Total Quality Management Implementation in Oil and Gas Sector Organisations-A Case Study from the Sultanate of Oman

[1]Adil Al Busaidi, [2]Mohammed Usman, [3]Norizan Bint Mohd Kassim

[1]*Student of Master of Business Administration, CEMIS, and University of Nizwa, 7414532@uofn.edu.om*
[2]*Assistant Professor, CEMIS, University of Nizwa, usman@unizwa.edu.om*
[3]*Professor, CEMIS, University of Nizwa*

Abstract

Total Quality Management (TQM) concept is behind many organisations prosperity. Many researchers have studied the Critical Success Factors (CSF) of TQM implementation in order to enlighten other organisations willing to implement TQM. The context of the organisation will influence the order of priority of the CSF. In this research, the CSF of TQM implementation are explored for a successful oil and gas organisation in the Sultanate of Oman that is already certified to ISO9001 Quality Management Standard. A descriptive type of research is adopted using primary data collected via self-administered survey questionnaire. The collected sample represents 16.4% of the total organisation employees using stratified random sampling approach. An Exploratory Factor Analysis was carried out to confirm the association of the measuring elements with the latent variables. The Common Method Variance was checked and the result proved there is no Common Method Bias in the collected data. The reliability of data was checked using Cronbach Alpha and the variables which scored less than 0.6 were discarded from the analyses. An ANOVA test proved there is no significant difference in responses between the different groups of staff indicating the cohesiveness of the organisation. The arithmetic means of the employees' responses indicated that the TQM principles are implemented in the organisation. The Linear Regression Analysis results indicated a significant influence of the TQM principles on the organisation's economic performance concluding them as CSF. Based on their influence significance on the organisation's economic performance, the CSF was ranked as Culture, Management Commitment and Vision, Information Technology, Process Control and Supplier Management. The organisation Culture was the most important CSF in contrast with the published literature which mostly reports Management Commitment and Vision as the most important CSF. Moreover, the lowest rank CSF was Supplier Management which indicates a room for improvement that need to be further explored by the organisation. The study results confirm the importance of implementing TQM principles for the organisation economic prosperity. Based on the research outcome, a step wise approach was developed for any organisation with a similar context willing to implement TQM. The study was implemented in only one organisation of the oil and gas sector at the Sultanate of Oman. Therefore, a further work is recommended to carry out the study covering more than one successful organisation in the Omani oil and gas sector.

Keywords: Total Quality Management, Critical Success Factors, Oil and Gas, Oman.

I. INTRODUCTION

As defined by Omachonu and Ross (2004, p3), "Total Quality Management (TQM) is the integration of all functions and processes within an organisation in order to achieve continuous improvement of the quality of goods and services. The goal is customer satisfaction". With such a definition, it is clear that TQM is not a system that an organisation can buy or a department it can create. It is much more than that!

TQM is about making the whole organisation starting from the Top Management and going down to the shop floor staff geared towards satisfying the customer needs. It is about creating a management system, training people, controlling processes, establishing the right culture, adopting the right technologies, contracting the right suppliers and continually improving towards delivering the best outcome that satisfies the customer. In a TQM approach, quality is inherited in every stage of the product creation starting from the mission and vision of the organisation all the way through to the after sales service.

TQM has received a great deal of attention from organizations willing to achieve excellence and prosperity. For many organizations, TQM has been regarded as the prime mover to achieve competitive advantages and to remain in the market. However, some organizations failed to embrace TQM principles due to various reasons. Accordingly, such stories of success and failures raised the researchers' interest to look into the success factors and barriers to implement TQM principles. Therefore, this work is motivated by the interest to dig deep into a typical industry within the Sultanate of Oman to find out how it is different from the rest of the world from TQM perspective. The selected industry for the study is the oil and gas sector because it is the major contributor to the country income. Since access to primary data requires specific permission, the researcher selected one successful organisation as a case study for his investigation due to the possibility of data access. In addition to data accessibility, the selected organisation has been one of the most successful organizations in the oil and gas sector at the Sultanate of Oman making it a good example for the study. The organisation name has been made anonymous to ensure the confidentiality of the data.

II.   LITERATURE REVIEW

TQM is a well-established concept that has been around for many decades. Globally, there is a sizable amount of research in exploring the TQM implementation success factors based on empirical studies (Black and Porter (1996), Dayton (2001), Porter and Parker (1993), Sila and Ebrahimpour (2003)). Moreover, it has been established that the critical success factors can be affected by the local context of the organisation (Sila and Ebrahimpour (2003)). For example, country specific or organisation specific culture can affect the implementation of TQM significantly (Stefan (2003), Gambi et al (2015), Yonela and Sukdeo (2018), Karimi and Sharifah (2012)). Hence, there is a need for a contingency approach to TQM implementation (Sila and Ebrahimpour (2003).

Many researchers reported various success factors of TQM implementation. Sila and Ebrahimpour (2003) studied over 76 published papers on Critical Success Factors of TQM implementation. They concluded that the most commonly reported success factors are top management commitment and leadership, customer focus, information and analysis, training, supplier management, strategic planning, employee involvement, human resource management, process management, teamwork, product and service design, process control, benchmarking, continuous improvement, employee empowerment, quality assurance, social responsibility, and employee satisfaction. However, they also argued that the criticalness of a factor should also be measured by its contribution to various performance measures and not solely by the extent of its adoption. Therefore, a correlation study between the level of adoption of the success factor and the performance of the organisation will provide an insight on how critical it is.

TQM principles can vary in number depending on how they are separated from each other. For example, some may consider the top management commitment and vision as the same principle but others can make them two separate principles. In reality, all the TQM principles are interrelated as they support one objective which is meeting the customer requirement. Therefore, there is no fix number of TQM principles and the Literature have reported different lists of TQM principles (Sila and Sila and Ebrahimpour, 2003).

