SUCCESSFUL IMPLEMENTATION OF TOTAL QUALITY MANAGEMENT IN LNG SECTOR AT SULTANATE OF OMAN

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Abstract

This study looks at the challenges and opportunities of implementing successful Total Quality Management (TQM) and best practices at Liquefied Natural Gas (LNG) sector in Sultanate of Oman country, which is a fundamentally promising sector in Oman and considered the first contributor to Omani GDP after Oil sector and one of the main contributors in developing local community in general. This study investigates the effective implementation of total quality management system by using Oman LNG as a case study and following both an empirical methodology and a theoretical methodology. Based on the a comprehensive literature review of similar study for last decades from different fields and based on outcome from online questioner; this study will provide better understating of total quality management system perspectives and will examine the effect of those prospective in the effectiveness and strategic implementation of the system in Oman LNG business at both locations Head office at Muscat and the factory at Sur. Oman LNG has number of unique resources but the effeteness of these resources on the effective implementation of total quality management system has yet measured, by following Resource Based View – RBV concept and conceptualized existing Oman LNG quality management framework this study will yield the complicity of relationships of quality management practices and firm performance (FP). Basically Oman LNG exiting quality management framework consists of two constructs, first is Technical Quality Resources (TQ) and second is Behavioral Quality Resources (BQ); this study for first time explore the association relationship of BQ, TQ and FP in LNG sector .

Keywords: Quality, Management, Systems, Technical Resources, Behavioral Resources

INTRODUCTION

This study fuses several researches and literatures those examined the relationship between quality management resources both behavioral (BQ) and Technical(TQ) and their impact on the firm performance (FP), also similar studies have been included to broaden the research range and explore blind spot of quality management system practices in LNG sector. To understand the contradictory and complexity of relationship between named perspectives and their impact on the LNG business competitive benefit, ad hoc study and a comprehensive empirical study should be addressed at different level within Oman LNG.

In 2014 Hietschold, Reinhardt & Gurtner expressed that, Increasing in demanding customers and global competition push a lot of exiting establishments to enhance their business adaptability to new market changes specifically changes reveled from external business environment such as new technologies or political changes. Also that demand forces firms to enhance managing changes of continual improvement for both product and services delivered to their respective customers.

Thus, numbers of firms employ quality practices such as the ISO 9001- quality management system standard, statistical process control or Six Sigma (Rahman and Talib, 2012). Beside above mentioned quality practices; scholars and practitioners worldwide give total quality management (TQM) more important in the research (Sila and Ebrahimpour 2005. (Welikala and Sohal 2008 ; Zeng, Zhang, Matsui and Zhao 2017).

There are many definition for TQM for instance in 2006 Demirbag, Tatoglu, Tekinkus and Zaim have distinct total quality management system as universal management approach that take into deliberation full management chain of system but with more emphasis on human resource perspective.

Having an effective and systematic TQM process in an organization will ensure having a product with superior quality (Ng et al. 2014). Basically the success and failure of any organization is a result of producing a superior product quality or service in the competitive market (Demirbag, Tatoglu, Tekinkus and Zaim, 2006). Establishments with an excellent quality have higher operating incomes, revenues and stock performances. Successful planning and followed by extra effort on the implementation stage will eventually reflect on the accomplishment of management concept within organization. However, in same year Mohammed Rad expressed that implementing effective total quality system is a very multifaceted process and achieving desired result is not easily could be realized.

Also, previous examinations of critical success factors (CSF) of quality management system have recommended number of measurement instruments. However, In 2009 Salaheldin, concluded that there are two main challenges to organizations definition and choosing the

passable measurement tools and that due to an absent of an agreement on specific critical factor or in general.

Basically, there are number of critical success factors related to success of TQM , for instance Kumar, Garg, and Garg (2011) conducted study in north of India for 30 service industries and 30 manufacturing industries, their study investigated the benefit and shortcoming of TQM and seven critical success factors of TQM, also Zairi and Alsughayir (2011) did a study in different international organizations around the world and they focused on challenges of successful adaptation of TQM and two types of successful factors {structural and foundational}. It is essential to understand that the quality concept in this research is wide and not partial to final products, but comprises other associated processes, technical resources and behavioral resources according to Mehra et al (2001) total quality management is management philosophy which involves a wide range of staff starting from front line, middle management and top management and such philosophy will enhance global competitive advantage of the firms.

