QUALITY MANAGEMENT IN OMAN'S CONSTRUCTION INDUSTRY

by

KHALID ALI SULAIMAN AL-BULUSHI

Thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy
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DEDICATION

This thesis is dedicated with all my love to:

My Father & Mother
My Wife
My Teachers
My Brothers & Sisters
My Children

I love you forever…

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LIST OF ABBREVIATION

TQM	- Total quality management
KM	- Knowledge management
QA	- Quality Assurance
QC	- Quality Control
ISO	- International Organization for Standardization
GDP	- Gross Domestic Product
OCCI	- Oman Commercial of Chamber and Industry
GDP	- Gross Domestic Product
RO	- Riyal Omani
CSL	- Client Satisfaction level
R&D	- Research and Development
QMS	- Quality Management System
SPC	- Statistical Process Control
CSFs	- Critical Success Factors
CI	- Construction Industries
WTO	- World Trade Organization

ABSTRAK

Proses Pengurusan Kualiti Total (TQM) boleh dianggapkan sebagai satu sistem yang terkini dalam bidang kualiti, selepas pemeriksaan kualiti, kawalan kualiti, pemastian kualiti dan sistem pengurusan kualiti ISO 9000 dalam sektor binaan. Dewasa ini, kebanyakan organisasi di dunia menggunakan TQM dengan hasrat untuk menilai dan meningkatkan kualiti. Objektif kajian ini adalah: i) untuk menilai pelaksanaan terkini TQM di kalangan firma binaan di Oman, ii) untuk menilai halangan-halangan yang dihadapi oleh firma binaan binaan bagi melaksanakan prinsip-prinsip TQM, iii) untuk mengenalpasti faktor kualiti yang kritikal yang memberi kesan kepada pelaksanaan prinsip-prinsip TQM secara berkesan serta memberi kesan kepada produktiviti di tapak bina; dan mengemukakan kemungkian penyelesaian kepada masalah tersebut, dan iv) untuk mengenalpasti persepsi klien terhadap prestasi kontraktor yang berkaitan dengan kualiti di Oman. Responden kajian ini terdiri daripada kontraktor in Oman dari pelbagai kelas yang diklasifikasikan oleh *Chamber of Commerce and Industry of Oman*. Data kajian ini dikutip secara kuantitatif dengan menggunakan dua set borang soal selidik, iaitu i) dikutip daripada kontraktor, dan ii) dikutip daripada klien. Faktor-faktor penting yang telah diambil kira seperti pengetahuan tentand TQM, parameter yang berkaitan dengan persepsi kualiti, kaedah perolehan data, rancangan latihan, halangan yang dihadapi oleh industri binaan, faktor-faktor kualiti yang mempunyai impak terhadap syarikat-syarikat binaan, dan tahap kepuasan pelanggan. Pendekatan kuantitatif telah digunakan dalam kajian ini bagi menunjukkan kesahihan masalah yang dihadapi oleh knotraktor dalam pembinaan. Borang soal selidik telah diedarkan kepada 350 firma binaan dari pelbagai kelasifikasi di Muscat, Oman. 200 kontraktor memberi maklum balas kepada kajian ini yang merupakan 57% daripada kerangka persampilan. Pada masa yang sama, 300 klien memberi maklum balas, iaitu 67% daripada keranka persampilan. Data yang dikutip telah dianalisa dengan menggunakan kaedah *Chi-Square test,* dan *t-test,* kekerapan, *ranking* dan peratusan. Penemuan kajian menunjukkan yang firma-firma binaan secara amnya mengambilkira prinsip-prinsip TQM. Walaubagaimanapun, terdapat kelemahan pada kebanyakan angkubah-angkubah TQM. Kajian ini juga menunjukkan yang kontraktor gred keempat mempunyai banyak halangan dan masalah dalam melaksanakan prinsip-prinsip TQM berbanding dengan firma dari kelas-kelas yang lain. Kajian ini juga menunjukkan yang tahap produktiviti berbeza di antara kelas-kelas kontraktor. Kajian ini merumuskan yang i) kos dan jadual, dan ii) kekurangan latihan dan pengetahuan ke arah penambahbaikan adalah halangan utama yang dihadapi oleh firma binaan di Oman. Kajian ini mencadangkan satu kemungkinan penyelesaian, iaitu menerapkan kesedaran kepada aspek pengurusan kualiti yang memberi fokus kepada pengetahuan dan latihan kepada semua yang terlibat dalam industri binaan, terutamanya di Oman. Akhir sekali, kajian ini menunjukkan kebanyak klien di Oman tidak berpuas hati dengan prestasi kontraktor gred satu dan gred tiga terhadap aspek kualiti semasa melaksanakan projek. Kajian ini juga telah mengemukakan cadangan-cadangan bagi kajian masa hadapan dalam bidang TQM, pengurusan kualiti dan industri binaan.

