 7.2.8.9) which faced fewer difficulties as lessons learned from the first one were taken into consideration, but still remained strenuous.

Thus, the Suggestion Competition is a typical example of an initiative which conflicted greatly with the original characteristics and culture of the company. It was aimed to foster the participation and involvement of all employees. It was strongly resisted by some managers which were against workers’ participation, and faced high difficulties of communication (see paragraph 6.2.1.1). The company succeeded over time to reduce managerial resistance and increase the scheme communication (see paragraph 7.2.8.9) by adapting the scheme to its environment.

11.3.3.4. Simultaneity of TOM and BPR implementations

A fourth example of original implementation of TQM tools is the simultaneous implementation of TQM and BPR. Although the implementation of Business Process Reengineering (see paragraph 5.2.1) had been initially rejected by the organisation, it
uncovered, through the initiative of one of its managers (see paragraph 8.2.19.2), that both
BPR and TQM can be beneficial depending on the specific situation (see paragraph
8.2.19.3). In a mature production unit TQM is preferable as the continuous improvement
principle allows enhancement without perturbing the work. When a new production unit is
set up, BPR allows breakthrough improvements and can generate outstanding performance.

Both TQM and BPR have as a starting point the study of an existing process and its
imperfections, but from a different perspective: The former studies how the system could
be improved and the latter how it could be entirely reorganised if one could restart from a
"blank page". Based on this observation, the company launched process studies in order to
collect different types of information, some of which will be useful for continuous
improvement of existing production units, and others which will support Process
Reengineering for new production units (see paragraph 8.2.19.3).

In the “fast growth” environment of the Industrial Sector of the UAE, the possibility of
implementing simultaneously and complementarily TQM and BPR is a distinctive
advantage, and the combination of both is a powerful tool as knowledge of breakthrough
BPR improvement in new production centres can lead to continuous improvements in
mature production centres and the knowledge of all implemented improvements and all
constraints of mature production centres is used to rethink the entire production process for
new production centres.

It is to be noted that BPR as well as TQM requires a resolve to implement the concept.
This is illustrated by the company’s experience, which set up two new production centres
nearly at the same time: the Shahama factory and the Dubai factory. The former was
designed using all the knowledge (positive and negative) of the mature Mussafah factory
and the application of BPR principles to enhance the process. The later had for aim to
reproduce the Mussafah production centre in a different location. The productivity
outcome reflected these choices (see paragraph 8.2.19.2): The Shahama factory was
showing outstanding performance, well above the Mussafah factory one. The Dubai
factory however was showing a lower performance than the Mussafah factory, as it was its
"imperfect copy".
These four examples of adaptation of TQM tools to the company’s specific environment are highlighting different types of adjustments, some cultural and some operational:

Cultural adaptation as demonstrated by the Suggestion Competition and the participation of employees to the Strategic Plan; Operational adaptation to a developing country context with the use of simple practical initial implementation of the tools as demonstrated by the Strategic Plan and the Balanced Scorecard implementation; Operational adaptation to the fast growing environment of the industrial sector of the UAE as demonstrated by the simultaneous implementation of TQM and BPR.

Thus, the third research hypothesis, which states that the implementation of TQM principles in the specific environment in which the company operates requires an adaptation of some of the tools proposed by the TQM theory, is verified.

**11.3.4. Supervision of the TQM implementation process by a European female employee**

In a country where female employment remains the exception rather than the rule, and where women rarely hold a managerial position, it might be of interest to review why and how the researcher could successfully supervise the TQM implementation process with limited opposition from her male colleagues.

Although the TQM implementation process in the company was satisfactory overall, the researcher faced the following types of difficulties:

1. Her colleagues were sometimes very sceptical about initiatives she tried to introduce, arguing that a tool or concept effective in a European environment (the researcher is French), might very well be ineffective in the UAE. This sometimes resulted in strong opposition to the initiative. This resistance was particularly important at the onset of the TQM implementation project (the strongest opposition concerned the first Suggestion Competition), but reduced over time, as positive results became more and more visible.

2. Following the suggestion competition, some of her colleagues reported to the company owners that the researcher was spending already scarce funds on a doubtful initiative aiming at asking barely literate workers about their suggestions for improving the company’s competitiveness.
3. Her colleagues complained that she was adding to their already overloaded workload by insisting that non-urgent tasks, not directly related to their area of responsibility, should be completed by a fixed date. This type of complaint occurred mostly during Strategic Plan update periods, when Managers where strongly solicited for their input. Generally, the complaints were not addressed to the researcher directly, but often directed to the Top Management. Although this type of problem was not generalised, it persisted throughout the TQM implementation programme.