Similar study conducted in 2017 by Young, Joo and Kevin, they have developed research model and eventually they have concluded that the firm's performance is impacted by both technical & behavioural practices, also emphasis on behavioural practices is a strategic option in developing a robust quality management system which supports organisations to sustain in high competitive market.

Basically, this study recognizes main component of quality management and classifies them into two constructs behavioral and technical   and also will propose new frame work to measure and analyses the relationship between these two construct with firms performance. Firm performance is divided into two parts financial performance and nonfinancial performance.

PROPOSED RESEARCH MODEL

After a comprehensive literature and insight review for both theoretical and empirical studies a cross the world and from different industrial and services sectors, it may be concluded that there are many studies carried out covering the relationship of behavioral TQM practice, Technical TQM practice and Firm's performance. In this study, there will be six adding new concept to previous research models (see figure 1):

1] The new added feature to my proposed model is to segregate the firm's performance into financial performance non-financial performance.

2] New proposed hypotheses will verify the mediation effect of   Technical management system resources on firm performance, which will be in line with my research model.

3] Change the Information & analysis term to Knowledge Management (KM) terminology hence KM has holistic approach, basically it's including both explicit information such as {data analysis

reports, procedures, management meetings outcome, investigation reports and audit reports} and tacit information such as cumulative of experiences within organization's employees .

4] Replace management commitment to leadership commitment, hence leadership terminology has holistic meaning and involve different levels of management within the organization.

5] Use the concept of quality management resources instead of quality management practices for incidence KM is a real asset to the organization and not just a management system practice, based on that also I have changed the concept of 'involvement' to 'relationship' hence relationship with interested parties is an imported resource to the firm where involvement is a practice of this relationship.

6] Overall, it is a novel study of relationship of TQM technical/ behavioral resources and firm performance in Oil & Gas sector.
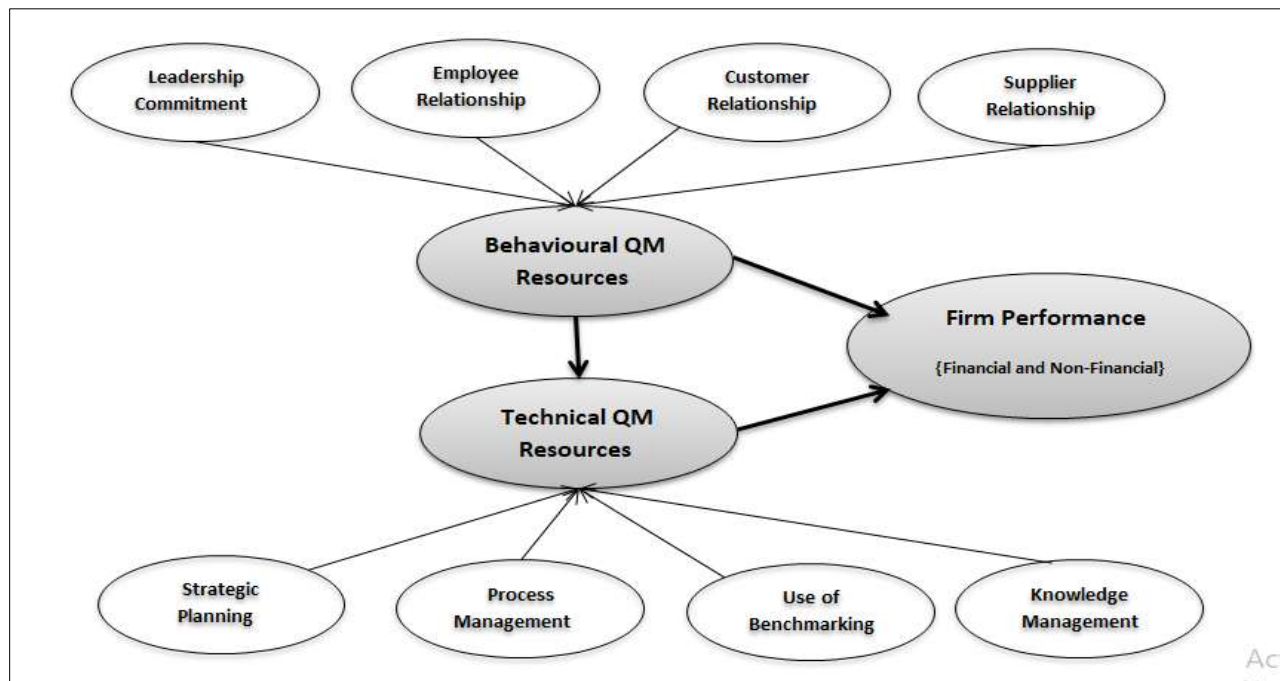