Organisation performance shall be sustainable whereby it shall perform well now and be able to perform well in the future. Organisations can only achieve sustainable performance if they consider a balanced view of performance. Sustainable performance concept considers the economic performance, the social performance and the environmental performance as key dimensions. Therefore, organisations shall not exhaust their environmental resources while trying to maximize their economic performance. Moreover, the organisation shall consider the contribution to the society that operates in and achieve both the organisation and the society prosperity. The economic dimension includes the general activities of production, distribution, delivery and consumption (An-Yuan Chang and Yen-Tse Cheng, 2018). The social dimension includes the number of job vacancies released in the local area, work safety and the protection of community surroundings during the production process (An-Yuan Chang and Yen-Tse Cheng, 2018). The environmental dimension includes the protection of the surrounding environment from the use of hazardous substances, the discharge of wastewater, the emission of harmful gases and the development of new factories (An-Yuan Chang and Yen-Tse Cheng, 2018).

Elhuni and Ahmad (2014) explored the implementation of TQM in Libya. They found that not much of empirical research has been done on TQM implementation in developing countries with limited research on manufacturing and services sector. Hence, their work was to cover the gap by studying the TQM implementation in oil and gas sector in Libya. Accordingly, they have investigated the Critical Success Factors of the TQM implementation in Libyan oil and gas sector. They argued that TQM success factors are company specific depending on various aspects. They concluded that there is a strong correlation between the TQM success factors and the organizational sustainability development. They also drawn a framework for TQM implementation based on the most critical success factors namely top management commitment, employee involvement and participation, customer driven processes and continuous improvement culture.

Rula Al-Damen (2017) investigated the implementation of TQM on the Jordanian Petroleum Refinery Company and the impact on its business performance. She found that the company is implementing the principles of the TQM and that is reflecting positively on the its performance.

Al-Maamari et al (2017) explored the correlation between TQM principles and individuals' readiness to change in Yemen oil industry. Their study revealed that there is a strong correlation between the TQM principles and individuals' readiness to change regarding the TQM implementation.

Foud et al (2015) investigated the relationship between TQM, Supply Chain Management (SCM) and Organization performance of an oil pipe line company in Iraq. They found that there is a significant correlation between TQM, SCM and organization performance.

Abdalla Alsaidi (2014) investigated the critical success factors and barriers of TQM implementation in oil and gas companies in Libya. He found that the customer focus, reward and recognition, employee empowerment, vision and plan statement, supplier quality management, training and education and top management commitment are the top Critical Success Factors of TQM implementation. He also concluded that undue influence of government is one of the barriers of effective TQM implementation.

Yazadi et al (2013) investigated the Critical Success Factors of implementing TQM in

Iranian Oil and Gas companies. They assessed the TQM Critical Success Factors largely based on the Malcolm Baldrige model. They concluded that leadership, strategic planning, and customer focus are the top three Critical Success Factors of TMQ implementation that Iranian oil and gas companies need to focus on.

Srinivas et al (2019) attempted an empirical study to test a model that can help Indian oil companies to embrace quality management practices. They found that top management commitment, employees' involvement and employees training are the top key factors for successful implementation of TQM.

Wagimin et al (2019) studied the influence of transformational leadership and transactional leadership on both TQM and employee performance. They used Indonesian oil company as a case study for their empirical research. They concluded that transformational leadership has a significant impact on both TQM implementation and employee performance. However, transactional leadership do not influence employee performance as much as it influences TQM implementation.

Mahour et al (2011) have investigated the implementation of TQM on Iranian upstream (exploration and production) oil and gas companies. They found that management support, employee training and employee involvement are the key variables that contribute to the operational performance. They also found that customer orientation does not have that significant impact on business performance due to the customers not having much of the bargaining power over the oil and gas production companies.

Abubakar and Ebigenibo (2019) explored the relationship between TQM and performance in in the oil and gas servicing companies in Nigeria. They found that the lack of management commitment and the lack of resources are the major barriers to the effective implementation of TQM initiatives. The study also revealed the top management commitment, the employee awareness and employee involvement are among the success factors to implement the TQM.

Firend and Khalifa (2009) have examined the critical success factors of TQM and its relationship with the organization performance in the oil and gas sector in Qatar. They found that there is a strong correlation between the organization performance and the TQM critical success factors in the oil and gas setting in the state of Qatar.

Zaynab and Al-Hinai (2016) have explored the critical success factors of the TQM implementation in the educational institute context at the Sultanate of Oman. They used Walajat College of Applied Sciences as a case study. Their work revealed that the most critical success factors of TQM implementation are employee involvement and stakeholders focus.

Soundararajan et al (2018) have explored the TQM implementation success factors at the educational institutes at the Sultanate of Oman. Their study was based on primary data collected from government and private institutes. They found that providing adequate resources, continuous improvement and value added courses are among the critical success factors of TQM implementation in the educational sector.

Moosa et al (2017) investigated the success factors of the potential TQM implementation and its impact on work performance at the Ministry of Justice at the Sultanate of Oman. They found that customer focus is the most important success factor that affects the work performance in such organization setup.

Al Shehhi and Azam (2019) investigated the relationship between TQM, Project Management and Organizational success at the agriculture and fisheries sector at the Sultanate of Oman. The outcome of their study is an empirically validated management framework that links the TQM and Project Management that increases the organizational performance at the Omanis agriculture and fisheries sector.

Martin and Thawabieh (2018) investigated the applicability of TQM for higher education institutes. They explored the factors of TQM that are mostly applicable in an educational setting taking the University of Buraimi at the

Sultanate of Oman as a case study. The results showed that TQM is applicable to the academic sector and it has a positive impact on its performance. The study also showed that leadership is the most important factor for the successful implementation on the academic sector.