4. A few employees were unwilling to admit that they were unable to execute a task assigned to them by the researcher. They accepted the task readily, and when finding out that they had difficulty in completing it, did not report their difficulty to the researcher, but kept on delaying their execution. When pressed to express the difficulties they were facing, they refused to communicate them to the researcher, but went directly to the Executive Manager (a man) to complain about the unfairness of assigning them difficult tasks. This type of problems was limited to a few employees of Arab origin.

5. The researcher was sometimes criticised by some of her colleagues and even the top management, for being too concerned with “feminine” initiatives such as those aiming to raise the safety level in the organisation, and not enough with “masculine” aspects such as productivity improvements. These types of remarks were expressed mostly at the end of the second period, and reduced significantly during the third period when process improvements were defined as a priority.

6. Finally, the researcher thought at first that she might face relational problems with some of her colleagues of Arab origin, who would not shake hands with her, nor look directly at her, for religious reasons. However, it soon appeared there was no link between this behavioural attitude and willingness or not to try to implement TQM initiatives proposed by the researcher.

When reviewing the difficulties faced by the researcher, it may be noted that only items 4 and 5 can be directly linked to gender (item 6 proved in fact to be unfounded), while items 1 and 2 were related to doubts that TQM principles may be relevant to the characteristics...
Daniele Seraphim – Ph.D.

and culture of the company, and item 4 to the additional workload induced by the TQM implementation project.

Overall, difficulties were few and limited in importance, and the willingness to assist the research in TQM implementation was next to unanimous.

The following elements were determining factors in this success:

- The researcher benefited from the strong overall commitment from the two owners (one of them being her husband) and from the Executive Manager. They would often defend the researcher’s point of view in the face of criticism.

- In 2000, because of the financial crisis faced by the company, the management was in agreement that change was required, and ready to participate actively in the TQM implementation project.

- When the researcher undertook to head the TQM implementation team, she was already known as an “achiever” by most of the managers in the organisation, as she had worked in cooperation with them on IT software development projects, during which she had gained their trust.

- The researcher could soon demonstrate positive outcomes at an early stage, based on three different types of assessments: Most of the company’s KPIs were soon showing signs of recovery; The ISO auditors were favourably impressed by the progresses of the organisation and the researcher made sure that their opinion was known to the management; The SKIA team reported the success of the company regarding its TQM progress, both through praise (such as asking the company to present its Suggestion Competition process and its Strategic Planning process during a best practice workshop in the Abu Dhabi Chamber of Commerce) and through the awards obtained. These successes were widely advertised among the employees by the researcher.

- The researcher made sure that TQM initiatives were seen as positive, using the newly set communication system to explain the reasons for these initiatives, the foreseen benefits, and the importance of employee participation.
Successes in TQM implementation were never presented by the researcher as her own success, but as the success of the company, which in fact was the case, and she was prompt to point out that success would not have been possible without all employees’ involvement.

The researcher used the communication system to pass the message to her colleagues that although TQM initiatives were not urgent, they were important, and that managerial responsibilities expand beyond the processes under their direct supervision, and include responsibilities for the overall performance of the company.

During management meetings, the researcher communicated to her colleagues that she understood their concern that a concept/tool effective in a European Environment might not be so in the UAE environment, and that therefore the characteristics and specific culture of the company was taken into consideration during TQM implementation.

The researcher had gained from her experience as IT developer, the knowledge that a “lack of success” is considered a “failure” only if one renounces the initiative. Success can be achieved through different means. This perseverance was respected by her colleagues, and sometimes led her to use the specific characteristics of the company to achieve success (such as the “forced participation” technique the researcher used during the first period for example (see paragraph 6.1.4.2)).

11.4. Evaluation of the advantages/disadvantages in applying TQM in the UAE construction sector

When reviewing the experience of the company under study, it is surprising to note the speed of transformation achieved by the organisation, as measured through its overall performance and the satisfaction of its stakeholders. In three years, the company evolved from an organisation in crisis, to a highly successful and profitable one, in which stakeholders’ satisfaction had been boosted, and which was evaluated as the best performing industry in the Abu Dhabi Emirate by a governmental TQM award body. Considering that TQM is based on the concept of incremental improvements rather than radical change, the company’s experience is inconsistent with the findings of most western
TQM experts, who report that TQM is not a "quick fix" (Dahlgaard and Dahlgaard, 2002) (Jeffries et al., 1996).

Three factors have affected the company's TQM implementation, and enabled it to provide rapid and substantial improvement.

