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Research Paper

THE EFFECT OF TOTAL QUALITY MANAGEMENT ON OVERCOMING SOME PRODUCTION PROBLEMS IN THE OIL INDUSTRY IN LIBYA

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There are many challenges facing the Libyan and manufacturing industries in Today's competitive market. One of these major challenges is the inability of oil companies in Libya to provide effective approaches such as Total Quality Management (TQM) that can empower oil companies and improve their ability to Response to international competition. The main objective of this study was to identify the drivers and barriers that prevent the application of Total quality management to overcome the production problems in the oil industry in Libya and develop a model through which the implementation and maintenance of quality systems for Libyan companies could be improved. In this study, we examined for a solution to some of the problems that occur in the oil field in Libya, where it was during the passage of crude oil from the refinery and exit of products and some of these products are issued directly and some of them is the raw material for other plants such as diesel, which is the raw material to factory ethylene and the passage of these products through pipes and pumps to the units of measurement by at being shipped to the ships. This study provides recommendations to mitigating some of the problems, including leaks and mechanical flaws to cut down the costs of oil production. This study also presents scientific methods to overcome oil production problems through Total Quality Management (TQM)

Keywords: Implementation of total quality management (TQM), Libyan oil industries, mechanical problems, Financial losses

INTRODUCTION

This research delves into overcoming some of the problems in operations and production in oil operations, and improving the quality and product standards, the environment, and addresses the problems of mechanical flaw. For these reasons, market for Libyan oil still lags compared to that of other developing countries. Generally, oil

companies in Lybia suffer from a lack of vision, poor leadership, wastage of expensive resources and total disregard for the potential of human resources as an important agent for change. The oil companies also suffer from overlooking customers and the absence of a scientific, systematic approach towards organizational management. The oil companies in Libya operate

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under a culture of maintenance which emphasizes on temporary results that are not comprehensive enough to mitigate problems facing the industry. As a result, a lot of money and reputation has been lost and the companies are lagging behind the era of international companies in all respects.

Study Motivations

The motivations considered for this study are:

- Huge financial losses incurred by oil companies due to some faults from Libyan Oil Industry.
- Continuous loss of customer-confidence due to lack of proper safety measures in accordance with international standards.
- There is a shortage of skilled managers and a very limited implementation of quality management tools such as ISO 9000, ISO 14000, ISO 18001 and Six Sigma, or other quality techniques such as process management, policy deployment, benchmarking, self-assessment or quality function deployment;
- There is a lack of expertise to identify target consumers and attract them to buy their products;
- Lack of government initiative to promote quality within the society.

Research Questions

This study aims to answer the following research questions:

- To what extent do the oil producing companies in Libya employ the principle of TQM?
- Which of the critical factors for successful implementation of TQM are significantly

associated with Total Quality Management (TQM)?

- Is the government a barrier to implementation of TQM in the Libyan oil industry?

Research Aims and Objectives

In order to respond to the research questions outlined above, the main aim of this Study is:

To identify the barriers to the adoption of TQM in Libyan process oil and gas industry and to develop a model through which Libyan companies could implement and maintain improved quality systems.

Specific objectives have been identified to achieve this aim. These objectives are

- To identify the critical success factors that lead to the effective implementation of Total Quality Management (TQM).
- To investigate the present status of TQM or other quality management systems among Libyan companies and determine the difficulties they are facing in improving their quality position, which is preventing them from being competitive.
- To learn from best practices and to develop an appropriate TQM model for Libyan process and manufacturing companies to create a quality culture in which to compete locally and globally.
- Mechanisms and foundations to prevent leakage of oil products in all the points that have seals.
- Study of measurements in the ports shipping now in the oil companies and evaluate the existing study and the installation of the new record with a particular Standard Libyan state.

RESEARCH PROBLEM

The Oil and Gas Industry in Libya suffers from major setbacks caused by mechanical problems such as accidental oil and gas leakages which occur in oil pipes during shipping and in the loading arms. Although Companies in these industries replace the spare parts regularly, these leakage problems often recur because of the different properties associated with the spare parts. In other words, most spare parts have a short shelf life. In addition, deterioration in the quality of spare parts is often caused by poor storage. Eventually, these leakages translate to heavy financial losses for the industry and therefore appropriate mitigation measures need to be implemented.

Most Libyan companies do not have a well-structured auditing management system, and no inspection mechanisms exist for the assessment of the quality of products and the services provided. Suppliers in this culture are insensitive to the needs of their customers and the general public regardless of poor performance and quality records of Libyan oil companies. In response to the challenges the Libyan companies are facing, Total Quality Management (TQM) could be the key to competitive advantage in improving Libyan oil production. As described by experts, TQM is a management-oriented, philosophical way of thinking that has helped many institutions in developed and developing countries towards achieving world-class status.