Abu Baker et al (2011) investigated the TQM practices in the construction sector at the Sultanate of Oman. They explored the extent to which the large construction companies has implemented the TQM principles and which are the areas that required further attention. They concluded that the construction companies in Oman have implemented the principles of TQM to some extent. They also found that most of the surveyed employees do believe in the team working principle but they need further training and empowerment.

From the literature review, it is clear that research on TQM implementation in the upstream oil and gas business is very limited considering the GCC region. To best of the researcher knowledge, there was no single paper found addressing the TQM implementation in the upstream oil and gas sector at the Sultanate of Oman. There is a clear gap in the published research about implementation of TQM in the Sultanate of Oman oil and gas sector. Therefore, our research scope will be focused on studying the TQM implementation in the upstream oil and gas sector at the Sultanate of Oman in order to cover the existing research gap. Moreover, since the criticalness of the TQM implementation success factors are best measured by its impact on performance, the study will attempt to correlate the success factors with the performance of the organisation.

III. PROBLEM STATEMENT

Considering the published literature about the linkage between the TQM implementation and the organisations performance, the following problem statement is derived for this research project:

"Did TQM implementation benefit the organisation performance?"

IV. RESEARCH OBJECTIVES

The following research objectives are set for this research project:

● Explore the Critical Success Factors of TQM implementation in the selected organisation

● Highlight the areas that require further attention from the selected organisation's management that will enable taking the company to a higher sky.

V. RESEARCH METHODOLOGY

A. Research Hypothesis

Based on the objectives of the study and the literature review, following hypotheses were developed to be tested through this study:

H1: Management commitment has strong correlation with Economic performance

H2: Management commitment has strong correlation with Social performance

H3: Management commitment has strong correlation with Environmental performance

H4: Vision and quality policy has strong correlation with Economic performance

H5: Vision and quality policy has strong correlation with Social performance

H6: Vision and quality policy has strong correlation with Environmental performance

H7: Employees participation has strong correlation with Economic performance

H8: Employees participation has strong correlation with Social performance

H9: Employees participation has strong correlation with Environmental performance

H10: Customer focus has strong correlation with Economic performance

H8: Employees participation has strong correlation with Social performance

H9: Employees participation has strong correlation with Environmental performance

H10: Customer focus has strong correlation with Economic performance

H11: Customer focus has strong correlation with Social performance

H12: Customer focus has strong correlation with Environmental performance

H13: Training, education and reward has strong correlation with Economic performance

H14: Training, education and reward has strong correlation with Social performance

H15: Training, education and reward has strong correlation with Environmental performance

H16: Suppliers' management has strong correlation with Economic performance

H17: Suppliers' management has strong correlation with Social performance

H18: Suppliers' management has strong correlation with Environmental performance

H19: Continuous improvement has strong correlation with Economic performance

H20: Continuous improvement has strong correlation with Social performance

H21: Continuous improvement has strong correlation with Environmental performance

H22: Process control has strong correlation with Economic performance

H23: Process control has strong correlation with Social performance

H24: Process control has strong correlation with Environmental performance

H25: Cost of quality has strong correlation with Economic performance

H26: Cost of quality has strong correlation with Social performance

H27: Cost of quality has strong correlation with Environmental performance

H28: IT infrastructure has strong correlation with Economic performance

H29 IT infrastructure has strong correlation with Social performance

H30: IT infrastructure has strong correlation with Environmental performance

H31: Culture has strong correlation with Economic performance

H32: Culture has strong correlation with Social performance

H33: Culture has strong correlation with Environmental performance

H34: There is a strong correlation between TQM principles and Performance

B.   Conceptual Framework

Based on the literature review, the purpose of the study and the hypothesis developed, the following conceptual framework (Figure 1) is developed for the study.
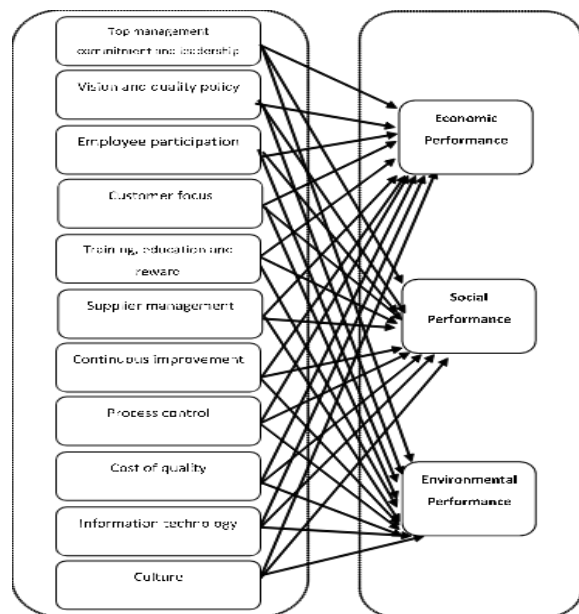

Figure 1 *Research conceptual model*

Source: Developed for this study

C.   Data sample

The population of the sample is the total number of the organization's employees which is 500 employees. Stratified sampling approach is followed whereby the whole

population of the organization's employees is first divided into two stratums, management and non-management. Then simple random sampling is applied for each stratum. A total number of participants of 15% of about 500 employees results into 75 employees are to be surveyed. Since there are about 50 employees are at the management level, at least 8 staff of the surveyed sample shall be from management level and 67 from non-management level.

The data were collected through a questionnaire distributed to individual employees.

D.   Data Analysis technique

The data were analyzed using the SPSS software. All the received survey responses have to go through data cleansing process. The cleansing process will ensure the missing answers are identified and its significance is identified. Responses with lots of missing answers may be discarded as it will affect the data reliability. Moreover, the few missing answers can be replaced the arithmetic mean of all other responses without the need to discard the full questionnaire response.