The guidance of the SKIA has allowed the company to take initiatives which were pertinent to its current stage of development, and to progress in a measured, systematic and balanced way towards its goal. Thus, it had certainly made less "mistakes" than organisations which underwent TQM implementation without such guidance.

The second significant factor is the buoyancy of Construction Industry in the United Arab Emirates. Early stages of TQM implementation allowed the company to increase its performance enough to take advantage of the booming Construction market in the country, and this was further accelerated during the next stages. Thus, the combination of improved performance and a buoyant market allowed the company to achieve in a few years time what takes much longer in a market characterised by a slow demand increase or a recession.

Finally, TQM implementation has clearly provided an edge to the company over its competitors. As, at the onset of the TQM implementation project, the company was fairly representative of construction companies in the UAE, it would be justifiable to assume that the TQM knowledge in that industry was comparable to the one in the organisation under study: very low (see paragraph 5.1.1.6). This is backed up by the fact that the first TQM award body (the SKIA) was introduced in the country in 1999 only. Thus, in an industry were TQM knowledge is low, the competitive edge of TQM implementation is superior to the same edge in an industry in which TQM is known and at least partly implemented, as it is the case in occidental countries.

Based on these factors, is it reasonable to infer that a construction company operating in the UAE, could benefit from similar positive effects than the company under study, if they implement TQM principles today?
TQM award schemes are nowadays available both in Abu Dhabi and in Dubai, and a construction company could certainly benefit from their guidance. However, the SKIA has recently been merged with the Sheikh Khalifa Excellence Award which is based on the EFQM model, and does not have some of the characteristics of the SKIA which had been so useful to the company (see paragraph 9.1.3.4): It is not specific to the Industrial Sector, there are less interactions between the award body and the participants, and the assessors are not full time employees of the award body. Although the researcher, who has a good understanding of both the SKIA and the SKEA (through repeated supervision of participation in the SKIA and through being a senior assessor and team leader in the SKEA), regrets that the SKIA scheme is not in existence as such any longer, it strongly believes that participation in other TQM award schemes would be greatly beneficial to an organisation wishing to implement TQM principles.

Considering the buoyancy of the UAE construction market, the current situation is even more favourable than it used to be when the company started on its TQM implementation in 2000, and specialists are of the opinion that it will remain that way for a number of years. Among the construction projects currently under study or going on in the UAE, the following examples can be mentioned: Construction of the biggest shopping mall in the world, construction of several mixed-use artificial islands, extensions on existing airports and construction of several new ones, construction of an underground in Dubai...

Finally, although the overall TQM knowledge in the UAE has been slightly raised by the efforts of the TQM award bodies, it has yet to impact significantly on the construction industry. None of the company's competitors and clients has participated in a TQM scheme.

Thus, a construction company in the UAE wishing to implement TQM principles and basing its implementation on the guidance of a TQM award body and on the present research, would have a high probability of achieving positive outcomes in line with to the ones of the company under study.

11.5. Verification that research objectives have been met

The experience of the company in implementing TQM principles have been described in detail using the case study approach, and its relevance to the UAE construction industry reviewed.
Daniele Seraphim – Ph.D.

The assessment of the company's performance progress has been carried out both using internal performance indicators and using participation in a TQM award scheme in order to obtain an independent overview.

The specific culture of the company and its impact of the TQM implementation project has been discussed through the different phases of TQM implementation as well as overall. Change in culture in the organisation between the initial and final stages of implementation has been examined. Relevance of the research findings related to the cultural specificity has been reviewed both for the UAE construction industry and for other industries.

Successes and failures of the company's initiatives in view of implementing TQM principles have been examined during each case study, and employees' perception regarding both the importance of these initiatives and the success of the organisation in implementing them has been analysed.

Factors of the company's overall success in implementing TQM principles have been studies, and 'key' factors identified and prioritised.

Both convergence and divergence between CSF identified in the TQM literature have been highlighted and commented upon in the light of the company's experience.

An evaluation of the advantages/disadvantages in applying TQM in the construction in the UAE has been carried out.

Thus, all research objectives have been met.
CONCLUSIONS

The prime aim of the company, as with most companies, was to introduce improvement initiatives so as to improve its efficiency. However, a straightforward implementation of accepted TQM methods was either unsuccessful or deemed difficult due to difficulties generally arising from the specific characteristics of the company. In such cases the company had to adapt the concept/tool or delay its introduction. Also, the number of concepts/tools proposed by TQM theory for improving organisational performance is high and the company had no clear available published guidance for developing a strategy for implementing a TQM system in its particular environment.

Thus, the “originality” of this research is not based on the concept/tools employed but on the specific implementation strategies employed, within the company’s cultural and operational context. The conclusions and recommendations are supported by an evaluation and critical appraisal of the initiatives and lead to recommendations that can be of benefit both to academics and to companies finding themselves in a similar situation.