ABSTRACT

Total quality management (TQM) process can be considered as the latest system in the field of quality, after quality inspection, quality control, quality assurance and ISO 9000 quality management in the construction sector. Recently, many organizations resorted to the application of TQM in the world, with a view to assessing the level of quality and to improve it. The objectives of this research are: i) to investigate the current TQM implementation in Oman construction companies, ii) to investigate the obstacles that construction companies face in implementing effective TQM practices, iii) to identify the quality factors that are critical to effective implementation of TQM and which factors impact site productivity; and to provide possible solutions to overcome these problems, and iv) to identify the perceptions of clients towards the performance of contractors in Oman with regards to quality. The respondents of this study are the contractors in the Sultanate of Oman in various grades of companies as classified by the Chamber of Commerce and Industry of Oman. The data of this study was collected quantitatively using two sets of questionnaires, i.e. i) collected from the contractors, and ii) collected from the clients. Important factors have been taken into account such as knowledge of TQM, parameters relating to the perception of quality, data acquisition method, training plan, obstacles facing construction industry, quality factors that impact on productivity of the construction companies and customer satisfaction level. The quantitative approach was used in this research to highlight the reality of the problems faced by contractors in construction. The questionnaires were distributed to 350 construction companies of various grades in different areas in Muscat, Oman. 200 contractors responded to this survey which is 57% of the sampling frame. On the other hand, 300 clients responded, i.e. 67% of the whole sampling frame. The results were computed and analyzed by using Chi-square test, *t*-test, frequencies, ranking and percentage. The results of this study show that these companies generally take into account the principles of TQM. However, there are weaknesses in most of the TQM variables. This study also found that the grade four contractors face more obstacles and problems in implementing TQM principles as compared to other grades of contractors. It was also found that the productivity levels vary from one grade to another grade. This study deduces that i) schedule and cost, and ii) lack of education and training to drive the improvement are the key obstacles faced by construction companies in Oman. This study recommends one possible solution to solve these problems, i.e. to create awareness to quality management aspect by focusing on training and education of the players in the construction industry, especially in Oman. Finally, this study also found that most of the clients in Oman are not satisfied with the performance of grade one and grade three contractors in terms of quality in delivering their project. This study also offers recommendations for future research in the area of TQM, quality management and construction industry.

CHAPTER 1

INTRODUCTION

1.1. BACKGROUND OF THE STUDY

This study investigates the implementation of Total Quality Management in the construction industry in the Sultanate of Oman. The construction industry represents a significant factor in the comprehensive development of Oman and it performs an important element in the execution of its structural, production and service projects. Construction industry in Oman has played an important part in the establishment of urban progress and it has achieved significant in the last thirty years. The sector has particularly contributed into the development of Oman's infrastructure such as roads and bridges. It has also been instrumental in the development of residential buildings (Ministry of National Economic, Statistical Yearbook 2006).

As building projects get larger, customers or clients are also increasingly requesting better specifications and standards for their projects. Total quality management (TQM) has been introduced as a successful management concept in the service industries and manufacturing, however TQM can likewise be embraced in the construction industry to assist raise productivity, customer's satisfaction and quality (Ali, 1997). The advantages of practicing TQM include minimizing in quality costs, better employee work satisfaction because they do not need to attend to defects and client complaints, recognition by clients, work carried out correctly right from the start, subcontractors and suppliers with proper good quality management systems, and closer relationships with suppliers. TQM performance measures were also reflected through

supplier relationships, and process improvement and management, employee involvement and empowerment, top management commitment, customer satisfaction. (McAdam et. al., 2002)

The major aim of this study is to investigate the implementation and practices of the Total Quality Management concepts and principles in the construction projects in Oman.

1.2. PROBLEM STATEMENT

The construction industry in the Sultanate of Oman faces many problems and difficulties that affect the productivity of those companies due to the lack of understanding and awareness on quality management. Furthermore, there were problems in the quality of services provided to the clients (Tender Board, 2008).