The collected data has to withstood the validity and reliability checks in order to be used for further analysis. Different validity checks will need to be performed starting from reviewing the questionnaire itself before distributing it to respondents. Content validity need to be assured by experts reviewing the questionnaire to ensure its constructs adequately addresses the research model. Data practicality check is also an important aspect that will affect the quality of responses. The required sample shall be achievable considering the available resources like time and accessibility to respondents. The questionnaire shall be designed in a way that supports the respondent to fully answer all the questions. Such design is achieved by segregating the elements and providing the Arabic translation.

The data discriminative validity checks start by ensuring there are no duplicated questions measuring the same variable. Hence, Pearson Correlation matrix will be calculated based on the responses and any two questions having a correlation factor above 0.8 will be considered duplicated and one of them will be removed. Moreover, the Common Method Variance will be checked using Harman's Single-Factor Test (Shehnaz et al, 2017) to ensure there is no common method bias.

Then, an Exploratory Factor Analysis (EFA) will be carried out to ensure the research conceptual framework is accurate in distributing the questions into the factors (latent variables). The EFA will be used to simplify the model where possible. Depending on the collected sample size, certain minimum loading factor as well as maximum cross loading of the questions on other factors will be adopted to remove certain questions from the model.

After carrying out the EFA, each variable Cronbach Alpha will be calculated to ensure the internal consistency of the responses and that we are likely to get the same response if the same survey questionnaire is repeated in the future. Any variable that do not have Cronbach Alpha greater than 0.6 will be eventually discarded from the model.

Once the model validity and reliability check is completed, the final version of the model and a revised list of Hypothesis will be tested using the following steps in order:

1.   Demographic profile of the respondents will be tested to ensure we have adequate representation of the different stratums of the population

2.   Descriptive analysis to check how disperse the responses are. Such test will enhance our confidence on the quality of the data.

3.   ANOVA test to check the differences of responses of the different stratums to explore any interesting differences between them.

4.   Descriptive analysis to check the organisation performance and the implementation of TQM principles based on employees' responses.

5.   Regression analysis for hypothesis testing and to rank the TQM Critical Success Factors based on the performance prediction.

VI.   DATA ANALYSIS

A.   Primary data cleansing

There were about 150 survey questionnaires distributed to the selected organisation employees including technical, administrative, managerial and non-managerial positions. A total of eighty-six responses were received representing a response rate of 57%. Two responses were discarded as they were not usable leaving us with eighty-four responses representing 16.8% of total the selected organisation employees. All other received responses were useable with some missing data. All missing data were filled with the arithmetic mean of all other responses using the SPSS function.

B.   Data validity, practicality and reliability tests

For the primary data to be useful for drawing realistic conclusions, there has to be some assurance of its validity and reliability. Therefore, sound measurement must meet the validity, reliability and practicality tests (Kothari, 2004, p.73).

Data validity is the first element that need to be considered and is done at an early stage while designing the survey questionnaire. It is one of the most important criteria that need to be established for the instrument to be able to measure what need to be measured (Kothari, 2004, p.73). Content validity test approach was followed and the designed questionnaire along with the proposed research model were subjected to two experts review to ensure the proposed measuring instrument provides adequate coverage of the topic under study. The comments received from the experts were incorporated and the final version of the survey questionnaire was established before distribution.

The practicality test was done from the economy and convenience of the measuring instrument (Kothari, 2004, p.75). Since the researcher is a member of the organisation under study, the population sample of 15%-20% is considered doable and economical as he is able to reach this number of staff comfortably and within the time and cost budget of the project. The designed questionnaire comprises fifty-nine elements which was considered as a long questionnaire. However, the questionnaire was structure in segments making it easy to understand and can be self-administered conveniently. In addition, the questionnaire was translated to Arabic since most of the population are Arabs and both English and Arabic text are provided in the questionnaire to ensure the respondents clearly understand each element.

The first test was carried out by producing the correlation matrix using the SPSS software. The result shows that only one pair of questions correlate to each other by more than 0.8 which is considered to be high. According to the high correlation, it is concluded that both questions received almost identical responses and hence one question is deleted.

The second test was carried out using the Single-Factor Test to check the Common Method Variance. The results prove there is no common method bias as there is no single factor emerged and the first factor did not capture most of the variance (31.8%). Therefore, these results suggested that CMV is not an issue in this study (Shehnaz et al, 2017).

The research model has a total of fourteen latent constructs which are eleven independent variables and three dependent variables. In order to ensure that all the remaining fifty-three questions are distributed correctly into the fourteen latent variables and whether or all the latent variables are needed, Exploratory Factor Analysis is carried out. Howard (2016) suggested a procedure for carrying out the EFA analysis after reviewing authors' choices for each EFA decision within 163 published articles. Accordingly, Howard procedure were followed with the following choices:

●   KMO Measure of Sampling Adequacy of a threshold of 0.7 is considered

●   Principle axis factoring extraction method is used

●   Varimax rotation method is used

● Kaiser criterion is used (Eigenvalue < 1 rule)

● Factor loading of 0.6 is used considering the sample size of 84 responses

● Maximum of 0.2 cross loading difference is allowed between the primary and alternative factor loadings

Accordingly, the EFA was carried out separately for the independent variables and dependent variables. The final solution was concluded after carrying the iterations for both the independent and dependent variables. The KMOs for the dependent and independent variables factors were 0.773 and 0.751 respectively which are above the acceptable threshold of 0.7.

Accordingly, five factors are concluded to represent the independent variables. Six factors were eliminated by the EFA due to the low factor loadings or high cross loadings. On the other hand, all the three dependent factors were retained however with reshuffling of some of the questions between the factors as well as the removal of some of the questions due to either low factor loading or high cross loading.

