

An-Najah National University

Faculty of Graduate Studies

**Framework for Implementing Quality Management in West
Bank Construction Projects**

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**This Thesis is Submitted in Partial Fulfillment of the Requirements for
the Degree of Master of Engineering Management, Faculty of
Graduate Studies, An-Najah National University, Nablus-Palestine.**

2014

DEDICATION

To those who give of themselves so that others may live.

To the lovely memory of my mother

To my special brother for his unlimited support

To my family...

To all who are loved & important memories in my life

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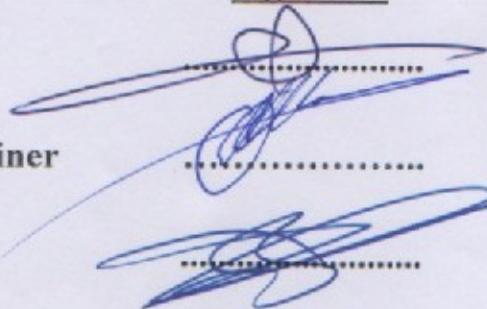
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DEDICATION

To those who give of themselves so that others may live.

To the lovely memory of my mother

To my special brother for his unlimited support

To my family....

To all who are being constant memories in my life

To all of my colleagues and friends for their help and support.

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انا الموقع أدناه مقدم رسالة تحت عنوان :

Framework for Implementing Quality Management in West Bank Construction Projects

اطار عمل لتطبيق ادارة الجودة في المشاريع الانشائية في الضفة الغربية

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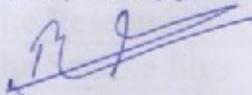
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Date: 14/9/2014

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List of Abbreviations

TQM	Total Quality Management
QM	Quality Management
GDP	Gross Domestic Product
GNP	Gross National Product
KPIs	Key Performance Indicators
PCBS	Palestinian Central Bureau of Statistics
PCU	Palestinian Contractors Union
SPSS	Statistical Package for Social Science
W.B	West Bank
C.P	Construction Projects
NGOs	Non-Government Organizations
USAID	United States Agency for International Development
IPMA	International Project Management Association
PMI	Project Management Institute
PMBOK	A guide to the Project Management Body of Knowledge

Framework for Implementing Quality Management in construction projects in West Bank

By

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Abstract

Firms world-wide are actively engaged to achieve internationally accepted quality levels to ensure their position in the emerging international market especially those from developing economies. Unfortunately the construction industry, generally, has lagged behind other industries in implementing Total Quality Management (TQM) which provides excellence in customer satisfaction through continuous improvements of products, processes or services. The main reason for construction lagging has been the perception that TQM is for manufacturing and service sectors rather than the construction sector. The objective of this research is to study the implementation of quality management of construction projects in West Bank. Construction sector is considered as a vital sector in today's economy, due to the development in construction which is taking place in the world in general and the West Bank. A survey of 300 contracting companies registered in the Palestinian Contracting Union (PCU) was conducted to establish the current quality management practices and managers perception of factors required for a successful implementation of TQM. The data is analyzed using descriptive Statistics especially in SPSS. The results indicate that the major problems affecting implementation of QM program are lack of skills, knowledge/resources in QM, changing the

behavior and attitude, lack of education and training to drive the improvement process, lack of employee commitment/understanding, and lack of top-management commitment. The results indicate that the most important benefits for implementing a quality system in the construction projects in West Bank is to keep improving the performance, develop the firm image and being a qualified competitor –market position-, and attain and sustain the competitive advantage. Depending on the distributed questionnaire, a framework was developed to facilitate the successful implementation of TQM in construction projects in West Bank.

Chapter 1

Introduction

1.1 Overview

Attainment of acceptable levels of quality in the construction industry has long been a problem. Great expenditures of time, money and resources, both human and material, are wasted each year because of inefficient or non-existent quality management procedures especially in construction projects (Arditi and Gunaydin, 1997).