In fact, those problems include defects, reconstruction, failures, delays, accidents and fatalities. Accidents during the construction process can similarly result in personal injuries, as the result, customer satisfaction index has been affected (Ministry of National Economic Statistic, 2008). As building projects get larger and more complex, clients do demand higher facilities, standards and quality for accomplishment of such tasks. In Oman, this scenario not only affects in raising the quality but also the productivity, employee's satisfaction and customer satisfaction. Hamood (2007) and Ministry of National Economic (2008) identify several problems in the construction industry in Oman that are related to quality. These include: 1) Problems inside the construction industry; 2) Problems related to the tenders & assignment; 3) Problems related to the consultants; 4) Problems related to the construction labours; 5) Problems related to the satisfaction of building clients; and 6) Problems related to others.

It seems clear that all of those factors emphasize the absence of a clear management policy for the development of quality in Oman (Hamood, 2007; Ministry of National Economic, 2008). However, the literature evidences that investigate the awareness of quality management among industry players in Oman; the practices and implementation of quality management among construction companies in Oman; and the level of effectiveness of quality management implementation in Oman seems to be scarce. The literature reviews reveal that previous researchers in this field in Oman emphasize mainly on quality control and quality assurance (Ali, 1997). Hence, it provides gap in the available literature studying successful implementation and practices of TQM among industry players in Oman. Therefore, it is clear that a scientific investigation to empirically investigate the awareness, understanding, practices and implementations of quality management among industry player in Oman seems necessary.

1.3. RESEARCH QUESTIONS

This study tries to answer the following research questions:

i) What is the current TQM implementation in Oman construction companies?

ii) What are the obstacles that construction companies face in implementing effective TQM practices?

iii) What are the quality factors that are critical to effective implementation of TQM and which factors impact site productivity?

iv) Do clients satisfy with the performance of contractors in Oman with regards to quality?

1.4 RESEARCH OBJECTIVES

The main objectives of this study are:

i) To investigate the current TQM implementation in Oman construction companies.

ii) To investigate the obstacles that construction companies face in implementing effective TQM practices.

iii) To identify the quality factors that are critical to effective implementation of TQM and which factors impact site productivity; and to provide possible solutions to overcome these problems.

iv) To identify the perceptions of clients towards the performance of contractors in Oman with regards to quality.

1.5 SCOPE OF RESEARCH

This research was conducted in Muscat, the capital of the Sultanate of Oman. Muscat was selected as the setting of the study due to the following reasons: 1) it is the center where the construction companies and contractors are located; 2) Muscat is the center of the population and building density; and 3) Most government ministries and the headquarters of the private sector are located in this area.

1.6 SIGNIFICANCE OF THE STUDY

There are research works in the available literature, studying the effect of quality management practices on business performance of companies (Chua *et al.*, 2003; Kamal *et al.*, 2004), however, research that specifically focuses on the

construction industry seems limited (Bossink, 2002). Therefore, studying the implementation of TQM among contractors in Oman has the potential to contribute: 1) to expanding the research in existing quality management area, 2) to encourage the awareness among contractors of the importance of the TQM, and 3) to expand the available literature in the construction industry in relation to TQM.

This study adopts the constructs from the TQM as the basis for the development of the instruments to measure the implementation of TQM practices of contractors in Oman. Therefore, this study will complement the existing development of quality management theory. Furthermore, the construct of the study has never been validated by previous research. Interestingly, this study had considered choosing contractors in Oman, which seem to be neglected by many researchers.

This study attempts to evaluate the current practices of TQM in Oman, therefore, this is the first attempt of its kind in the Sultanate of Oman that considers construction industry and its players. Ali (1997) further confirms that the growing interest in quality has reached the Middle East region due to globalization. It seems appropriate to investigate the implementation and practices of TQM for the benefit of the managers in the developing countries, especially in Oman where the need is confounded by a dire lack of total quality management information (Thiagarajan et al., 2001; Ali, 1997). Whether or not there are differences between previous findings and this study, in many ways the findings of this study will still contribute to the available knowledge on how contractors in Oman perceive the implementation of TQM that may enhance and improve their business performance.

1.7 RESEARCH LIMITATION

This study investigates the perceptions of the construction companies. The financial outcomes of TQM practices and implementations are not measured. The investigation was carried out on the sample of 200 certified organizations. The sample is restricted to contractors operating in Muscat only.

1.8 THESIS ORGANIZATION

Chapter One is the introduction of the dissertation. It covers the background of the study, statement of the problem, research questions, research objectives, limitation of the study, and significance of the study. Chapter Two presents the literature review on the construction industry in Oman. Chapter Three covers the theory of TQM. Reviews of implementation and practices of TQM in the construction industry and the development of theoretical framework are presented in Chapter Four. Chapter Five covers the methodology of the study. Chapter Six presents the analysis and findings, and finally, the conclusion and recommendations are presented in the last chapter.