Figure 1: This study Conceptual Model

RESEARCH METHODOLOGY

To analyze the different facts related to the current research, a quantitative research approach (Positivist Research Paradigm) had been adopted as it helped in achieving the objective of the research. The implementation of the positivist research paradigm helped in gaining a clear understanding of the subject which is essential for evaluating the relevant problems of research. The Abductive approach had been used in this research which is a combination of both the inductive as well as deductive approaches. The deductive approach helped in developing the

conceptual framework from the research literature. The inductive approach helped in acquiring the in-depth knowledge and understanding on Total Quality Management of the manufacturing sector by taking into account the different phenomenon and perspective of people who work as a leader and decision-makers in the company. While focusing on the data collection method, the study included a primary method of data collection in the form of the questionnaire method. The questionnaire method helped in preparing the valuable questions essential for predicting the outcome of the study in a very quick and simple process (Bhat & Rajashekhar 2009).

The research also included a secondary method of data collection which included collecting data from the previous year's annual report of the oil industry also by taking into consideration the government and online journals. The collection of data from the secondary data collection method helped in determining the factors that play a significant role in analyzing Total quality management in the oil industry. Additionally, a simple random sampling technique had been included in the study to ensure that all the data are gathered are authentic. The size of the population was 260 which involved junior employees, middle level, top-level employees as well as the staff of the quality management department so that there is the attainment of a sufficient number of satisfactory responses. The data analysis and data interpretation had been carried out with the help of statistical measures of association, Excel, and SPSS software programs so that research outcomes are attained accurately. Reliability and validity consideration had been taken into account so that creditable research approaches and instruments are used for performing researching processes (Ahmed & Lodhi 2015).

Nevertheless, to yield precise results from primary source; the questionnaire of this study adopted from previous studies in the quality management system field and modified to fit with the scope of the research (Cho and Jung , 2014; Akgün et al. 2014; Munir and Elhuni, 2014; Hietschold et al. 2014; Young, Joo and Kevin, 2017; Kanapathy, et al , 2017).

FINDINGS AND DISCUSSION

The study analyzed the facts related to the current research which is the successful implementation of total quality management in the LNG sector at the sultanate of Oman by including descriptive statistics of the respondents. While considering the age of the respondents, it was found that 43.1% of the respondents belonged to 30 –39 years of age group and 0.8% of the respondents belonged to less than 20 years of age group, refer to table 1 . The study included facts related to the current qualification of the respondents and found that 53.5% of the respondents were educated up to a university degree/ Bachelor level while 1.5% of the respondents were educated up to the Ph.D. level, refer to table 2. The facts related to job group

level were included in the study in which about 47.3% of the respondents were of the 07-05 JG job group and about 2.3% of the respondents were of the 01+JG job group, refer to table 3.

