TQM Implementation in Libyan Oil and Gas Sector

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Abstract: This paper investigates quality factors that are absolutely essential for successful implementation Total Quality Management (TQM) in Libyan oil and gas companies (LOGCs). Eleven quality factors with forty-two elements where identified based on literature search to develop a questionnaire to carry out the survey in order to identify the quality factors that are seen by LOGCs to be critical to the success of TQM implementation. Forty-five questionnaires were provided by hand to quality-related managers from the Libyan Oil and Gas sector. A total of forty-two were returned sufficiently completed, that gave us a response rate of approximately 93.33%. The empirical analysis demonstrates several key findings: The analysis indicated that twenty-four quality factors are found to be critical and absolutely essential for successful TQM implementation. These factors classify into three levels of criticality. All of the factors were found to be supported by similar studies and cited literatures. These factors will direct an organisation towards business excellence and enhancing success of TQM practices in the oil and gas sector.

Keywords: Total quality management, Critical success factors, Libya, Oil and gas.

INTRODUCTION

In a global market, knowing how the best organizations conduct their business is a critical element of successful competition. The international paradigms of management that cross national boundaries, the new information revolution, the introduction of new technologies, and the shift towards customer-focused strategies have made competition stronger than ever.

Organisations and governments can no longer perform their functions with bureaucratic rules, inadequate resource planning, or inefficient managerial approaches. They are challenged by the need for a better quality of products, services, improved performance standards, and greater responsiveness in order to be competitive in the global market.

Quality has been an important issue for organisations for many years. The early focus on quality evolved from inspection to quality control and later to quality assurance. During the 1990s, TQM evolved as a common term among organisations in different parts of the world. TQM has developed in many countries into a holistic framework (e. g. National quality or internationally recognized awards such as the Deming award, MBNQA and EFQM) aimed at helping organizations achieve excellent performance, particularly in customer and business results.

Companies in developed and developing economics need to transform their traditionally bureaucratic style of management to a high value-added, proactive, and efficient one. For such a transformation the adoption of effective quality strategies and practices is considered as one of the crucial factors for success.

In the continued global changes, companies need to continually improve this is where TQM come into play, and companies taken TQM for many different reasons. For some the focus is upon reducing the cost of operation, others focus on improving customer and/or employee satisfaction, some see it as a way of changing the corporate culture and style. Many look to TQM as a step further than their achievement of IS09000 certification. Most, though are looking for a way to improve their businesses make them more profitable and competitive and more enjoyable to work with.

LITERATURE REVIEW

Many countries have established their quality award programs based on Deming Prize, MBNQA, and EQA awards. Respectively, many quality awards have been developed in Europe the last 15 years. Their purpose is the improvement of the competitiveness of

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various types of organizations. Most of the European countries have initially used the ISO quality assurance standards in order to promote development and production procedures. The followed stage was the implementation of methods of self-assessment and systems of quality management, basically through quality awards schemes, serving the ultimate goal of the alteration of the quality's philosophy and the improvement of competitiveness of small- and medium-sized firms.

The first published paper to address the determination of the critical quality factors of TQM was by Saraph, *et al* 1989. This study involved thorough analysis of the literature (writing of the gurus, experts, and academics). They extracted 120 organisational prescriptions for effective TQM. Using judgmental process (Saraph *et al* 1989) categorised these prescriptions into eight critical factors was established utilising the one hundred and twenty prescriptions. A questionnaire survey directed to twenty firms in Minnesota, USA was used to validate the instrument. Using a likert scale of five points (1 very low and 5 very high), respondents were asked to rate the level of practicing the factors in their firms. Using the responses of 162 managers, and applying reliability and detailed item analysis, Saraph *et al* was able to validate the following eight factors as critical quality factors (1) Role of top management and quality policy, (2) Role of the quality department, (3) Training, (4) Product/ service design, (5) Supplier quality management, (6) Process management, (7) Quality data and reporting, (8) Employee relations.

Baker and Strabird (1993) were the first to publish a research paper applying the instrument developed by Saraph *et al* 1989. The study was directed to the food processing industry in California, USA. The study aimed at assessing the level of CF's that are present, and to identify the organisational characteristics that are conducive to these CF's. The results of this study empirically reinforced the emphasis on the top management's role and behaviour and quality policy in the efforts of quality management. Another result of this study is that organisation-wide sharing of responsibility is more conducive to quality management implementation than a centralised approach.