CHAPTER 2

AN OVERVIEW OF OMAN AND THE CONSTRUCTION INDUSTRY IN OMAN

2.1. OVERVIEW

The objective of this study is to investigate the implementation of TQM in the construction industry in Oman. Therefore, this chapter concentrates on the issues that are related to construction industry. The first section reviews the overview of the Sultanate of Oman historically and geographically. It follows with the reviews the construction industry in Oman. The third section dwells briefly with the application of TQM and construction industry in Oman.

2.1.1. History of Oman

Oman's ancient civilization dates back at least 5,000 years, inhabited originally by fishing communities and hunter-gatherer societies. Archaeological digs continue to uncover and explore sites that shed light on the country's ancient history. Sumerian tablets refer to a country called Majan, thought to allude to Oman's ancient copper mines. Mazoun, another early name for Oman, is thought to refer to its plentiful water. The name of Oman is said from Arab tribes who migrated to its territory from the Uman region of Yemen. Many tribes settled in Oman from elsewhere, and modern Oman families can still trace their ancestral roots to other parts of Arabia today (Ministry of Information, 2005).

2.1.2 Area and Location

The Sultanate of Oman occupies the South Eastern corner of the Arabian Peninsula and is located between latitudes 16 40 and 26 20 north and longitudes 51 50 and 59 40 east. It has a coastal line extending almost 3165 kilometers, from the

Strait of Hormuz in the north to the borders of the Republic of Yemen, overlooking three seas; the Arabian Gulf, Gulf of Oman and the Arabian Sea. The Sultanate of Oman is bordered to western south by the Republic of Yemen and the west by the Kingdom of Saudi Arabia, and by the UAE to the north and west (Ministry of Information, 2005).

The total area of the Sultanate of Oman is 309.5 thousand square kilometers, and it is the third largest country in the Arabian Peninsula. There are elements that contribute to the promotion of the Sultanate of Oman. The main element is the petroleum. The daily production is about 738 barrels. This quantity contributes in promoting the national economy. Petroleum is the essential revenue of the Sultanate of Oman. The local production reached 13.709 billion (Riyals) and this amount covers the needs of the country and the promotion projects without deficit.

2.1.3 Climate

The country's climate is varied, with humid areas and a hot, dry desert interior with temperatures from 18^{O} Celsius to 44^{O} Celsius and the average rainfall ranges from 76mm to 102mm annually. Its highest mountains range to an altitude of just over 3,000 meters. Although rainfall is generally light and irregular, the southern Dhofar province catches the Indian Ocean monsoon rains, which fall between May and September. The monsoon season turns Dhofar into a lush, green paradise that draws thousands of Arab tourists fleeing Arabia's stifling summer heat Oman every year (Ministry of Information, 2005).

2.1.4. Administrative Region

According to the Ministry of Information (2005), as per Royal decree no. 6/91 sanctioning the administrative regions of Oman was issued on February 3, 1991, as a mended. The Sultanate of Oman is divided into nine main Administrative regions. These are:1) Muscat Governorate (Capital); 2) Al-Batina Region; 3) Musandam Governorate; 4) Dhahirah Region; 5) Dakhaliyah Region; 6) Sharqiyah Region; 7) Al-Wusta Region; 8) Dhofar Governorate; and 9) Al-Buraimi Governorate.

2.2. BUSINESS

2.2.1. Economy

Oman's economy is based on petroleum, since 1970 when Sultan Qaboos came to power; revenues of the state have been utilized to build roads, provide housing and electricity, expand irrigation, develop manufacturing and modernize the fishing industry. A majority of the population is engaged in subsistence farming though less than 1% of the land is currently under cultivation.

2.2.2. Workforce

The Sultan knew from very early in his reign that Oman needed skilled workers and foreign expertise but he acknowledged that Oman could not afford the armies of foreign workers who built the Kuwaiti and Saudi infrastructure. Thus, it is far more common to see Omanis in service jobs or doing manual work than it to see other gulf Arabs doing such jobs (Ministry of Information, 1999).

2.2.3. Industry

In 1995, the 2020 Vision Conference highlighted Oman's need to diversify its economy and to reduce its reliance on oil in future. Oman's sixth five – year plan (2006-2010) introduces economic strategies and policies to diversify the Sultanate's sources of revenue, developing new economic and service sectors. Manufacturing is a key sector to diversify Oman's economics base, reducing depending on oil, boosting exports and improving the trade. Industrial contribution to GDP has increased from 0.5 per cent in 1986 to 5.4 per cent in 2000 increasing its contribution to GDP from 11.5 million (Riyals) in 1986 to 401.5million (Riyals) in 2000 (Ministry of Information, 2002).