Indeed, Total Quality Management can derive a competitive advantage in the market, as well as in operational processes. It emphasizes reduce costs through waste reduction and encourages suppliers to help provide high quality products and meet the customers with quality goods and services. Total quality management

helps to create a culture of trust, participation and collective continuous improvement.

LITERATURE REVIEW

Oil Industry in Libya accounts for 60% of public sector wages, 25% of GDP and 95 % of export earnings. The economy is heavily dependent on the Oil Industry. Libya is among the African countries with the highest per capita GDP because of its small population and significant gains in revenue from the oil and gas sector. Recently, economic reforms have been the centre-piece of the economy in a wider attempt to adopt a free-market economy and an open political system. This initiative was stated after UN uplifted some of the economic sanctions that had earlier been imposed on the vibrant nation. This followed after Al Qadhafi pledged to surrender weaponry of mass destruction earlier in 2003 (Chapman & Al-Khawaldeh 195-219). On the other hand, the oil and gas industry loses large amounts of revenue to technical problems emanating from mechanical flaws. Investments in the cost of maintenance of refinery equipment amount to 15% of Libya's gross national budget. Nevertheless, the mechanical problems recur year after year due to differences in the cost and quality of spare parts adopted by different companies. Accidental leakages from the point of refinery to the point of shipping not only translate to heavy losses, but also increase the cost of production.

There is scarcity of literature about implementation of TQM in the Oil and Gas industry, particularly in developing countries (Al-Kalifa and Aspinwall 197; Hodell *et al.* 25). In addition, little research has been undertaken in this field. Nonetheless, Ross and Khleef (59) carried out the first study to assess the understanding, awareness, progress, obstacles

and the reasons for the implementation of TQM tools such as ISO 9000, ISO 14000, ISO 18001 and *Six Sigma* for the Libyan Oil and Gas Sector. According to the findings, it was encouraging to learn that though the certification of ISO 9000, ISO 14000, ISO 18001 and *Six Sigma* were undergoing reasonable degrees of understanding in the oil-rich nation, the level of awareness of Total Quality Management was very low. The main drawbacks to implementation of TQM were lack of information/training/education, lack of quality initiatives to adopt TQM tools, lack of top management commitment and ultimately, no pressure to implement them. Al-Kalifa and Aspinwall (202) also empirically assessed the connection between labor productivity and the implementation of TQM in the Libyan Oil and Gas manufacturing companies. According to the findings of the study, measurements of labor productivity for companies with low-level TQM were lower than those with high-level TQM.

Najeh and Chakib (189-200) classified critical success factors in a study that contrasted the practice and quality vision across three Arab countries mainly Saudi Arabia, Libya and Kuwait. The orientation as well as the sector classification of companies was the main variable used in the study. For the case of Libya, the oil sector, which constitutes 39% of the entire study sample, was selected. According to the study, most Oil manufacturing companies in Libya (70%) are state-owned while the rest (30%) are under the ownership of private entities and joint ventures. Critical success factors identified for the three countries feature including Libya were quality management system, problem solving and improvement process and supplier-customer chain.

By definition, critical success factors are

specific areas of interest whereby the outcomes of an organization, in case they are appealing, will propel the organization to a lofty success level. In other words, they are the essential requisites to the prosperity of an organization. In the event that the results are unsatisfactory, an organization's efforts will be deemed to be undefined (Rockart, 81). If the outcomes are not adequate, the organization would be unlikely to meet its objectives and obligations. While there is an increased concern about critical success factors in the Oil Production Industry in Libya, there is no research method for universal critical success factors. Critical success factor methods that have been employed by researchers and scholars over time include but not limited to questionnaires, interviews or a combination of questionnaires and interviews (Auruskeviciene, Salciuviene, & Trifanovas 327-346).

Nonetheless, Black and Porter (7) suggested ten critical factors for Total Quality Management (TQM) based on the Baldrige Award criterion. These TQM's critical success factors ranged from orientation towards customer satisfaction, to customer and workforce management, partnerships with suppliers' improvement in communication strategies, management of external interface, corporate quality culture, and improved team work structure, improved systems of measuring quality improvement, quality operational planning and strategic quality management. Saraph *et al.* (810-829) proposed a method to assess total quality management and her proposition is based on eight critical success factors which are: employee relations, reporting and data, operating quality process management, supplier quality management, product/service design, in-service training, duties of the quality department, roles of quality policy as established by top management officials.

After expanding the practices, Ahire *et al*, (23-56) further pointed out twelve critical success factors that are necessary for successful implementation of TQM at organizational level. These factors are supplier performance, quality monitoring, employee training, employee involvement, employee empowerment, quality data processing, process control through statistical techniques, benchmarking, establishing a management committed to quality, quality management of suppliers, customer focus and organizational dedication. Generally, both Libyan and non-Libyan studies confirm that there are 7 common critical success factors for successful implementation of TQM (customer focus; Reward and Recognition; plan statement and vision; employee involvement, supplier quality management; education and training; and top management commitment, all of which have been applied in different settings, particularly in Arabian studies.