The instrument of Flyn *et al* (1994) represented significant departure from the pioneer instrument of Saraph *et al* 1989. The instrument was administrated at the plant level in view of the fact that quality programmes are most often implemented at that level. Seven major dimensions of quality management and eleven constructs were identified mainly from the practitioner and empirical literature. The study was based on a sample of forty two manufacturing plants from the machinery, transportation components and electronics industry located in the USA. The constructs identified by this study include quality leadership, feedback, inter-fanctional design process, supplier relationship, quality improvement rewords, selection of teamwork potential and teamwork, customer interaction, process control, cleanliness and organisation.

Thiagarajan and Zairi (1997) present a comprehensive review of the literature in a three-part series of articles. This is done by discussing critical factors in key areas of TQM which are often stressed in implementation case studies, and supported by quality gurus and writers. Such critical factors are considered conducive to the success of TQM implementation. The authors take 98 companies as examples of best practices of TQM implementation, based on the Malcolm Baldrige National Quality Award (MBNQA) the European Quality Award (EQA) and the Deming Prize for assessing organizational excellence. The criteria used are found to reflect the most important components of effectiveness and competitiveness. Thiagarajan and Zairi (1997) emphasize the key elements of quality management implementation taken from the experts on quality and examine them against TQM implementation in companies with quality awards. The key elements of TQM can be summarised as follows: Leadership, Internal stockholders' management, Employees' involvement, Middle management role, Training and education, Reward and recognition, Teamwork, The role of employees' unions, Policy and strategy, Resource management, Communication for quality, Managing suppliers, System and process management. Accredited quality management system, Organising for quality, Managing by process Benchmarking, Self-assessment, Cost of quality, Quality control techniques, Measuring customers wants and satisfaction, Issues in implementation, TQM and national culture, TQM failures, Gestation period, Hard and soft quality management.

Another study conducted by Al-Khalifa and Aspinwall (2008). The study had presented the results of a study on Critical Success Factors for Total Quality Management (TQM) implementation in UK organisations. A survey instrument (10 Success Factors) developed by Yusof and Aspinwall for use in the automotive sector was used after some modification. The findings have supported Yusof

study and validated the instrument as a reliable tool. The results indicated that the Manufacturing sector in UK is embarked towards quality excellence. Suggestions were made to replicate the study in some developing countries.

A study by Dayton (2001) used data from American industrial companies to determine whether the ten TQM critical factors (i.e. people and customer management, supplier partnerships, communications, customer satisfaction, external interface management, strategic quality management, teamwork structures for improvement, operational quality planning and quality improvement systems) identified by the Black and Porter (1996) study could be considered as important TQM CSFs by USA small and large companies. From his conclusion he identified the strategic quality management as the most important TQM critical factor.

Baidoun (2003), conducted an empirical study of critical factors for TQM in Palestinian organisations. The main focus of the study was to identify the critical quality factors for effective TQM implementation and to understand how they were implemented by Palestinian organizations. His study identified nineteen quality factors were perceived as being critical for the successful implementation of TQM. These factors were identified and classified into three tiers of criticality. Nine of them were addressed in the early stages of the implementation process.

Many other researchers have also investigated the critical success factors of implementing TQM (Allen and Kilmann, 2001; Dean and Bowen, 1994; Douglas and Judge, 2001; Easton and Jarrell, 1999; Nilsson *et al* 2001; Reed *et al* 2000; Waldman 1994; Sila *et al* 2002). These writers produced more or less the same factors as the previous studies. The common conclusion from these studies is that each organization has a set of critical success factors to which it must pay attention, and that the implementation process is firm-specific (Ghobadian *et al* 2005).

METHODOLOGY

Based on this literature review of the quality factors, 42 factors were derived to construct the questionnaire of this study. The questionnaire survey targeting the oil and gas organisations aims at identifying the perception of these organisations of each of the 42 quality factors as to its level of criticality in successful implementation of TQM.