2.2.4. Oman 2020 – the vision of Oman's economic future

Oman's economic strategy is based on a series of five – year plans that set objectives for all government sectors. These plans were drafted by Oman's Development Council, later was renamed to the Ministry of National Economy. Economic planning demands joint input from government and non – government bodies and the Ministry of National Economy draws up the five – year development plans, after consulting other authorities. Oman 2020 outlines the Sultanate's development over twenty- five years to 2020. It responds to changes in the world economy, and to the way that the revolution in telecomm nations and information has transformed global production and services. Oman 2020 represents a dividing line between two stages of the Sultanate's economic and social development (Ministry of Information, 1999).

2.3. PUBLIC ESTABLISHMENT FOR INDUSTRIAL ESTATES

As part of the Sultanate's endeavors to diversify the sources of its national income, the government has attached great importance on the industrial sector, considering it the best way to achieve the long-term economic development goals and to diversify the national income sources. In order to activate this sector and to support it, the government has set up a number of industrial estates in various parts of Oman, within a time frame to keep pace with the economic and social developments being witnessed in the country.

The Public Establishment for industrial Estates was set up by the Royal decree No.4/93 with an insight: 1) to set up industrial estates as set out in the development plans; 2) to supervise the existing industrial estates; 3) to set up and develop general facilities and services such as electricity, water and gas supply networks; 4) to determine and distribute land plots; 5) to issue building permits for industrial estates, after ensuring that they meet the prescribed technical conditions; 6) to contribute in promoting the products of the industrial estates through exhibitions, publicity and advertisements; 7) to hold seminars and training programmes with the aim of spreading industrial awareness among the investors; and 8) to prepare industrial security and professional safety procedures and to monitor their implementation within the industrial estates (Ministry of Information, 1999).

2.3.1. Economic and Social Surveys

The directorate general of economic statistics carries out an annual survey of economic enterprises in Oman, building up accurate data to support national development. It compiles statistical information for National Audit to show the

market value of goods and services. Other information includes national and expatriate labour figures, GDP, average consumption, financial assets and liabilities, a breakdown of capital over the year and other data needed for effective economic and social planning (Ministry of Economic, 2007)

2.3.2 Oman Chamber of Commerce and Industry (OCCI)

Oman chamber of Commerce and Industry was established by Royal Decree in May 1973. It represents the private sector's interests, and contributes to development. OCCI has played as significant role in decision making on committees that represent the different economic sectors. The Sultanate has joined the World Trade Organization (WTO). The number of construction companies in the Sultanate of Oman is 14,926 in 2006. The fourth category presents 8,316 companies, the super category presents the fewest number as 274 companies.

Table 2.1 indicates the number of construction companies registered in the Chamber of Industry and Commerce in Muscat in 2007. There are five categories of contractors, i.e. Super, Category 1, Category 2, Category 3, and Category 4.

Table 2.1: Construction companies in Muscat (Year 2007)

GRADES	NO. OF CONSTRUCTION COMPANIES	% OF CONSTRUCTION COMPANIES
Super	93	5%
First	607	33%
Second	312	18%
Third	158	9%
Four	639	35%
Total	**1,8**09	**100%**

Source: Oman Chamber and Commercial Industry, Information Centre (2007)

According to the Ministry of Manpower (2005), the construction sector faces fundamental problems and hindrances such as worker's unexpected running away from work for several reasons. The financial reason is one among them, in addition to the dwelling reasons. The Ministry of Manpower (2005) further reveals that the number of fleeing workers reached 795 workers in 2005. In other sectors the fleeing workers are around 2,045, which is 38.9% of the total workforce. The number presents a critical problem and has its own impact on productivity.

2.3.3 Planning and Housing

Oman has launched medium – (five years) and long term (ten years) plans to develop the Sultanate's regions, provide services to outlying villages and limit migration to the major cities. In 2001, the government earmarked 24,958 plots of land across the country: between 1996 and 2000 it provided 125,094 plots, distributed according to rules on eligibility for government land. In 2001, officials distributed 8,310 plots of land. Between 1996 -2000, 57,099 plots were distributed.

Oman operates three social housing programs, each targeting to different income groups. The social housing programs aim to provide home that suit their local areas, for average sized Omani families (Ministry of Economic, 2007).