RESEARCH METHODOLOGY

The study integrates two quantitative and qualitative methods. Two techniques were employed in data collection; namely semi-structured interviews and a survey questionnaire. The aim of the questionnaire was to assess critical success factors for the implementation of Total Quality Management (TQM) in the Oil Industry in Libya while the interview was adopted to support the outcomes of the study and to give a clear picture about the effects of TQM in overcoming production problems in the Oil and Gas Industry in Libya. Issues and themes that arose from the results of the questionnaire were understood through the interviews administered to managers of leading Oil Companies in Libya.

90 copies of the questionnaire were disseminated to targeted workforce employed by different Oil Companies in Libya's capital, Tripoli. The questionnaire was limited to Likert scales (strongly agree, agree, strongly disagree, neutral). According to Collis *et al.*(2003), the scale was useful particularly in making participants to feel comfortable with diverse options to choose from. The questionnaires were accompanied with 50 statements, 20 of which required the respondents to identify the critical success factors for the successful implementation of TQM, while 30 required them to identify the implications of TQM in overcoming some production problems in the Oil industry in Libya. For purposes of validity, the questionnaires were circulated with the help of Libyan scholars who are majoring in either Total Quality Management (TQM) or Quality Management.

The academics commented about the contents of the questionnaires; their suggestions were taken into consideration and appropriate amendments were made on the documents before and after revalidation. Out of the 90 administered questionnaires, 80 Of them were successfully completed by the participants. SPSS Program version 13.0 was used to analyze the data collected and returned. The interviews helped to understand some of the issues that unprecedentedly arose in the questionnaires and to gather more information about the implementation of TQM.

RESULTS

80 responses were obtained from the 90 questionnaires distributed to different employees. The following is a summary of the main findings from the quantitative and qualitative data collected:

Using the five-points Likert Scale Method, a group of questions was used to rate the value of each TQM factor. The participants were asked about the effect of each factor to the Oil industry; they were requested to rate their scores from 1 to 5 against the given options (whether they agree or disagree with the statements. The average score from the Likert Scale is $((1+2+3+4+5)/5)$. A score greater than 3 implied that the participant agreed with the statement while a score less than thereof implied that the respondent disagreed with the statement. The following table illustrates the mean of each critical factor as investigated in this study. The critical factors sampled for the successful implementation of TQM are: Customer Focus, Recognition and Reward, Employee Empowerment, Vision and Plan Statement, Supplier Quality Management, Training and Education, and Top Management Commitment.

TQM Factors Mean		
Critical success factors	Mean	SD
Customer Focus	3.4	0.63
Recognition and Reward	3.81	0.48
Employee Empowerment	3.86	0.50
Vision and Plan Statement	4.00	0.65
Supplier Quality Management	3.80	0.62
Training and Education	3.91	0.90
Top Management Commitment	3.90	0.75

All the quality managers who were interviewed identified the seven critical success factors for implementation of TQM in the Libyan Oil and Gas Industry. Majority of the respondents agreed that the critical success factors are key necessities in achieving effective implementation of TQM within the Oil and Gas Industry in Libya. This

finding is consistent to similar studies: Chapman and Al-Khawaldeh (248-262) mentioned that industries which apply the philosophy of TQM have an added advantage when it comes to resolving and fixing customers' complaints and problems – customer focus. Das, *et al.* (195-219) reasoned that customer focus and top management commitment play a significant role in the implementation of TQM. Salaheldin (215-237) attributed successful implementation of TQM in Egypt to top management commitment Baidoun (2004) found that an organization's mission – focus, expectations and corporate values – are reflected through a well-developed quality policy.

To ascertain the core impediments to the adoption of TQM, the participants (respondents) were requested to arrange identified obstacles in descending order of magnitude (from the greatest to the least) according to the degree with which the identified barriers prevented both public and private entities in the Libyan Oil sector from implementing Total Quality Management (TQM) effectively.

The findings from analyzed data suggest that three core barriers hinder the adoption of TQM in Libyan process oil and gas industry. These obstacles are undue influence from the government (state), poor vision and plan statement, lack of policy/quality initiative in maintaining existing plants/preventing mechanical leakages, and lack of commitment by top management officials.

DISCUSSION

Lack of Commitment by Top Management

From the study, lack of commitment from the top management was identified as the key obstacle to the adoption of TQM in the Libyan Oil and Gas

industry. Top management officials do not participate actively in activities related to quality management which are a barrier to implementation of TQM.