Frequency distribution is most appropriate for the data organisation as it allows the typical value (point of centre tendency) and it can be seen how typical this value isWeisberg (1992).The use of mode as the measure of central tendency for this level of investigation is proved appropriate as all of the quality factors response distributions appear on one category, illustrated as a single peak in the bar charts representing the response distribution of each the 42 quality factors. According to the scale used in the questionnaire (four-point scale), there are only four possible range values. A zero value of the range occurs when all respondents give a quality factors the same rating (that is, 1, 2, 3, or 4) where the maximum and minimum rating will be thesame. The range analysis tells little about the general agreement on the importance of a quality factor. Therefore, Variation ratio will help separating the quality factors with majority the consensus from other quality factors with no majority consensus as perceived by some respondents as of no consequences to the success of failure of the implementation process of TQM.

VR is calculated using the following simple formula:

VR= 1- frequency distribution of the mode

Where:
Variation ratio = 0 means unanimity (all respondents rated the quality factor as critical).
Variation ratio $\leq$ 0.5 means majority consensus (more than 50% of respondents rated the quality factor as critical).
Variation ratio > 0.5 means no majority consensus in rating a quality factor as critical.
However, the variation ratio doesn't take into account the full distribution of responses. To do so, index of diversity does take full distribution into account when dealing with non-metric data. The Index of diversity shows the degree of concentration of responses in a few large categories, and it can be considered as a surrogate measure of agreement amongst respondents concerning the response distribution of each of the quality factor.

In mathematical terms:
Index of diversity = 1- (P_{21}+P_{22}+….+P_{2k})

Where Pk= the proportion of responses in category k and k is the number of categories.

This means:

Index value close to zero will imply near unanimity; Index value close to 0.5 is when there is equal clustering around two large categories; and a

value close to 0.75 (4-1/4) will indicate high level of disagreement.

Sample selection: This study has focused on the most important sector of Libyan industry, namely the oil and gas sector. This sector constitutes an important and influential part of the entire Libyan industrial economy. The reason for this selection, that these companies have at least adopted ISO 9001, which is shared with their international counterparts.

Questionnaire design and administration: The questionnaire developed in this study consisted of two parts. The first part of the questionnaire (8 questions) was intended to determine fundamental issues, business information; such as the number of years a respondent is involved in quality management, the position of the respondent in the company, size of the organisation, business category, organisation ownership, and whether the company had implemented TQM. The second part consists of 42 variables or statements, which were extracted from the published literature of leading TQM practitioners and academics in order to enable the participants to evaluate and measure the implementation of quality initiatives in their organizations. The questionnaire developed uses a 4-point Likert scale (Critical, Important, Minor Importance, Don't Know) for rating the level of criticality of factors important to successful TQM implementation among Libyan oil and gas organisations.

Respondents Rate: 42 out of 45 questionnaires were returned sufficiently completed, with a response rate of approximately 93.33%, which is considered large enough to establish a representation and credible data for analysis. The questionnaire with a covering letter was directed to individuals who were considered quality-related managers from the Libyan oil and gas sector as they are in a position to answer the questions and to indicate how they perceive each of quality factors, as to their level of importance to the successful implementation of TQM, and to study the effects of TQM implementation on overall business performance.

Questionnaire reliability: Data were entered into a computer, the SPSS 17 reliability program was performed separately for the all factors. An internal consistency analysis was performed on the set of 42 factors. Table 1 lists Cronbach's alpha for different TQM implementation factors. This indicated that the reliability of multi-item scales corresponding to them ranged between 0.827 and 0.912. Generally, a reliability coefficient of 0.70 or more is considered to be good (Nunnally, 1967). The instrument developed for measuring TQM implementation using CSFs was considered to be reliable.

Table1. Internal Consistency Analysis

Quality Factor	No. of Question	Cronbach'salpha
1.Top management commitment & leadership	2	0.898
2. Vision and Quality Policy	4	0.827
3.Employee Participate	8	0.912
4. Customer Focus	2	0.881
5. Training & Education & Reward	3	0.875
6. supplier Management	3	0.902
7. Continues Improvement	10	0.891
8. Process Control	4	0.863
9. Cost of Quality	1	0.893
10. Information Technology	1	0.888
11. Culture	4	0.896

RESULTS AND ANALYSIS

Profile of the respondents: Table 2 presents the demographic profile of the respondents.The survey represented various types of organisations working in oil and gas sectors. The breakdown of these organisations is 29 % from the upstream operation, 16 % from oiland gas production, 5% from refinery and petrochemical, 24 % from oil services, and 26 % from consultation in oil and gas sector. Regarding the organisations size in terms of number of employees, about 34 % of the organisations participating were large- sized have more than 500 employees,43% were medium-sized have less than 250 employees, and 23% small size have less than 5o employees. Regarding principle ownership, about 43% of the organisations were public, 33% were private, and 24% were sharing organisations.