2.3.4 The Environment

According to the Ministry of Economic (2007), the Sultanate of Oman has won regional and international recognition for its commitment to conservation and protecting the environment. The United Nations Environmental programme has hailed Oman as a country with an enviable record in conservation and pollution

control. Oman introduced environmental protection laws in 1974. In May 1984, it became the first Arab country to create a ministry to handle of environmental issues, i.e. the Ministry of Regional Municipalities, Environmental and Water Resources. The Sultanate celebrates national Environment Day in every January of the calendar year, and further declared the 2001 and 2002 as years of the Environment (Ministry of Economic, 2007)

2.3.5 Health Services

According to Ministry of Information (1999), since 1970, Oman's health services have expanded enormously, delivering huge improvements in the standard of health care. Today, Omani citizens receive excellent service from an efficient, integrated health system that has been praised by international bodies including the World Health Organization (WHO), UNICEF and United Nations Development Fund. The WHO report for the year 2000 named the Sultanate of Oman as the country that had achieved the greatest progress in improving health standards, and ranked Oman eighth in terms of overall health care.

2.3.6 Quality Control

According to the Ministry of Information (1999), the Ministry of Commerce and Industry believes that specifications, standards and quality control play a role in industrial and economic development. Ministerial Decision 130/2001 introduced the Omani Mark of Quality, creating provisions for granting the Omani Mark of Quality to industrial commodities. The mark is an indication of quality, proving that the product conforms to appropriate standard specifications, boosting consumer confidence. It encourages consumers to buy Omani products bearing the mark and

helps to compete against products that cannot prove their conformity to standard specifications. Companies apply to the ministry's directorate general of specifications and standards for permission to use the mark on products that conform to standard specifications.

2.4. MUSCAT AND THE MUSCAT MUNICIPALITY

2.4.1. History of Muscat

According to the Ministry of Information (2007), archaeological evidence suggests that man, from the dawn of history, settled in the Muscat area. A site excavated in the Wattayah, district of Muscat. In 1981, it was estimated to be 9,615 years old, indicating that man had lived in this region since the first Stone Age.

The Ministry of Information (2007) further reveals that subsequent excavations showed that man in the Bronze Age inhabited the area, while the archaeological remains in the Ras Al Hamra, district of Muscat indicated that the inhabitants in the 3rd century BC were fishermen with a highly developed lifestyle. Other districts of Muscat such as Bausher are also rich in archeologically sites. For many centuries Muscat has been renowned throughout the world for its maritime trade. However, the history of Muscat actually goes back to several centuries before the rise of Islam.

In 1507, the Portuguese arrived in this region and occupied some of the coastal areas of Oman. They clearly realized that possession of the straits of Hormuz and Muscat meant the control of the Arabian Gulf and trade between the Arabian Peninsular and Persia, Iraq and Syria as well as between Europe and India. They, therefore,

constructed well-structured forts and defenses in Muscat. They were finally driven out of Muscat and Omani in the 1650.

Muscat extended for half a mile between Fort Mirani and Fort Jalali and was bounded by a wall whose gates were locked at sunset following the firing of the warning cannon shot. This practice continued till recent times. The streets of Muscat were about 10 feet wide and covered with palm fronds for protection from the heat (Ministry of Information, 2007)

All this was in the past, to 1970. With the throne of His Majesty Sultan Qaboos, the face of Muscat changed rapid development and expansion of the city took place and the city grew in extent by leaps and bound. A cursory comparison of the old and new buildings shows the extent of change. However, all efforts are made to retain selected old structures for their architectural value and link with the past.

2.4.2. Muscat Municipality

The Municipality plays a multiplicity of roles, some extending beyond the traditional duties of similar bodies in other countries. With a field of activity spanning healthcare, public services, the Municipality is deeply involved in services, culture, the Municipality is deeply involved in servicing the Muscat region. Muscat Municipality also undertakes five-year development projects in cooperation with other governmental Ministries and departments.

3.4.3. Directorates

Muscat grew rapidly, prompting a degree of decentralization in the municipality to ensure adequate and efficient service to the public. Accordingly, Royal decrees 76/84 and 103/84 were issued in 1984. These decree divided the municipality into administrative areas and defined the powers and responsibilities of these divisions, which were called Directorates General and identified by the name of the respective area. These Directorates are set out as: 1) Directorate General of Muscat Municipality at Greater Mutrah; 2) Directorate General of Muscat Municipality at Seeb; 3) Directorate General of Muscat Municipality at Bausher; 4) Directorate General of Muscat Municipality at Al Amerat; and 5) Directorate General of Muscat Municipality at Quriyat.

All the Area Directorates Generals had the same organizational structures and functions. However, the area of responsibility (size), the density of population and the degree of development varied.