Table 1: Study participants age category

Age	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 20 years	2	.8	.8	.8
20 - 29 years	34	13.1	13.1	13.8
30 - 39 years	91	35.0	35.0	48.8
40 - 49 years	112	43.1	43.1	91.9
50 or more	21	8.1	8.1	100.0
Total	260	100.0	100.0	

Table 2: Study participants' qualification category

Qualification	Frequency	Percent	Valid Percent	Cumulative Percent
University degree/Bachelor	18	6.9	6.9	6.9
HND/Diploma	56	21.5	21.5	28.5
University degree/Bachelor	139	53.5	53.5	81.9
Masters	43	16.5	16.5	98.5
PhD	4	1.5	1.5	100.0
Total	260	100.0	100.0	

Table 1: Study participants' job group category

Job Group	Frequency	Percent	Valid Percent	Cumulative Percent
01+ JG	6	2.3	2.3	2.3
04-02 JG	82	31.5	31.5	33.8
07-05 JG	123	47.3	47.3	81.2
13-08 JG	49	18.8	18.8	100.0
Total	260	100.0	100.0	

However, this section divided into four subsections as per the theories of this study and supporting evidence from primary and secondary source elaborated under each theory: -

A) Theory H1a. Technical quality management resources have   direct and constructive effect on firm performance {FP}

 The research carried out a one-sample T-test was applied by using SPSS to determine whether there is a significant difference in Strategic Planning (SP) and found that the T value corresponding to the mean difference between the SP and a fixed mean value of 3 was 31.192

and its corresponding p-value was less than 0.05. Since the p-value was less than 0.05, it can be concluded that there was a significant difference in SP of total quality management. The study included a one-sample T-test which was performed by using SPSS to determine whether there is a significant difference in Process Management (PM). It was found that the T value corresponding to the mean difference between the PM and a fixed mean value of 3 and its corresponding p-value was less than 0.05. Since the p-value was less than 0.05, it can be concluded that there was a significant difference in PM of total quality management. While comparing the above facts with the literature review, it was found that important inputs related to quality control and management were also provided by scholars such as Juran and Deming. The study examined the facts with the help of one sample T-test by using SPSS to determine whether there is a significant difference in Benchmarking (BE). It was found that T value corresponding to the mean difference between the BE and a fixed mean value of 3 was 29.959 and its corresponding p-value was less than 0.05. Since the p-value was less than 0.05, it can be concluded that there was a significant difference in BE of total quality management.

B) H1b. Behavioral quality management resources have direct and constructive effect on Technical quality management resources

The descriptive analysis was carried out in which it was found that all the departments were aware of the aims & objectives of OLNG and are working together to attain the objectives had a high mean value of 4.15 with a standard deviation of 0.72. The top management played a major role and eliminated the barriers between departments and individuals showed a low mean value of 3.82 and a standard deviation of 0.78. It was also ascertained that the management and the employee communication process was very much strong and active and showed a high mean value of 3.84 with a standard deviation of 0.79. It was also ascertained that OLNG provided the required training for staff to serve company customers well that showed a low mean value of 3.55 and a standard deviation of 1.0. The examined that "OLNG gave customer feedback high priority which had a high mean value of 3.86 with a standard deviation of 0.75 and the current processes and tools were very effective to resolve external or internal customer feedback and showed a low mean value of 3.6 and a standard deviation of 0.81. It was found that OLNG Staff was trying to build long term relationships with the company's suppliers and showed a high mean value of 3.90 with a standard deviation of 0.68. It was also ascertained that the suppliers of ONLG worked strongly concerning the service and product development and a low mean value of 3.83 and a standard deviation of 0.64. While comparing the above facts with the literature review, it was found that structural and foundational challenges are faced by the company while implementing TQM into the firm work process (Zairi and Alsughayir 2011).

C) H1c. Behavioral quality management resources have direct and constructive effect on firm performance {FP}