Analysis of responses: A total of 41 quality factors were stacked on critical and important categories, while one quality factor was returned as of minor importance by the majority of the respondents. This factor related to employees union support of the organisation's quality initiative (Figs. 1 & 2).

The Modal Category: The mode provides a summary of how respondents perceive the criticality of the QF to the success of the implementation

Table 2. Demographics of respondents of the survey

	Number of respondents	Percentage of respondents
Business Category		
Upstream operation	12	28.57
Oil & Gas production	7	16.67
Refinery & Petrochemical	2	4.76
Service	10	23.81
Consultancy	11	26.19
Year of experience		
Less than a year	12	28.57
1 to < 5 years	26	61.90
>5 years	4	9.52
Number of Employee		
Less than 50	10	23.81
Less than 250	18	42.86
More than 500	14	33.33
Position		
Quality Engineer	18	42.86
Quality manager	8	19.05
Consultant	8	19.05
Technical Engineer	5	11.90
Deputy general Manager	2	4.76
General Manager	1	2.38
Principle Ownership		
Public	18	42.86
private	14	33.33
Sharing	10	23.81
Techniques		
ISO 9001:2000	30	71.43
ISO 14000	8	19.04
TQM	none	0
Other	4	9.53

process of TQM in their organisations. Based on the identification of the mode for each quality sample, 24 factors were identified as critical, 17 factors were identified as important and only one factor was identified as minor importance which is related to employee's union support to the organisation's quality initiative, and no factor was identified as don't know. These modal categories are presented in the Table 3.

Range Analysis: Range analysis is used to indicate how the perceived importance of a quality factor varies in practice. This investigation reveals that the response distributions of the quality factors include only two possible types of ranges, which are (1 & 2). Nine distributions exhibit a range value of 1 that grouped into one category (critical) and the other Thirty-three distributions exhibit a range value of 2 which dispersed into the three categories. However, in the instances of a value of one or two of the range tells little about the general agreement on the importance of a quality factor.Therefore it is very important to look for other complementary measures of spread to achieve the objectives of this investigation.

From Tables 2 and 3, the quality factors with a range value of one were returned as critical impact the successful of implementation of TQM. The remaining 33 quality factors have a range value of two. Form these quality factors, the majority consensus returned 17 factors as important and 1 factor as minor important. Therefore, it will be rational not to analyse these 18 quality factors and to treat all of them as non-essential quality factors in the implementation of TQM in Libyan context. This support the conclusion from literature, that there is little agreement essentiality of many of the quality interventions to the success of TQM implementation. This reflects the need for classifying the quality factors in terms of their criticality.

Variation ratio and Index of diversity: Variation ratio helps to separate the quality factors with majority consensus from others with no majority consensus, and the index of diversity shows the degree of concentration of responses in a few large categories. Table 4 shows the computed variation ratio and the index of diversity for 24 quality factors returned by respondents as critical.

Table 5 shows that the index of diversity values supports the level of agreement identified by the variation ratio. The value of the index of diversity did not reach the maximal value of 0.75. This implies agreement among the respondents concerning the criticality of these quality factors.

The variation ratio values, however, identified 16 quality factors to have majority consensus (those with VR value of 0.5 or less), and 8 quality factors of no majority consensus (VR > 0.5).The findings, therefore, represent the fundamentals to construct the group's structure of the critical quality factors.