2.4.4. Muscat Municipality and the Building Regulation

According to Muscat Municipality (2006), as mentioned before Muscat Municipality is supervising the construction projects in Muscat, and some of Building Regulation that applied in Muscat are set out below :-

a) Approved shall obtained from the municipality before a building is constructed, additions to it are made demolished totally or in part or have external or internal alterations, changed in style, leveled or have a door or window opened. Colors of paintings approved by the Municipality shall be adhered to when the building is painted or re- painted.

b) Before starting any construction work, organic and botanical materials, if any, shall be removed from the construction site and replaced if necessary, materials shall be approved by the building authorities. The site shall also be treated with insecticides for protection against termites and other insects.

c) The percentage of covered area differs from one area to another depending on the condition of each area and the type of buildings. Hence, it is not allowed to exceed the percentage set by the Authority for each area according to its detailed plans. (Muscat Municipality, local order No. 23/92, Building Regulation For Muscat)

2.5 THE CONSTRUCTION INDUSTRY AND BUILDING SECTOR IN OMAN

According to OCCI (2007), the Sultanate of Oman has experienced a massive development programme, which started from scratch. This development process has been accomplished in a record time. Both the government and the private sector participated equally in the development process. Playing a leading role since the early stages of development, this sector has almost constructed the new infrastructure of the sultanate, which comprises paved roads, housing complexes and other buildings, electrical networks, government premises and many other structures.

The construction and building sector started with 502 companies in 1975, and this number increased to 2,896 in 1980. It was doubled by 1986 and by the end of 1989, the number of these companies came up to 5,259. Seventy per cent of the construction companies and industry, with a capital of not exceeding 25,000 (Riyals) Twelve per cent of the construction companies are in Class 3 with capital not exceeding 50,000 (Riyals), followed by 8% in Class 2 with a capital not exceeding

250,000 (Riyals), and the rest 3% are classified as Super grade companies with capital exceeding 250,000 (Riyals).

The GDP share of the construction companies was 88.5 million (Riyals) in 1976. This figure jumped to 144.9 million (Riyals) in 1981 and then to 242.2 million (Riyals). In 1985, due to economic recession in the whole area and the effects of the low prices of crude oil, which resulted into a severe reduction in the government expenditure, the share of the construction sector in the GDP fell to 106 million (Riyals). However, in the year 1989 it began to recover again and by the year 2004 it reached 128.8 million (Riyals) (Oman Chamber of Commerce and Industry, 1991).

The construction sector engaged 21% to 30% of the foreign workforce in the private sector. At the end of the second development plan in 1985, the number of workers in the construction sector was to 67,271 and in 2004 it jumped to 81,228 (OCCI, 2007)

The Omani Chamber of Industry and Commerce (OCCI, 2007) classifies the companies into categories on the basis of its capital. The reason is to distinguish between the big companies and the small ones. The objective is to make it easy for the project owner to choose among these companies.

2.6. TOTAL QUALITY MANAGEMENT PRACTICES IN OMAN'S CONSTRUCTION INDUSTRY

This study intends to identify the TQM practices by construction industry players in Oman; and secondly, to evaluate and report the existing level of use of these management practices in construction companies in Oman. The construction industry in Oman has lagged behind other industries in implementing reform through

TQM. The success of the TQM philosophy in manufacturing and other industries is forcing Omani construction organizations to adopt TQM (Ministry of National Economic, 2006)

The construction industry of any country is the backbone of its infrastructure and economy. Though it is a major sector and contributor to the economy of any country, it faces the problems of high fragmentation, poor quality, lack of standards low productivity and dissatisfaction from client's side. Furthermore, the construction in Oman has lagged behind other industries in implementing TQM. The main reason is the perception that TQM is for manufacturing and service industries only.

2.6.1 The Common Pitfalls for Successful TQM among Companies in Oman

According to Lahndt (1999), the transformation from existing level to a better quality level is not without its pitfalls. Many companies in Oman have started on the road to quality but failed to achieve success due to several factors: 1) commitment; 2) lack of measuring success; 3) incoming materials not tested; 4) lack of top and middle management support; 5) failure to provide statistical training for employees; 6) lack of technology and computers; and 7) lack of funds.

2.6.2 Quality, Productivity and Performance in Construction Industry in Oman

No organization is operating in the construction industry, whether large, medium or small, public or private, can afford to ignore this changing environments in the techniques, methods and principles if it is to survive. Lahndt (1999) stresses

that since last twenty years the construction industry in Oman has been criticized for its productivity and performance. With new millennium, it would appear that the construction industry is going through an intense period of introspection, Moreover, such changes significantly affect the way the construction companies conduct their business.