On the other hand, global wise, the construction industry as an economic sector plays a major, significant role in developing and achieving the goals of society as all. Construction is one of the largest industries which contribute around 10% of the Gross National Product (GNP) in industrialized countries (Navon, 2005). Many criticisms have been pointed to the construction as an industry. These projects are being showed as one with low quality level compared to other sectors like the manufacturing and service sectors.

But we have to keep in mind that the quality issues in construction management are not an easy task because this industry has numerous problems represented in its complicated nature of operation, major and minor activities and this industry is comprised of a multitude of professions and organizations. which are involved in the different phases of a construction (Arditi and Gunaydin, 1997).

All the stakeholders, client, consultants, contractor and sub-contractors of a construction project all have a role to play in delivering a quality project. Failure of any of the parties will seriously affect the quality of the final project, so in this case the quality is everyone responsibility. Generally speaking, one can say that the construction industry is also characterized by its non-standardization. Productions processes are to some extent alter from one project to another even in the same characteristics but the location of the project and the site is different.

Hence, the final product couldn't be projected to any universal standard or specification, which leads to problems in quality assurance. Furthermore there are excessive deviation to the details between design of a project and the construction process. The main reason for this deviation attributed to the lack of build-ability of the design as drawings and specifications. This considered the main cause for wide-spread perception about the differences between the design and the construction phase (El-Sawah, 1998).

In the same context, we have to recognize that the construction management comprises three phases which are the planning and design phase, the construction phase and the operation and maintenance phase. This will lead to the coordination and integration need as a vital concept to deliver this mission successfully. All the aforementioned discussion can considered as a generally, globally applicable information, the same situation is applicable in Palestine.

In Palestine, construction projects can provide a robust platform for refreshing the economy and for building a stable and autonomous economy during steady political conditions. In 1993, neglect of such systems, services, and institutions, however, has harmed the quality of life of Palestinians and their health and environment. But, after Oslo agreement we can assume a period in which the Palestinian authority was formed and seed for stable economy were merged, that positively impacted the construction sector (Osaily, 2010).

However, project performance in Palestine return to suffering since conflict erupted in September 2000 after the collapse in Israel-Palestinian negotiation on permanent-status issues, in addition to the Jewish breaking in to Al-Aqsa mosque. This has led to closures and tight restrictions on movement of people and goods in West Bank and Gaza resulting in a dramatic and devastating decline in trade, investment, and employment due to the turmoil condition, and that had a negative impact on the construction project. In addition this has prevented the planned implementation and has caused problems in performance of projects (World Bank, 2004).

To be fair it should be noted that the political condition is not the only reason that inhibit the construction industry, and prevent it of being a prosperous sector. There are other different factors affecting construction projects performance in Palestine such as poor management and leadership; lack of top management commitment; inappropriate participants; poor relations and coordination; lack of convenience communication system;

absence of motivation, control, monitor or decision making systems; lack of management information system; inadequate infrastructure, political problems; cultural problems and economic conditions.

As a transient assessment for the project management triangle (cost, time and quality), and their perception in Palestine we can realize that due to cultural antecedents in Palestine the most common criterion for winning a bid is the lowest price, and there is a prevalent perception that as much as the timeframe of the construction project is small that will positively impact the profit of the firm, even if that possibly harm the quality issues. Unfortunately, according to the aforementioned attitudes in this sector, the quality issues to some extent is marginalized and neglected.

Even with the aforementioned ranking, it is still highly noticeable that Construction projects performance difficulties appear in many perspectives. There are many construction endeavors fail in time performance, others fail in cost performance and others fail in other key performance indicators (KPI's) especially quality indicators. The main objective of project management is to address the stakeholder needs, expectations and go further beyond their expectations; thus, dissatisfactions of a project's stakeholders lead to extra, or at least difficulties time and cost, so the importance of quality management is appear in project management as a vital tool to reach the desired output (Osaily, 2010).