Data reliability was then tested using Cronbach Alpha of the overall variables data set as well as individual independent and dependent constructs. Peterson (1994) reported that a Cronbach Alpha greater than 0.7 is an established criterion to indicate a reliable set of data. However, Taber (2018), reported wider ranges of acceptable Cronbach's Alpha indicating a value of 0.6 is also an acceptable threshold.

According to the calculated Cronbach's Alpha coefficients as shown in Table 1, it is clear that the Social Performance and the Environmental Performance constructs data are not reliable since they have Cronbach Alpha below the threshold of 0.6. Therefore, those two constructs are removed from the research model as the collected data are not having enough reliability to make any useful conclusion out of them.

Table 1: *Cronbach Alpha coefficient of all variables and individual constructs.*

S. N	Construct	Cronbach Alpha
1	All variables data set	0.907
2	Management Commitment & Vision	0.889
3	Supplier Management	0.81
4	Process Control	0.827
5	Information Technology	0.847
6	Culture	0.87
7	Economic performance	0.678
8	Social performance	0.372
9	Environmental performance	0.536

The research model has changed according to the results of the EFA analysis and the data reliability assessment and therefore its complexity has been substantially reduced. Totally eighteen independent variables' questions out of the thirty-three questions and two dependent variables questions out of the ten questions were maintained. Moreover, the independent constructs were reduced from eleven to five constructs and the dependent constructs were reduced from three to one. The list of hypotheses to be tested has also been reduced and the following list is the revised list of hypotheses:

H1: Management Commitment & Vision is significantly correlated with the Economic Performance

H2: Supplier Management is significantly correlated with the Economic Performance

H3: Process Control is significantly correlated with the Economic Performance

H4: IT infrastructure is significantly correlated with the Economic Performance

H5: Culture is significantly correlated with the Economic Performance

H6: TQM implementation is significantly correlated with the Economic Performance

Accordingly, the new research model is shown in Figure 2. The figure shows TQM principles, the Economic Performance dimension, the measuring elements and direction of each hypothesis.
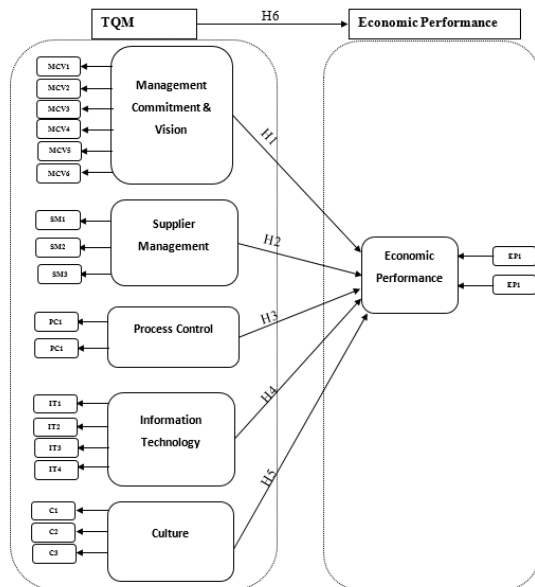

Figure 2 *Revised research conceptual model*

C.   Demographic analysis

The demographic profile of the respondents is a very important context upon which any research conclusion can be made. Table 2 below summarizes the demographic profile of the respondents of the survey questionnaire.

Table 2: *Demographic Profile of Respondents*

Category	Percentage
Gender	
Male	100%
Female	0%
Area of expertise	
Administrative	25%
Technical	75%
Position	
Management	10.7%
Non-management	89.3%
Age	
20-30 years	21.4%
31-40 years	56%
41-50 years	19%
Above 50 years	3.6%
Education	
Diploma	36.9%
Bachelor	53.6%
Master	8.3%
Doctorate	1.2%

From Table 2, it is clear that men are dominating the oil and gas industry with 100% of the respondents to the survey questionnaire were men. Since the desert type of business is not suitable for women in the Omani culture, it is expected to find men are dominating the oil and gas business with few of the admin positions in the headquarters. Moreover, since Oil and gas industry is heavily dependent on technical expertise, it is not surprising to see most of the respondents (75%) are from technical backgrounds.

Since the sample population were targeting two stratums of staff, Management and Non-management, it is important to shed some light on the obtained percentage of respondents. The selected organisation has about 50 management staff in all departments out of a total population of 500 staff which means 10% of the staff are at the management level. Therefore, the obtained responses of 10.7% being from the Management team is considered as adequate representation of the management Level in the survey responses.

In addition, the results show that the mass population of the respondents are well educated with 53.6% and 8.3% are Bachelor and master holders respectively. Oman, has a relatively young population and that is clearly reflected in Table 4.6 where 77.4% of the respondent's population are from 20 and 40 years

In general, the demographic profile of the respondents is very much as expected for the Omani oil and gas sector context.

D. Descriptive Analysis

To get an insight into how disperse the questionnaire responses are, the number of responses, range, minimum, maximum, mean, standard deviation and variance were calculated for each element. Only one question is having a higher standard deviation more than 1 with standard deviation of 1.02. All other questions are having low spread of data around the mean value. With this fact, the obtained data are considered having good dispersion and are therefore trusted for further analysis.

Using the SPSS software ANOVA test function, the difference in the mean responses of the different groups of respondents is examined. A significance threshold value of 0.05 is used. The ANOVA test concludes there is no significant difference in the response between Administrative and Technical staff groups as well as there is no difference in the response between the Management and Non-Management staff groups. This is an important outcome as it indicates the cohesiveness of the organisation and there are shared values and perceptions among the different groups across the organisation.

Two questions were used to measure the organisation economic performance. The means of both questions responses are 4.14 and 3.8 respectively which indicate the organisation is well performing in achieving the production targets and is very efficient in expenditure respectively.