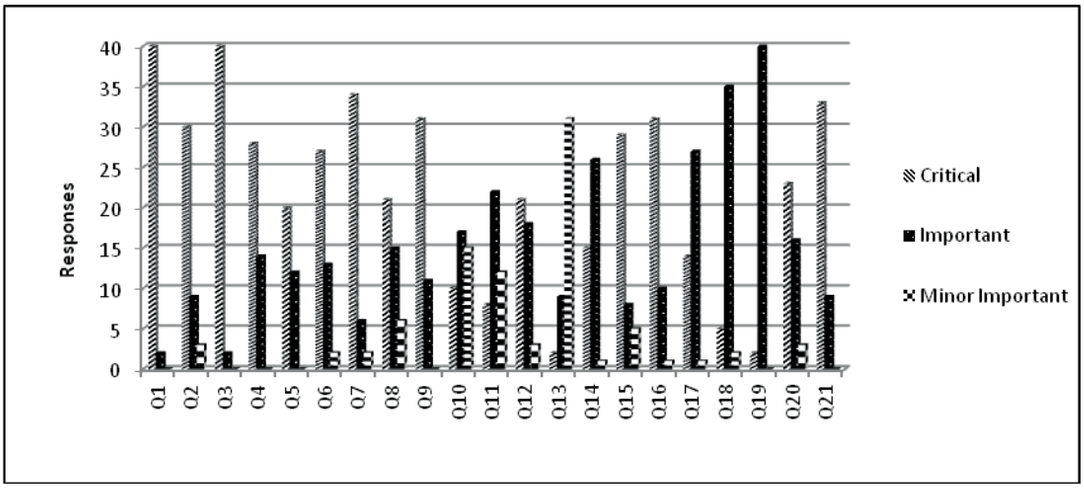


Fig. 1. Critical Quality Factors Frequency distribution

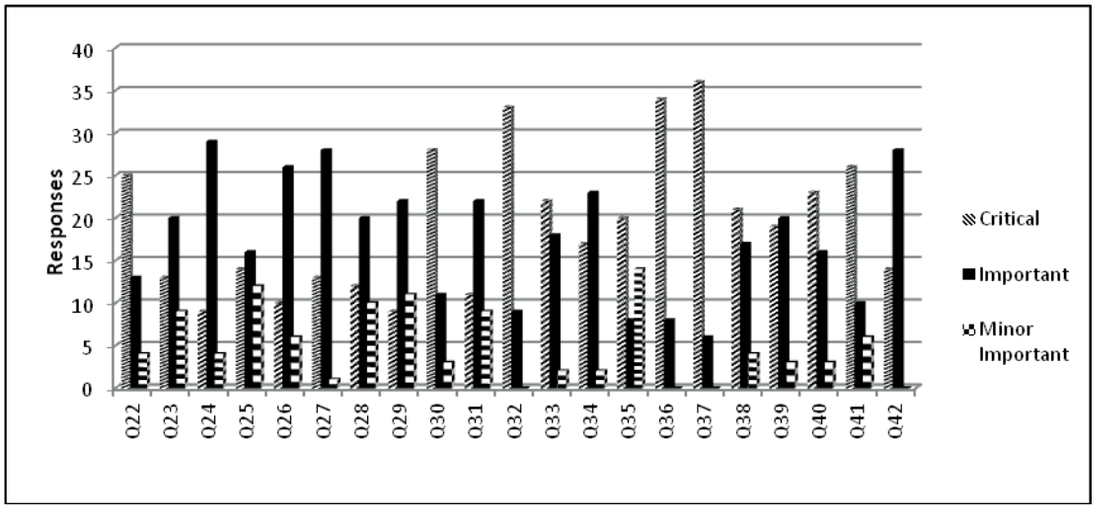


Fig. 2. Critical Quality Factor Frequency distribution

CLASSIFICATION OF THE IDENTIFIED CRITICAL QUALITY FACTORS

In the process of classifying and ordering the CQF's the use of range and the variation ratio well provide an opportunity for objective judgement. The sorting and ordering of the 24 CQF's using VR and DI provide a hierarchical structure in a descending order of criticality which is presented in table 5. These CQF's become essential. The CQF's classifying into three levels according to the range and the variation ratio presents the CQF's ranked in a descending order of their variation ratio.

The range and calculated variation ration values impose a three levels structure. A four level structure might prevail if several factors were returned with a range value of zero, and others with range value of one and two, and the calculated variation ratio values were between zero and greater than 0.5. Many researchers in the process of developing their TQM models ordered the hierarchical structure of critical quality factors into three tiers of importance (Ramirez and Loney, 1993; Ali, 1997; Thiagarajan *et al* 2001). The criteria to be used to stratification the CQFs is as follows

Level 1 critical quality factors: Those are quality factors that have a range value of 1 with the highest consensus level. They are essential to successful TQM implementation as perceived by all respondents to impact on the success of implementation. The low value of VR and range value of 1 indicate that there is uniformity in this level of quality factors amongst organisations concerning the criticality of these factors. These CQF's should be treated as basic components of the TQM implementation model and must be considered with priority in the early stages of implementation process.