Three types of “innovation” regarding introduced initiatives can be noted:

1. Initiatives not in conflict with the company’s characteristics and culture and deemed both highly successful and important by the management, which encouraged the organisation to refine their implementation.

2. Initiatives where important implementation difficulties were faced due to characteristics/cultural resistances, and where the organisation decided to adapt the implementation process in order to obtain at least a partial success.

3. Initiatives that the company was the first to implement in the Abu Dhabi industrial sector.

The three following examples are representative of such “innovative” initiatives.

Thus, although the intention of the organisation was not to be original in its improvement initiatives, some “originality” can be noted regarding the way a number of initiatives had been implemented.
A further major element of originality in the present work concerns the cultural specificity of the organisation, and its influence over its overall TQM implementation programme.

From the Literature review it became evident that no research was available relative with respect to the description and analysis of a TQM implementation in the UAE construction sector, nor to such an implementation in the UAE altogether, prior to this work.

Thus, the main originality of the present research relies on the verification that TQM implementation in the UAE construction industry differs significantly from TQM implementations in other parts of the world, were implementations have been studied.

The present work demonstrates that the UAE construction sector is characterised by a cultural specificity that is, in several respects, not suited to the implementation of TQM principles. Some authors view such cultural identity as “hostile” to TQM, and express serious doubts that TQM can be successfully implemented in such an environment (Al-Khalifa and Aspinwall, 2000).

The researcher’s findings are that its cultural specificity and characteristics have greatly influenced its TQM implementation approach, and have often been a source of difficulty. However, it is undeniable that the company has been successful in implementing TQM principles, as demonstrated by the detailed study of the evolution of its internal performance indicators and by the external recognition of a governmental TQM award body.

It is therefore useful, from the TQM knowledge point of view, to analyse how an organisation with characteristics unfavourable to TQM implementation nonetheless succeed, and to draw guidance from that experience, which might prove useful to companies sharing these characteristics, or even to companies sharing part of them.

Such guidance was not available to the company during its TQM implementation project although the organisation felt the need for it and strongly believes that it would have given it a higher confidence in its chances of success, as well as a clearer implementation “roadmap”.

The researcher trusts that the original knowledge provided by the present research may prompt UAE construction companies and even Arab Gulf countries industries to undertake
Daniele Seraphim – Ph.D.

TQM implementation projects, as the company’s experience is a proof that success is possible and that important performance increases can be expected.

In addition, as the researcher is female, the research provides a perspective on gender aspects of TQM management in the UAE which is currently unique in terms of published data.

In this sense, this research is an important addition to the TQM field of knowledge.

Accepted TQM theory claims that if an organisation implements TQM principles and tools, its performance will increase and the satisfactions of all stakeholders will improve.

This has been empirically confirmed by an important number of case studies in organisations in developed countries, which have seen their performance increased following the implementation of TQM principles. However, one may wonder if such a success could be obtained when implementing TQM principles in an organisation which originally had a much less favourable environment for TQM implementation. This is particularly relevant for developing countries, in which environmental conditions are a long way from matching those of developed countries, and in which the TQM theory is receiving increased attention.

A case study of TQM implementation in an organisation having initial conditions considered not favourable to the successful implementation of TQM principles, which fostered an important increase of performance and of satisfaction of all stakeholders, would not be a proof that TQM principles can have a positive impact in any type of environment, such as the ones found in developing countries. It would, however, demonstrate that TQM implementation in such environments can produce the positive impacts claimed by the theory.

The initial environmental elements not favourable to TQM implementation in the company studied were the following:

- It operates in a developing country.
- Management style, both within the organisation and in the country as a whole, was autocratic.
A strong financial crisis was endangering the very existence of the company.

A multicultural/multilingual workforce renders internal communication difficult at best.

A very low knowledge base of TQM both within the organisation and in the country at large.

A management selected for its technical abilities and experience, with little knowledge of management techniques.

A workforce used to obey orders, and not to display initiatives.

An ISO system that was no longer effective, limiting the organisation’s progress.

A few environmental elements, however, were favourable to TQM introduction:

A strong increase of demand in the country’s construction industry (however, this was a main factor for the organisation’s destabilisation, which led to the financial crisis).

Political stability in the country.

The existence of a governmental body promoting TQM implementation.

A management willingness to introduce change (fostered by the financial crisis).

The company used these four positive elements to the maximum during its attempt at TQM development, and altered several of its characteristics which were originally non-favourable to TQM implementation:

The management style of the company became less autocratic, with reduced power distance.