The results are as expected since the organisation is known for its excellent oil production performance over the last two decades.

The ranking of the TQM principles based on the arithmetic means of responses was calculated and is shown in Table 3.

Table 3: *Ranking of the factors based on employees' responses*

Rank	TQM principle	Mean
1	Information Technology	3.94
2	Culture	3.82
3	Process Control	3.77
4	Management Commitment and Vision	3.66
5	Suppliers Management	3.54

From Table 3, it is clear that all the five factors of TQM are implemented in the organisation as the arithmetic mean is above three. It is an expected outcome since the organisation under study is already an ISO9001 certified company.

The Information technology is on top of the list with a score of 3.94 indicating that almost all the respondents agreed with the elements of the Information technology construct.

The organisation culture is the second on the list and scored 3.82 on average which indicates the organisation is having a well-established TQM culture. The result also confirms the importance of the organisation culture on any TQM implementation journey. The Process control and the Management Commitment and Vision are also among the highly agreed factors by the respondents indicating those two principles are already deeply inherited by the organisation.

The lowest score was for Supplier Management factor which scored 3.54 on average indicating that it is agreed by most of the respondents. However, the fact that Supplier Management has received the lowest score need to be further explored by the organisation as to what extent Supplier Management can be improved to ensure there is no lost opportunity for the organisation.

In fact, for the organisation to keep improving, all five factors shall be continually improved in line with the TQM concept of continual improvement.

E. Regression Analysis & Hypotheses testing

Linear Regression Analysis is done between the individual five TQM principles and the organisation economic performance. The regression analysis is used to test the established hypothesis for the study. Moreover, the regression analysis will be used to rank the Critical Success Factor of the TQM implementation. A TQM principle is called a Critical Success Factor if it significantly influences the organisation performance (Sila and Ebrahimpour, 2003). One regression analysis is also done between the mean of the five TQM practices and the economic performance to check the overall correlation between the TQM implementation and the organisation economic performance.

Table 4 shows the Hypothesis, the independent variable, the dependent variable, the regression analysis result and the hypothesis testing result.

Table 4: *Regression analysis result and Hypothesis testing*

Hypothesis	Independent variable	Dependent variable	p	Result
H1	Management Commitment and Vision	Economic Performance	.001	Accepted
H2	Supplier Management	Economic Performance	.018	Accepted
H3	Process Control	Economic Performance	.005	Accepted
H4	Information Technology	Economic Performance	.002	Accepted
H5	Culture	Economic Performance	.000	Accepted
H6	TQM implementation	Economic Performance	.000	Accepted

H6   TQM implementation   Economic Performance   .000   Accepted

The regression analysis results shown in Table 4.12 confirms there is a strong correlation between the five TQM principles and the organisation economic performance at the significance level of 0.05. The results also confirm there is a strong correlation between the TQM implementation and the organisation economic performance.

Accordingly, the following is concluded for each Hypothesis:

H1 Management Commitment & Vision is significantly correlated with the Economic Performance: Accepted and the null hypotheses is rejected. Accordingly, the Management Commitment and Vision is an important factor that needs to be considered by the organisations due to its influence on the economic performance.

H2 Supplier Management is significantly correlated with the Economic Performance: Accepted and the null hypotheses is rejected. Accordingly, the Supplier Management is an important factor that needs to be considered by the organisations due to its influence on the economic performance.

H3 Process Control is significantly correlated with the Economic Performance: Accepted and the null hypotheses is rejected. Accordingly, the Process Control is an important factor that needs to be considered by the organisations due to its influence on the economic performance.

H4 IT infrastructure is significantly correlated with the Economic Performance: Accepted and the null hypotheses is rejected. Accordingly, the IT infrastructure is an important factor that needs to be considered by the organisations due to its influence on the economic performance.

H5 Culture is significantly correlated with the Economic Performance: Accepted and the null hypotheses is rejected. Accordingly, the Culture is an important factor that needs to be considered by the organisations due to its influence on the economic performance.

H6 TQM implementation is significantly correlated with the Economic Performance: Accepted and the null hypotheses is rejected. Accordingly, the TQM implementation is

beneficial for the organisations due to its influence on the economic performance.

Table 5 ranks the Critical Success Factors based on its influence on the organisation economic performance based on the regression analysis significance level.

Table 5: *Ranking of TQM Critical Success Factors*

Rank	Independent variable	Beta	*t*	*p*
1	Culture	.523	5.551	.000
2	Management Commitment and Vision	.365	3.546	.001
3	Information Technology	.337	3.243	.002
4	Process Control	.303	2.878	.005
5	Supplier Management	.259	2.424	.018

The ranking of the Critical Success Factors as shown Table 5, suggests that the organisation culture is the most important predictor of the organisation performance. This is an important finding that demonstrates the importance of the culture for any organisation aiming to improve its performance. The result is different from the published literature where Management Commitment and Vision is the mostly reported important TQM factor (Sila and Ebrahimpour, 2003). Whereas in our study, the Management Commitment and Vision is ranked in the second place after the Culture. The result emphasis on building the right culture as the foundation of TQM implementation initiative in the Omani oil and gas sector.

Supplier Management is the fifth Critical Success Factor as confirmed by the study. The result is also in line with the research literature published by Sila and Ebrahimpour (2003) and Abdalla Alsaidi (2014). It is worth mentioning that the regulation environment of the oil and gas sector in Sultanate of Oman do impose some conditions for contracting services. Therefore, the organisations need to comply with the regulations of contracting as well as to maximize the suppliers' positive impact on its

quality management. Nevertheless, the results indicate a room for improvement for the organisation under study in managing its suppliers.

In summary, for an Omani oil and gas organisation to improve its economic performance, it is advised to implement TQM and pay particular attention to its Culture, Management Commitment and Vision, IT infrastructure, the Process Control and the Supplier Management system.