In this study, barriers and benefits of implementing quality management in construction projects will be analyzed. Find out how that

can affect performance in construction projects. The results can then be used for benchmarking purposes, and will be a key component of any organization's move towards achieving best practice in order to overcome performance problem.

1.2 Project Management

Today organizations are competing with each other to produce high quality output with the minimum budget and be delivered at the right time; the most appropriate way to achieve this is using project management.

Project management, is the application of knowledge, skills and techniques to execute projects effectively within time, cost, and quality, which are called the project management triangle. It is a strategic advantage for organizations, enhancing them to tie project results to business objectives — and thus, enable compete in their markets and develop the market share (Project Management Institute, 2000). According to Kerzner (2006), project management “Project management is the planning, organizing, directing, and controlling of company resources for a relatively short-term objective that has been established to complete specific goals, or objectives”.

Project management has a vital role to play in complex organizations, where several projects may be in play at the same time, requiring similar resources. According to the project management institute, there is a noticeable percent of the projects failure. The project can fail

from a process stand point (initiation, planning, executing, controlling, or closing), or they can fail due to a weakness in the project dynamics (scope, time, cost management, quality management, human resource management, communication or risk) (Project Management Institute, 2000).

Long time ago in ancient civilizations, building great buildings that represent the nation and the civilization culture and tradition had great importance, such as the great projects of the Romans, and the Egyptian pyramids. , Those complex works needed sophisticated and effective management due to its massiveness. This shows that the science of project management was known long time ago and was practiced in different ways, but not with the dependency that practiced these days.

It also shows that effective management and construction techniques can produce excellent and long-lasting results, simply if you spend too much of money and effort and time on a project, you will not let results determined by chance. However, in those eras, little attention was paid to those people who finished this work, they were given insufficient consideration than they deserve, in spite of the huge effort they deliver it to such great historical statue. But, recently, in the late 19th century, because of the rising complexities of the construction business, these projects involve thousands of labors, too much of tools and equipment, millions spending over such projects, management principles began to evolve more effectively.

Big projects involved huge quantities of materials, machinery and equipment. We began from that time to see project management implemented by engineers and architects themselves. An engineering projects managements firm specialized with the management starts to emerge. In 1967 the International Project Management Association (IPMA) was established in Europe as a federation of several national project management associations, (Ahuha et al., 1994).

The Project Management Institute (PMI), founded in the U.S. in 1969, publishes the PMPOK Guide, (A guide to the Project Management Body of Knowledge), which describes the most common project management practices and gives certification in PM Field (Project Management Institute, 2000). Project management is really important when the project faces changes, either these changes are internal or external, and when we need to make alternative solutions or implement contingency plans, especially in argent cases in which the manager can't keep the original plan.

This is especially true in Palestine, which suffers from a considerable instability in political, economic, or even the cultural condition; project managers face many challenges and must always be creative and flexible in order to deal with difficult and sometimes unforeseen circumstances. Project management is an essential philosophy to attain and sustain the competitive advantages in these days, since it is an approach that attains the

required quality and performance to satisfy the customer, in a reasonable cost and within a deterministic time schedule.

1.3 Quality Management in Project Management

Reaching acceptable levels of quality in the construction industry has long been a problem rather than an easy task. Great expenditures of time, money and resources, both human and material, are wasted each year because of inefficient or non-existent quality management policies especially in construction projects (Arditi and Gunaydin, 1997).

Many criticisms have been pointed to the construction as an industry. These projects are being showed as one with low quality level compared to other sectors like the manufacturing and service sectors. Companies in the construction industry provide infrastructure for the economy and constitute an important backbone of many economies, yet they face problems of instability, low productivity, poor quality and lack of standards, in the face of high fragmentation in the industry. Total Quality Management provides an effective approach to prevent or reduce these problems and provide higher quality services and products. Its management and control processes are designed to focus on the entire organization and all of the employees in providing products or services that satisfy the customers (Sommerville, 1994).