The study examined that the OLNG mission statement had been communicated throughout the company and employees were aware of it showed a high mean value of 4.22 with a standard deviation of 0.61, refer to table 1. It was found that top management reviewed and finally approved the objectives and plans of all staff showed a low mean value of 3.88 and a standard deviation of 0.72. The facts related to procedures and work instructions were and found that they were clear and easy to get access to them showed a high mean value of 4.11 with a standard deviation of 0.67. It was also determined that the measurement methodology of service provided or product quality was well established and staff aware about it showed a low mean value of 3.75 and a standard deviation of 0.75. It was estimated that having a benchmarking process would support improving the system and business processes and showed a high mean value of 4.16 with a standard deviation of 0.58. It was found that the result generated from self-assessment (BQ element) such as a staff survey that was incorporated in the business planning process (TQ) showed a low mean value of 3.71 and a standard deviation of 0.73. The facts related to OLNG regularly review and analyze the quality of products or services {internal or external service} were analyzed in the research and found that it showed a high mean value of 4.22 with a standard deviation of 0.62. It was found that OLNG regularly reviewed other organization processes in getting new products or services to the LNG industry and showed a low mean value of 3.77 and a standard deviation of 0.68. While comparing the above facts with the literature review, it was found that the LNG industry in Oman is growing and expanding its reach to different frontiers. In respect to this, a major initiative was taken by the Sultanate of Oman in the year 2000 by exporting LNG cargo with the help of leading LNG Company Oman Liquefied Natural Gas LLC (Oman LNG). The company was established in the year 1994 in a joint venture form with the effective collaboration of 5 shareholders. It was found that Oman LNG mainly specializes in producing and selling two products Liquefied Natural Gas (LNG) and condensate gas.

A one-sample T-test was applied by using SPSS, to determine whether there is a significant difference in Customer Relationship (CR). It was found that the T value corresponding to the mean difference between the CR and a fixed mean value of 3 was 18.526 and its corresponding p-value was less than 0.05. Since the p-value was less than 0.05, it can be concluded that there was a significant difference in CR of total quality management. Additionally, a one-sample T-test was applied by using SPSS was performed to determine whether there is a significant difference in Suppliers Relationship (SR). It was ascertained that the T value corresponding to the mean difference between the SR and a fixed mean value of 3 was 25.594 and its corresponding p-value was less than 0.05. Since the p-value was less than

0.05, it can be concluded that there was a significant difference in SR of total quality management.

D) H1. Technical quality management system resources positively {TQ} mediate the relationship between behavioral quality management resources {BQ} and firm performance {FP}

The constructs included in the confirmatory factor analysis had Cronbach's alpha of more than 0.8. The Cronbach's alpha indicated the internal consistency between the constructs and it was deemed to be good. All the items included in the analysis had factor loadings of 0.4. Hence, it indicated the assessment and validation by using the discriminant and convergent validity. The convergent validity was also assessed by using the factor loadings of latent constructs which had a significant p-value of less than 0.001. Thus, the test supported that the constructs had convergent validity. The discriminant validity indicated by correlation matrix where the majority of the constructs had a correlation coefficient of less than 0.85 and also by using the path analysis where the correlations among the latent constructs were less than 1.

Additionally, Confirmatory Factor Analysis was performed by the researcher with the help of confirmatory factor analysis by using AMOS. The preliminary model allowed the researcher for its best fit as per parsimony and substantive meaningfulness. The model fit indices indicated how the underlying structure fits the data. The model was evaluated by using the model fit indices including Chi-Square statistic, Degrees of Freedom (DF), CMIN/DF, CFI, and RMSEA. The research included facts related to different indices as per the Model fit and Desired Score including Chi-Square, Degrees of Freedom, CMIN/DF, CFI, RMSEA, and NFI. It was found that the chi-square value was 1956.486, DF was 699 and the CMIN/DF was 2.799 indicating a moderate fit model. The CFI was 0.798 which is close to 0.9 and RMSEA was 0.083 indicating a moderate fit. However, the values of NFI were close to 0.9 indicating a moderate fit.

CONCLUSION

While focusing on the association between TQM and financial performance, there have been studies and researchers by many scholars and researchers that have analyzed the impact TQM on the financial efficacy of the firm. It includes analyzing both behavioral and technical quality management resources practices so that the monetary working of the firm is determined (Kaynak et al, 2008).