VII.   CONCLUSION   AND RECOMMENDATION

Oil and gas organisations at the Sultanate of Oman that are willing to implement the TQM concept shall pay due attention to the TQM Critical Success Factors while setting up their TQM implementation plan. Considering the empirical data collected for this research work and the analysis carried out in this case study, the following are the Critical Success Factors ranked based on their influence on the economic performance of the organisation:

- Culture

- Management Commitment and Vision

- Information Technology

- Process Control

- Supplier Management

The organisation Culture is identified as the most important Critical Success Factor for TQM implementation within the Omani oil and gas sector. The order of importance is different from the published literature where Management Commitment and Vision is often considered as the most important TQM factor (Sila and Ebrahimpour, 2003).

Based on the outcome of the study, the following steps are suggested for the TQM implementation:

1. Discuss and agreed the concept among the organisation Board of Directors and Top Management.

2. Establish Corporate Objectives to implement the TQM

3. Reflect the TQM implementation objective in the Organisation Vision and Mission and communicate accordingly

4. Using ISO9001 or any other quality management framework, conduct a gap analysis on the organisation and establish the TQM implementation projects plan. The plan shall be clear on who will do what and when

5. Establish a department reporting the to the top management that will follow the implementation of TQM and report to the management. The department will play the role of facilitator and program management. Throughout the TQM implementation journey, the department shall keep engaging the stakeholders and conduct awareness and training of the new concepts.

6. Establish Corporate KPI's to monitor the progress of the TQM implementation

7. Establish Departmental KPI's to monitor the implementation of the TQM implementation projects

8. Conduct an annual review to review the progress and adjust the plan accordingly

9. Celebrate the achievement of important milestones

Change management skills will play an important role throughout the TQM implementation plan because in many cases the organisation has to move from one state to another state while it is continuing to operate. Such change can only happen smoothly if the management are skillful in managing the change and mobilizing the employees towards the new state. Therefore, training the management in managing the change will be crucial for a successful implementation of TQM.

VIII. LIMITATION OF THE STUDY AND FUTURE RESEARCH DIRECTION

The study has considered one organisation as a case study to investigate the Critical Success Factors of TQM implementation within the Omani oil and gas sector. The study assumed that the Omani oil and gas sector has the same context. To some extent, that is true but in reality, there are variations in the organisation internal contexts within the individual organisation. Most of the oil and gas organisations within the Sultanate of Oman have emerged from different multinational organisations which have influenced the internal context of each organisation. Therefore, the study outcome based on one organisation context may not fully represents the Sultanate of Oman oil and gas context. Therefore, considering a wider sample by covering more than one successful organisation within Oman will be of an added value to the study so that the outcome can be generalized for the whole Oman and possibly the GCC region too.

Reference

[1] Abdalla Alsaidi (2014), "THE EFFECT OF TOTAL QUALITY MANAGEMENT ON OVERCOMING SOME PRODUCTION PROBLEMS IN THE OIL INDUSTRY IN LIBYA", International Journal of Engineering Research and Science & Technology, Vol. 3, No. 2

[2] Abu Hassan Bin Abu Bakar, Khalid Bin Ali and Eziaku Onyeizu (2011), "Total Quality Management Practices in Large Construction Companies: A Case of Oman", World Applied Sciences Journal 15 (2): 285-296

[3] Abubakar Mustapha Mohammed and Ebigenibo Genuine Saturday (2019), "IMPACT OF TOTAL QUALITY MANAGEMENT ON PERFORMANCE OF OIL SERVICING COMPANIES IN PORT HARCOURT", Global Scientific Journal, Volume 7, Issue 3

[4] Adalia Martin and Fawaz Ali Thawabieh (2018), "The Effect of ISO 9001 to Oman Higher Education Operational

Performance: Buraimi University College as a Case Study", International Journal of Applied Engineering Research ISSN 0973-4562 Volume 13, Number 6 pp. 3939-3947

[5] Ali Malik AL Harthy, Yu Hock Oo, Said. M. Al-Saqri and Asif M. Karim (2018), "Critical Factors Affecting the Quality Management System in Oil & Gas On-Shore Drilling Sector for In-Sourcing Drilling Model – (Concept Paper), International Journal of Advance Research and Development, Volume 3, Issue 1

[6] Alireza Yazdani, Mohammad Ali Soukhakian and Mohammad Reza Mozaffari (2013), "Evaluation of Critical Success Factors in Total Quality Management Implementation and Prioritization with AHP - Case Study: Pars Oil and Gas Company", European Online Journal of Natural and Social Sciences, vol.2, No. 3(s), pp. 1624-1633

[7] An-Yuan Chang and Yen-Tse Cheng (2018), "Analysis model of the sustainability development of manufacturing small and medium- sized enterprises in Taiwan", Journal of Cleaner Production, 207, pp. 458-473

[8] Black and Porter (1996), Identification of the Critical Factors of TQM, Decision Sciences, Volume 27 Number 1, pp.1-21

[9] Firend Al. Rasch and Khalifa Al-Khalifa (2009), "An examination of TQM critical success factors at Qatar's Oil & Gas industry", The International Journal of Business and Management Research Vol.2, Num. 1, pp 106-113

[10] Gambi, L. D. N., Boer, H., Gerolamo, M. C., Jørgensen, F., & Carpinetti, L. C. R. (2015). The relationship between organizational culture and quality techniques, and its impact on operational performance, International Journal of Operations and Production Management, 35(10), pp. 1460-1484.