2.6.3 TQM implementation in the construction industry in Oman

Quality and productivity improvement implementation in the building and construction industry is a relatively new field of interest, especially in Oman. In other countries (e.g. USA, Australia, Canada, Japan, and Europe) attempts have been made to implement TQM practices in the building and construction industry, mostly relying on the ISO 9000 and 14000 standards. According to Kuprenas & Kenney (1998), most of the research concentrates on: 1) reasons for TQM implementation in the building and construction industry, 2) methods of TQM implementation in construction industry; and 3) effects of TQM implementation in construction industry.

2.6.4 Reasons for TQM implementation in Construction Industry in Oman

Many researchers argue that TQM could be a solution for many obstacles and problems such productivity, cost, health and safety that construction industry is facing. As Kim et al (1995) addressed that the application of TQM leads to better construction products. Furthermore, Oakland and Aldridge (1995) recommended the industry players in construction industry to take up the concept of TQM.

Kuprenas & Kenney (1998) conducted a study regarding the significance of TQM implementations in engineering and construction industry. They found that the overall motivation for implementing TQM stayed basically the same over a period of three years, and that most organizations agreed that TQM is a good practice. The effectiveness of implementing TQM, however, did vary substantially between companies over the three years. Some of the organizations totally abandoned their TQM implementations; while the other side achieved good achievements. Oakland and Aldridge (1995) pointed out that an important part of research agenda in Oman will develop a coherent set of methods, principles, and tools that can help companies in their effort to improve quality, customer satisfaction, productivity, environment as well as health and safety over time.

2.6.5 Methods of TQM Implementation in Construction Industry in Oman

Most of the researchers concluded that it is necessary to transform the principles, practices and techniques used for TQM in manufacturing to construction industry (Formoso et. al., 1999; Lahndt, 1999; Soares et. al., 1997; McCabe, 1996). Lahndt (1999) concludes that TQM tools have been used widely and beneficially in the areas of manufacturing to control process and prevent damages and defects before they happen. The construction industry in Oman needs the same type of tools and for the same reasons, but due to the dissimilarity industries; it cannot be applied as they are. Some of methods are based on simple well-known quality techniques for problem identification, analysis and solving, such as flowchart, brainstorming, checklist and Pareto diagram.

Others researchers tried to tie a TQM approach to other existing management systems, such as project-management, partnership, Quality-Assurance Plan (QAP), Quality Function Deployment (QFD), Jobsite Quality Planning (JQP) and/or to the ISO 9000 and 14000 standards, with mixed results (Abdulaziz et. al., 1999; Gamsby et. al., 1996; Phenol, 1994). The TQM implementation in the building and construction industry in Oman is not an easy matter. One of the reasons is "the transient nature" of building and construction, the lack of standardization and the many parties (occupations, professions and organizations) involved. Another reason is the unique nature of the construction industry (Oakland and Aldridge, 1995). Therefore, this study intends to highlight the significant importance of TQM practices.

2.7 THE GROWTH OF CONSTRUCTION INDUSTRY IN OMAN AND TQM IMPLEMENTATION

The implementation of TQM principles, practices and techniques has the potential not only to benefit quality and productivity, but also occupational safety and health. More research is needed to study TQM in the building and construction industry, and how safety can be integrated in TQM. The building and construction industry could benefit tremendously from lessons learned in other branches of industry and in other countries. However, it has become clear that it will not be easy to implement TQM in construction industry. Special tools and techniques need to be developed.

In some countries, the TQM culture is widely spread and applied to many productive sectors. The integration of some components of the different management systems

allows achieving good results also in the construction sector, in particular for procurement, design, construction and maintenance activities.

The Sultanate of Oman is growing leaps and bounds under the vision of His Majesty Sultan Qaboos that provides ground for the growth of the construction industry. The growth of the construction industry can be divided into four stages, viz. the period of 80's, the 90's, the present and the future.

a) The Period of 80's

The country started infra structure development during the period of the 80's. This period saw development of the road, ports and buildings. This wide range opportunities presented by the market were seized by international organizations. The initial construction activity during this period was mainly attributed to the achievement of completion date with contractors handing over the work to clients on time and reaping huge profits. As the main focus of the industry was on completing the projects on time the quality aspect of a particular work was not concentrated upon.

The later half of the period saw wide spread looks out for quality in an on going project as well as in a completed project, hence the shift of focus from timely completion to quality management was scripted. The key players in the market started developing quality departments and these departments were responsible for maintaining the quality to the required standards of the clients. The government laid focus on quality of the project through