The nine critical quality factors in level 1 are:

Table3. Quality factors' Modal Categories

Q. No.	Quality Factor
Modal Category - Critical	
Q1	1- Senior executive assume active responsibility evaluation and improvement of management system, and leading quality drive.
Q2	2- Visibility of senior executive commitment to quality and customer satisfaction.
Q3	3- Clear, consistent communication of mission statement and objectives defining quality values expectations and focus.
Q4	4- Comprehensive policy development and effective deployment of goals.
Q5	5- Top management push decision-making to the lowest practical level.
Q6	6- Effective top-down and bottom-up communication.
Q7	7- Elements of quality management structure are in place to manage the organisation's quality journey.
Q8	8- The entire organization understands that each individual and each process has internal customer and suppliers.
Q9	9- The entire workforce understands, and is committed to the vision, values, and quality goals of the organization.
Q12	10- Supervisors, unit heads and divisional managers assume active roles as facilities of continuous improvement, coaches of new methods, mentors and leaders of empowered employees.
Q15	11- Training objectives of the organisation corresponded with the main objectives of the organisation.
Q16	12- Training for employee to improve interactive skills (such as communication skills, effective meeting skills, and empowerment and leadership skills).
Q20	13- Systematic review and analysis of key process measures that have a direct impact on value-addition to customer satisfaction.
Q21	14- Problem-solving and continuous improvement processes based on facts and systematic analysis.
Q22	15- Application of total quality approach to the management of support services and business processes.
Q30	16- Cost of quality process to track rework, waste, rejects, and for continuous improvement.
Q32	17- A formal documented quality management system in place.
Q33	18- Reliance on reasonable few dependable suppliers who are evaluated and selected based on their capability and commitment to product and service quality, and value for money.
Q35	19- Comprehensive identification of customers and customers' needs and alignment of processes of satisfy the needs.
Q36	20- The use of customer surveys and feedback process, and tracking of other key measures to asses' customer satisfaction.
Q37	21- The use of Information Technology (IT) considered as important tool in achieving strategic objective.
Q38	22- Quality forms part of our organisation culture.
Q40	23- We have a culture of continuous improvement.
Q41	24- I look upon change as a challenge.
Modal Category - Important	
Q10	25- The use of employee surveys and tracking of other key measures to assess employee support of, and involvement in the quality initiative.
Q11	26- Employee suggestion scheme in place, with target time scales for management response.
Q14	27- System for recognition and appreciation of quality efforts and success of individuals and teams.
Q17	28- Informal benchmarking and other forms of information acquisition and sharing with organisation in different sectors and industries to identify best practices for improvements and opportunities.
Q18	29- Competitive benchmarking made against primary competitors.
Q19	30- Benchmarking help improve system and processes.
Q23	31- The use of self-assessment tools and other mechanisms to track and improve performance gaps in the implementation and effectiveness of system, processes and practices.
Q24	32- The outcomes of the self-assessment are linked to the business planning processes.
Q25	33- People who conduct the self-assessment receive relevant training.
Q26	34- A team approach (such as quality circles, cross-functional teams) to problem solving and continuous improvement.
Q27	35- The use of statistical processes control to control variability and improve processes.
Q28	36- Process performance outcome is measured.
Q29	37- Measurement of process performance is based on defined standards.
Q31	38- Zero defects as the quality performance standards.
Q34	39- Long term relationship and working partnership with key suppliers.
Q39	40- Our organisation's culture enhances productivity.
Q42	41- Employees fully understand the need to change from the status (existing situation) to a Total quality management philosophy.
Modal Category –Minor Important	
Q13	42- Employees' union support of the organisation's quality initiative.