[11] Gopalakrishnan Soundararajan, Preeti Srivastava and Gopalakrishnan Chinnasamy (2018), "Assuring Total Quality Management across Educational Institutions: Evidence from Oman", International Journal of Scientific and Research Publications, Volume 8, Issue 4

[12] Howard Matt C., (2016), "A Review of Exploratory Factor Analysis Decisions and Overview of Current Practices: What We Are Doing and How Can We Improve?", Intl. Journal of Human Computer Interaction, 32, PP 51–62

[13] Kothari, Research Methodology Methods & Techniques, India, New Age International (P) Limited Publishers, Second Edition, 2004

[14] • Leslie J. Porter & Adrian J. Parker (1993), Total quality management-the critical success factors, Total Quality Management, 4:1, pp. 13-22

[15] • Mahour Mellat Parast, Stephanie G. Adams and Erick C. Jones (2011), "Improving operational and business performance in the petroleum industry through quality management", International Journal of Quality & Reliability Management, Vol. 28 No. 4, pp. 426-450

[16] • Mohammad Munir Ahmad and Redha Elhuni (2014),"Critical quality factors for successful TQM implementation in Libyan oil and gas sector", Benchmarking: An International Journal, Vol. 21 Iss 5 pp. 713 – 733

[17] • Moosa Mohammed, Elsadig Musa Ahmed and R.N. Anantharaman, (2017) "The effect of TQM intention to implement on work performance in Oman's Ministry of Justice", World Journal of Entrepreneurship, Management and Sustainable Development, Vol. 13 Issue: 3, pp.223-242

[18] • Nick A. Dayton (2001), Total quality management critical success factors, a comparison: The UK versus the USA, Total Quality Management, 12:3, pp. 293-298

[19] • Omachonu and Ross, Principles of Total Quality, USA, CRC Press, Third Edition, 2004

[20] • Peterson Robert A. (1994), "A Meta-Analysis of Cronbach's Coefficient Alpha", Journal Consumer Research, Vol. 21, No. 2, pp. 381-391

[21] • Qais Ahmed Al-Maamari, Mohammed Abdulrab, Bassam Ali Al-Jamrh and Abdo Hasan Al-Harasi (2017), "The Relationship Between Total Quality Management Practices and Individual Readiness for Change at Petroleum Exploration and Production Authority in Yemen", International Journal of Business and Industrial Marketing, 2(6): 48-55

[22] RAMI H. FOUAD, ZEYAD M. HAMED and OMER A. ABDULWAHHAB (2015), "Exploring TQM and SCM Practices Influence On Oil Pipelines Company's Performance", International Review of Management and Business Research, Vol. 4, Issue.4

[23] Rashid Hamdan Rashid Al Shehhi and S. M. Ferdous Azam (2019), "DEVELOPING AND VALIDATING THE TQM FRAMEWORK IN THE SULTANATE OF OMAN AGRICULTURE AND FISHERIES CONTEXT", European Journal of Economic and Financial Research, Volume 3, Issue 4

[24] Rashmi Srinivas, D R Swamy and T S Nanjundeswaraswamy (2019), "QUALITY MANAGEMENT PRACTICES IN OIL AND GAS INDUSTRY", International Journal for Quality Research 14(2) 421–438

[25] Redha Elhuni and M. Munir Ahmad (2014), "Critical quality factors for successful TQM implementation in Libyan oil and gas sector", Benchmarking: An International Journal, Vol.21, No5, pp. 713-733

[26] Redha Elhuni and M. Munir Ahmad (2014), "A Framework for Successful TQM Implementation and Its Effect on the Organizational Sustainability Development", International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering Vol:8, No:1

[27] Rula Ali Al-Damen (2017), "The impact of Total Quality Management on organizational performance Case of Jordan Oil Petroleum Company", International Journal of Business and Social Science Vol. 8, No. 1

[28] Samiya Abdullah Sulaiman Al-Qayoudhi, Syed Sulaiman Hussaini and M. Firdouse Rahman Khan, "Application of Total Quality Management (TQM) In Higher Education Institution (HEI) In Oman: Shinas College of Technology- A Case Study", Humanities & Social Sciences Reviews, Vol 5, No 1, pg 21-32

[29] Shehnaz Tehseen, T. Ramayah and Sulaiman Sajilan (2017), Testing and Controlling for Common Method Variance: A Review of Available Methods, Journal of Management Sciences Vol. 4(2): 146-175

[30] Sila and Ebrahimpour (2003), Examination and comparison of the critical factors of total quality management (TQM) across countries, International Journal of Production Research, vol. 41, no. 2, pp. 235-268

[31] Stefan Lagrosen, (2003),"Exploring the impact of culture on quality management", International Journal of Quality & Reliability Management, Vol. 20 Iss: 4 pp. 473 – 487

[32] Taber Keith S. (2018), "The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education", Res Sci Educ 48, pp 1273–1296

[33] Wagimin, Elisa Kusrini, Juhary Ali and Vembri Noor Helia (2019), "The Effect of Leadership on Employee Performance with Total Quality Management (TQM) as a Mediating Variable in Indonesian Petroleum Companies: A Case Study", INTERNATIONAL JOURNAL OF INTEGRATED ENGINEERING VOL.11 NO. 5, 180-188

[34] Yadollah Karimi and Sharifah Latifah Syed Abdul Kadir, (2012), "The Impact of Organisational Culture on the Implementation of TQM: Empirical Study in the Iranian Oil Company", American Journal of Industrial and Business Management, 2012, 2, pp. 205-216

[35] Yonela Gantsho and Nita Sukdeo, (2018), "Impact of Organizational Culture on Service Quality", Proceedings of the International Conference on Industrial Engineering and Operations Management, Paris, France, July 26-27, 2018

[36] Zaynab Shukri Nadim and Ahmed Humaid Al-Hinai (2016), "Critical Success Factors of TQM in Higher Education Institutions Context", International Journal of Applied Sciences and Management, Vol. 1, No. 2, 147-156