Undue Influence from the Government

Interviewees identified lengthy and complicated government bureaucratic procedures as the most potent obstacle to the successful adoption of TQM in the Libyan Oil and Gas Industry. Generally, the complicated bureaucratic procedures set by the state limit the ability of companies to implement quality control tools and techniques, and to respond to clients in a timely manner. In addition to limited government support for quality programs, the oil industry in Libya also suffers from the drawback of lack of national quality control policy. Similar findings are echoed by Chapman and Al-Khawaldeh (248-262) who concluded that the implementation of TQM in Libyan oil producing firms is negatively affected by the absence of quality control policies and lack of support from the government.

Poor Vision and Plan Statement

Results from the interviews suggested that Libyan companies in the oil sector lack a defined, long-term vision. Further, none of the firms have a detailed plan explaining measures that should be taken for Total Quality Management (TQM) to be successfully implemented. Instead, the companies featured in the study simply pride on product quality goals and annual business performance plans. In this respect therefore, weak plan statements and poor vision are barriers to successful adoption/ implementation of TQM in Libyan Oil Companies to address mechanical problems and oil leakages.

Excessive Expenses incurred in correcting Mechanical Flaws

Majority of the companies in the oil venture in Libya lack adequate mechanisms, foundations and expertise to control/stop leakage of oil products in all the points that have seals. In addition, it is expensive to service and maintain existing oil installation plants, particularly those that comply with the guidelines of the Standard Libyan state. The industry also suffers from lack of technical expertise to implement the tools of TQM.

Apparently, the Libyan oil and gas industry is unable to replace outmoded lines of production with new technology. Over time, this results to prolonged delays in enforcing a replacement policy and eventually leads to increased cost of production and time wastage. The industry also suffers from little know-how in dealing with mechanical problems that lead to leakages and the sheer absence of a comprehensive system of contemporary management. Over the past two years, for example, it has been common practice for oil companies in Libya to change ownership, cancel, dissolve, emerge or/and relocate following the verdict of High Cabinet decisions. The recent ouster of Al Qadhafi from power financially crippled the oil and gas sector; the Libyan Dinar suffered low exchange rates against foreign currencies. As a result, the industry incurs high costs of oil and gas production, especially those firms due to the absence of a comprehensive technical framework that can address mechanical failures.

PROPOSED RECOMMENDATIONS TO IMPLEMENT AND MAINTAIN TQM

As proposed by Rockart (81), Libyan companies MAY implement and maintain the following TQM

model of improved quality systems. First, the government of Libya should establish more industrial complexes in order to improve the work infrastructure of the sector. This would lower the cost of production and attract more investors into the industry. Second, local capital should be extensively and continuously encouraged to participate jointly with foreign investors in oil investments. Herein, feasibility studies should be conducted and local capacity of oil projects that can be operated under joint ventures needs to be identified. Third, Oil and Gas Companies in Libya should come up with favorable policies that promote accountability at all levels, lower the cost of production and boost specifications. This would militate against unforeseen flaws such as lack of top management commitment as well as poor vision and plan statement, ultimately leading to successful implementation of TQM.

Fourth, extra funds should be allocated for plant maintenance. The Oil companies in Libya should correct mechanical flaws by hiring TQM technicians to implement TQM tools successfully. Finally, companies in the oil industry should also put much emphasis in implementation of in-service training programs which should be vast enough to cover all levels of the sector. This would lead to implementation of TQM from planning to execution phase.

CONCLUSION

This study has presented the findings of a questionnaire on critical success factors for successful implementation of TQM. A total of 90 questionnaires were issued. The questionnaire considered 35 variables, with 7 factors. It was discovered that the 7 critical factors were essential requisites for the successful implementation of TQM. This paper has successfully identified the

barriers to the adoption of TQM in Libyan process oil and gas industry and has developed a model through which Libyan companies could implement and maintain improved quality systems *in five-fold*.

The following are the main findings of the study:

- Critical success factors for successful implementation of TQM in the Libyan Oil Industry are: Customer Focus, Recognition and Reward, Employee Empowerment, Vision and Plan Statement, Supplier Quality Management, Training and Education, and Top Management Commitment.
- Barriers to successful implementation of TQM are: undue influence from the government (state), poor vision and plan statement, excessive expenses incurred in maintaining existing plants, and lack of commitment by top management officials.

Overall

- The study identified the essential components for the successful implementation of TQM in Libyan oil industries.
- The study identified how to use the Total Quality Management in solving mechanical problems in Libyan oil companies.
- In this study, some of the mechanical spare parts have been tested and analyzed to find out the problems caused and how to solve it by applying of total quality management by technicians, to find out solutions to the mechanical problems with minimal losses.
- Presented the results of the recommendations and proposals to solve problems to improve production and access to better production processes with minimal losses.

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