The study examined the TQM framework that has been successfully implemented by the leading firms in their business environment. It includes the adoption of behavioral practices and technical practices so that the firm can sustain itself in a competitive environment effectively. It was found that behavioral aspects are associated with developing and improving factuality

educational skills. On the other hand, technical aspects are associated with developing management of change, information management, and knowledge management and policy/process of transferring knowledge concerning research development to new and innovative practices. The study examined that both the aspects (behavioral and technical) are essential for the financial and non-financial performance of the firm as they cover all the business operations and functionaries (Ross, 1999). It was analyzed that TQM based organizations are in a better position as compared to the normal organization as it has increased capability of implementing innovative and problem resolving capabilities as compared to the normal firm. It is because the TQM based firm ensures that all its departments, human resource, internal and external associates, and management are organized and synchronized. It helps in an easy flow of information that allows the managers and workforce to make a rightful decision that promotes organizational growth optimally. Additionally, due to the development of effective communication channels, there is spread of vital information among all the associate and production units that reduce the occurrence of errors and eliminates the prospects of mistakes in the entire product manufacturing process. It does not help in enhancing the quality of the product but also improving the company status in the domestic and world market (Temtime, & Solomon, 2002).

In deduction from above and despite the limitation of this study, I believe that this study finding has made very clear the relationship between main variables of TQM and support study's four theories as detailed below and revels significant positive association exists between TQ, BQ and FP:

H1. Technical quality management system resources positively {TQ} mediate the relationship between behavioral quality management resources {BQ} and firm performance {FP} .

H1a. Technical quality management resources have direct and constructive effect on firm performance {FP}.

H1b. Behavioral quality management resources have direct and constructive effect on Technical quality management resources.

H1c. Behavioral quality management resources have direct and constructive effect on firm performance {FP}.

LIMITATIONS

The research is limited to the LNG industry and did not include other manufacturing industries that are operating in Oman. The manufacturing industry in Oman is showing a positive growth trend and contributes towards the economic development of the country. However, these aspects of the manufacturing industry have not been included in the study, and the main focus is majorly given on the LNG manufacturing industry. The study is also limited to the LNG

industry in Oman and did not consider the LNG industry that is operational in other countries such as Saudi Arabia, Australia, and Russia. Thus, it can be said that the research is limited to the Oman LNG industry and did not take into account the LNG industry of other countries. The study included 260 respondents out of 730 employees that were working as junior employees, middle level, top-level employees as well as the staff of the quality management department. However, the sample size represents 36% of Oman LNG population, but did not represent the opinions and views about the large population that is engaged in the LNG industry at large sale. As a result, the responses of the respondents could be limited and may not express the overall opinion of the large LNG working .Due to limited time constraints, Ire-check and authenticate the research outcomes accurately was extremely difficult .

SUMMARY AND FUTURE SCOPE

The manufacturing and LNG industry faces several challenges such as constrained managerial capabilities, scarce financing, limited abilities to exploit technology, excess regulations, infrastructure, and low productivity. It also includes other challenges such as difficulty in hiring, rising competition, developing and retaining talented staff, limited access to business chances. Therefore, it is essential to research this direction so that the main causes of challenges, their significance, and improvement strategies could be implemented effectively. It will help the entrepreneurs to face the challenges constructively and move ahead towards progressive growth simultaneously. The valuable insights provided by the research will help the industrialists to identify and rectify the challenges by adopting TQM strategies, building robust infrastructure, and encouraging inclusive. It will help them in achieving sustainable industrialization and fostering innovation. The study will also be beneficial to policy makers and industry experts as they will get better learning about challenges, business risks, and opportunities related to establish and maintain an effective Total Quality Management (TQM) in Oman manufacturing (LNG) sector. The research also helped in identifying the exploring blind spot of quality management system practices in the LNG sector and provided a better understanding of the contradiction and complexity of the relationship between named perspectives. The facts related to behavioral (BQ) and Technical (TQ) on the firm performance (FP) has been included in the study which helped in ascertaining the complexity of the relationship between BQ, TQ, and FP and identifying their impact on the LNG business competitive benefit.

However, further study scope in this filed has high potential for exploration, demography of the study may extend to cover GCC or middle east areas at large, other SME business could be included and with respect to sample size may increase by including other involved parties in LNG business such as suppliers and local community.

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