Table 4. Category quality factors by range value

Range value	No. of factors	Quality factors	category
1	9	Q1, Q2, Q3, Q4, Q9, Q21, Q32, Q36, Q37	Critical
2	33	Q5, Q6, Q8, Q10 to Q20, Q22 to Q31, Q33 to Q35, Q38 to Q42	Critical, Important, minor important

Table 5. Variation ratio and index of diversity

Sq.	Quality Factor		Variation Ratio	Index of Diversity	Classification into levels
	Range =I	Range =II			
1	Q1		0.048	0.091	1
2	Q3		0.048	0.091	1
3	Q37		0.143	0.172	1
4	Q36		0.190	0.267	1
5	Q21		0.214	0.277	1
6	Q32		0.214	0.297	1
7	Q9		0.262	0.347	1
8	Q2		0.286	0.384	1
9	Q4		0.333	0.394	1
10		Q7	0.337	0424	2
11		Q6	0.357	0.481	2
12		Q40	0.452	0.494	2
13		Q22	0.457	0.510	2
13		Q16	0.462	0.522	2
14		Q30	0.464	0.577	2
15		Q8	0.500	0.622	2
16		Q5	0.505	0.632	3
17		Q12	0.510	0.679	3
18		Q15	0.542	0.669	3
19		Q20	0.610	0.670	3
20		Q33	0.667	0.684	3
21		Q35	0.673	0.710	3
23		Q38	0.686	0.732	3
24		Q41	0.710	0.740	3

1. Q1: Senior executive assume active responsibility evaluation and improvement of management system, and leading quality drive.
2. Q2: Visibility of senior executive commitment to quality and customer satisfaction.
3. Q3: Clear, consistent communication of mission statement and objectives defining quality values expectations and focus.
4. Q4: Comprehensive policy development and effective deployment of goals.
5. Q9: The entire workforce understands, and is committed to the vision, values, and quality goals of the organization.
6. Q21: Problem-solving and continuous improvement processes based on facts and systematic analysis.
7. Q32: A formal documented quality management system in place.
8. Q36: The use of customer surveys and feedback process, and tracking of other key measures to asses' customer satisfaction.
9. Q37: The use of Information Technology (IT) considered as important tool in achieving strategic objective.

Level 2 critical quality factors: Those are quality factors that have a range value of 2, but their variation ratio value is 0.5 or less, they are absolutely essential as perceived by majority of the organisations, while some organisations perceive them to be of no consequence with regard to the success of implementation. These CQF's are suggested to be addressed immediately after addressing the level 1 quality factors in the TQM implementation framework. These seven quality factors are:-

1- Q7: Elements of quality management structure are in place to manage the organisation's quality journey.
2- Q40: We have a culture of continuous improvement.
3- Q6: Effective top-down and bottom-up communication.
4- Q22: Application of total quality approach to the management of support services and business processes.
5- Q30: Cost of quality process to track rework, waste, rejects, and for continuous improvement.
6- Q8: The entire organization understands that each individual and each process has internal customer and suppliers.
7- Q16: Training for employee to improve interactive skills (such as communication skills, effective meeting skills, and empowerment and leadership skills).

Level 3 critical quality factors: Those are quality factors that have a range value of 2, but their variation ratio value is greater than 0.5 which indicates low majority consensus (low level of agreement). They have the lowest impact on the implementation process of TQM. These eight quality factors are:

1. Q5: Top management push decision-making to the lowest practical level.
2. Q20: Systematic review and analysis of key process measures that have a direct impact on value-addition to customer satisfaction.
3. Q12: Supervisors, unit heads and divisional managers assume active roles as facilities of continuous improvement, coaches of new methods, mentors and leaders of empowered employees.
4. Q33: Reliance on reasonable few dependable suppliers who are evaluated and selected based on their capability and commitment to product and service quality, and value for money.
5. Q41: I look upon change as a challenge.
6. Q35: Comprehensive identification of customers and customers' needs and alignment of processes of satisfy the needs.
7. Q38: Quality forms part of our organisation culture.
8. Q15: Training objectives of the organisation corresponded with the main objectives of the organisation.