The workforce takes more initiatives, knowing that it would not be penalised for them, and became more involved and empowered.

The financial crisis was overcome, and the company is nowadays in a phase of high financial profitability.
The TQM knowledge was raised, particularly among the management.

The effectiveness of the ISO system was restored, and is now used as a key element to sustain improvements.

One could infer from the company’s experience that an organisation sharing the same initial characteristics as the subject company could successfully implement TQM principles and that this implementation should result in better performances and increased satisfaction of all stakeholders. The author would like to go one step further, and state that an organisation having several characteristics unfavourable to TQM implementation (whatever those characteristics), can still successfully implement TQM principles, as long as it capitalises on its favourable characteristics, and as long as it takes its specificity into consideration while introducing TQM improvements.

The importance of taking into consideration the organisation’s specificities (negative as well as positive to TQM implementation), is certainly one of the essential reasons for the success of the company studied in this TQM implementation process. In some cases, it has in fact led the company to quite original implementations, such as a complementary coexistence of BPR and continuous improvement techniques in a fast growing environment. Also the central consideration given by the company to its employees, in reaction to an environment in which people are often considered as readily replaced.

It is considered that this study has provided valuable guidance to Construction based companies in the UAE intending to implement a TQM system into their organisation. Also, it provides those with a wider interest in TQM with an insight into the implementation and potential benefits and difficulties that can arise in the specific environment found in the UAE.
**LIST OF ABREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPR</td>
<td>Business Process Reengineering</td>
</tr>
<tr>
<td>BSC</td>
<td>Balanced ScoreCard</td>
</tr>
<tr>
<td>CI</td>
<td>Continual Improvement</td>
</tr>
<tr>
<td>CSF</td>
<td>Critical Success Factor</td>
</tr>
<tr>
<td>CSS</td>
<td>Customer Satisfaction Survey</td>
</tr>
<tr>
<td>DoE</td>
<td>Design of Experiment</td>
</tr>
<tr>
<td>EFQM</td>
<td>European Foundation for Quality Management</td>
</tr>
<tr>
<td>FMEA</td>
<td>Failure Mode and Effect Analysis</td>
</tr>
<tr>
<td>GDP</td>
<td>Growth Domestic Product</td>
</tr>
<tr>
<td>GRC</td>
<td>Glass Reinforced Concrete</td>
</tr>
<tr>
<td>GRP</td>
<td>Glass Reinforced Polyester</td>
</tr>
<tr>
<td>HR</td>
<td>Human Resources</td>
</tr>
<tr>
<td>HSE</td>
<td>Health Safety and Environment</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>LSP</td>
<td>Lower Specification Level</td>
</tr>
<tr>
<td>MSDS</td>
<td>Material Safety Data Sheet</td>
</tr>
<tr>
<td>USP</td>
<td>Upper Specification Level</td>
</tr>
<tr>
<td>NQA</td>
<td>National Quality Award</td>
</tr>
<tr>
<td>PMS</td>
<td>Performance Measuring System</td>
</tr>
<tr>
<td>QA</td>
<td>Quality Assurance</td>
</tr>
<tr>
<td>QC</td>
<td>Quality Control</td>
</tr>
<tr>
<td>QFD</td>
<td>Quality Function Deployment</td>
</tr>
<tr>
<td>SAGA</td>
<td>Self-Assessment Gap Analysis</td>
</tr>
<tr>
<td>SD</td>
<td>Support and Development (dept in charge of TQM implementation)</td>
</tr>
<tr>
<td>SPC</td>
<td>Statistical Process Control</td>
</tr>
<tr>
<td>TQM</td>
<td>Total Quality Management</td>
</tr>
<tr>
<td>UAE</td>
<td>United Arab Emirates</td>
</tr>
</tbody>
</table>
REFERENCES


Al-Khalifa K., Aspinwall, E., (2001), “Using the competing values framework to investigate the culture of Qatar industries”, Total quality management, Vol. 12, No. 4, 417-428


Barton, R.T., (2000), "Journal of Construction research", 1, 109-122


Box, S., Platts, K., (2005), "Business process management: establishing and maintaining project alignment", Business process management journal, Vol. 11, No. 4, 370-387


BS7850 (1992), 'Total Quality Management', BSI Standards Publications

Daniele Seraphim – Ph.D.


Conti, T., (2004), “How to conceptually harmonize ISO 9000 certification, levels of excellence recognition and real improvement”, Total quality management, Vol. 15, No. 5-6, 665-677


Daniele Seraphim – Ph.D.


Collier Macmillan


Daniele Seraphim – Ph.D.


Daniele Seraphim – Ph.D.