DISCUSSION

The identification and analysis of CQFs for successful implementation of TQM are based on feedback received from the questionnaire survey carried out. The findings of this study are based on the perception of managers from the Libyan oil sector. Respondents were asked to rate given quality factors they perceive to be critical for the successful implementation of TQM in their organizations'. The findings from investigation identified 24 CQFs for a successful implementation of TQM in the Libyan oil sector. These factors were classified into three levels of criticality, as perceived by respondents from the companies of oil sector. Level 1 CQFs have been found to be fundamental components to be addressed in the early stages of the implementation. (40 out of 42 respondents) was achieved returning the factor of (senior executive assume active responsibility evaluation and improvement of management system, and leading quality drive) as critical.This is in conjunction with previous studies (Saraph *et al* 1989; Mann, 1992; Ramirez and Loney, 1993; Flyn *et al* 1994; Black and Portor, 1996; Thiagarajan, 1996; Ali, 1997; Ahire *et al* 1996; Tamimi, 1998; Rao *et al* 1999; Zhang et al, 2000; Thiagarajan *et al* 2001), and all major quality awards. The importance of top management commitment and leadership has got agreement in opinions amongst all quality gurus and every author of TQM (Zairi 1996).Problem-solving and continuous improvement processes based on facts and systematic analysis is an essential factor of TQM implementation (Oakland, 2000; Kanji, 1998) and a formal documented quality management system to be one of the essential factors. As for level 2 critical quality factors, elements of quality management structure are in place to manage the organisation's quality journey. Training and education is needed for empower employees and to improve interactive skills (such as communication, effective meeting, empowerment and leadership skills), and other technical skills (Deming, 1986; Rao *et al* 1999; Oakland, 2000).

To improve customer satisfaction, systematic review and analysis of key processes (Rao *et al* 1996). Application of total quality approach to the management of support services and business processes and Cost of quality process to track rework, waste, rejects, and for continuous improvement (Zhang *et al* 2000; Kanji, 1998; McAdam and Kelly, 2002) are all important.

However, for level 3 critical quality factors, these factors have the lowest impact on the implementation process of TQM. The emphasis is on organisational operations related to establishing a systematic review and analysis of key process measures that have a direct impact on value-addition to customer satisfaction. This is apparent from reliance on reasonable few dependable suppliers who are evaluated and selected based on their capability and commitment to product and service quality, and value for money to comprehensive identification of customers and customers' needs and alignment of processes of satisfy the needs.

CONCLUSION

Quality is an important consideration for executive thinking. The increased awareness of senior executive, who has recognised that quality is an important strategic issue is reflected as an important focus for all levels of the organisation (Crosby,1989, Oakland, 2000). This required defining and implementing several factors. These quality factors for successful

implementation of TQM cited in the literature are not formulated on the basis of empirical research (Black and Porter, 1996). Various quality factors are identified by various writers based on their own experiences in working as consultants, managers or researchers. Munro(2004:49) also indicated that TQM is an everywhere organizational phenomenon that has been given little empirical research attention.Knowledge of TQM in developing economics especially in Arab countries is almost totally lacking. The attention given to research in developed nations, confused by the acknowledged limitations of most of the research findings across national boundaries have made any efforts to readily learn and transfer empirically sound knowledge to developing economies all the difficult. This research tried to make the distance between the theory and practice of TQMimplementation and increasing its effectiveness in a developing country with different culture, andsocialist economy.

The results of this investigation suggest that addressing the 24 CQFs as main structure of quality management process increases its opportunity of success in Libya oil and gas sector. The discussion of the finding reveals that almost of 24 CQFs identified in this investigation share the value covered by MBNQA 2000, and EQA 2000.

TQM as a generic philosophy of management has been proved through the finding of the survey questionnaire as all quality factors identified as important in the developed countries (Thiagarajan and Zairi, 1997) were returned as critical or important by LOGCs except one factor (Employee union support of the organisation's quality initiative). For future research, a framework can be developing for successful TQM implementation in Libyan context based on the three levels of 24 CQFs identified and according to their degree of critical.

However, this study confirms that there are differences in the order and degree of emphasis of the quality factors. This is evident by making comparative of the identified CQFs in this study with other similar studies (Baidoum 2003, Thiagarajan and Zairi, 1997, Thiagarajan *et al* 2001). This is the evident that TQM organisations aim to excel in certain areas, regardless of their place of incorporation and supporting the saying that culture does not influence the approaches to TQM implementation.

Finally, the study assessed information only from the perspective of the participating organisations. Thus, it offers one dimensional focus. However, in the business practice, such TQM the success depends on its ability to satisfy the interested of multiple stakeholders. So, considering to gathering information from various stakeholders such as employees, customers, suppliers and even competitors it may be appropriate and this can be overcome using multiple methods to collect datain future research.

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