The potential benefits offered by Quality Management techniques are varied and the consensus from various studies is that it has been

successfully applied in other industries and can be very beneficial in the construction industry (Sommerville, 1994). The application of quality management programs assist companies to improve long-term relationships, process and product development, create a harmonious, consistent team spirit, more customer focused, employee job satisfaction, increased revenues, reduction in quality costs, decreasing waste and rework, better coordination of activities, improved customer service and market competitiveness, enhance professionalism and skills in all spheres of the construction sector (Schultzel and Unruh, 1996).

1.4 Statement of the problem

Generally, every business customer no matter of his/her profession would like to receive the final product according to the predefined, stated standards. Although these requirements may deviate depending on the nature of final product, they represent the client's issues. Therefore, contractors are responsible for doing their best to conform these requirements according to the tenders, design of their projects, otherwise, it will be considered as a breach of contract (Arditi and Gunaydin, 1997).

To do so, solve the problem of quality issues in the construction industry, and satisfy the customer's needs, the Total Quality Management (TQM) is highly being used as a vital tool to achieve this goal, and achieve the required standards and specifications. The quality management is viewed as a branch of the project management, so it should be highly considered and studied as a main tool for achieving the desired output of the whole

project management to make any noticeable saving in time, cost and exceeding the customer satisfaction.

As a part from the context, construction project in Palestine confront a tremendous challenges regarding the quality aspects. Therefore, this research will evaluate the factors affecting the performance of construction projects in Palestine, either the barriers or the benefits of developing and adopting a holistic approach of quality system, to overcome the problems that facing the construction projects and improve the overall performance of the whole process. Hence, performance of any construction projects can be evaluated according to key performance indicators, cost, time and quality that we are concerning about.

1.5 Justification

As we mentioned previously that, Many criticisms have been pointed to the construction as an industry. These projects are being showed as one with low quality level compared to other sectors like the manufacturing and service sectors.

and even that there are a special characteristics for the construction sector we can deal with as an excuses rather than characteristics such as complicated nature of operation (Kanji and Wong, 1998). This industry is contained a multitude of professions, occupations, positions and organizations (Sommerville, 1994). They are involved in the different stages of a construction project, including: feasibility, development,

finance, concept development and review, estimate, detailed engineering, procurement, construction and start-up (Schultzel and Unruh, 1996).

Another characteristic for this industry, that there are no constant standards that you can follow at every project; each project has its unique procedures that will not be applicable at the next project. This issue can be figured out through the project definition, according to the PMI the project is a series of activities that had a starting and due date and every project is unique.

This study will identify the barriers and the benefits of adopting such system to overcome the problem in construction practice and improving the overall performance.

1.6 Research Questions

This study will respond to the following major questions:

Q1. What are the linkages between the underlying dimensions of total project management and construction organization performance?

Q2. What is the current contractors' perception of implementing quality management in construction project in West Bank?

Q3. What are the main factors that affect the contractors' perception of implementing quality management in construction projects in West Bank?

1.7 Research Objectives

The main aim of this research can be broken down into the following objectives:

1. To investigate the relationship between total quality management practice and the performance of construction organization.
2. To develop a theoretical project management framework to facilitate the implementation of quality management through the construction projects in West Bank.

1.8 Constraints and Challenges

They are many constraints and barriers that faced the researcher during the conduction of the research. The most important barrier was the contractor's unconcern to present their opinions in such subjects. A large number of them showed lack of cooperation and they delegated the answers to office engineers. Although the researcher explained first the aim of the research, they were asked if they can present needed information, a few number of contractors replied easily and fast without a continuous reminding from the researcher.

When contractors agreed to participate and showed interest in the subject of the research, they were given a copy of the questionnaire to answer it, within two weeks to take their time in understanding the questions and answering them. After two weeks, the researcher phoned

contractors to remind them to finish preparing questionnaires in order to be collected. Some of contractors answered that they can't reply because they don't have enough time, others lost it, others will answer it soon, and others are not interested. The researcher sent the questionnaire times and times, phoned most contractors two, three and four times, and visited some of them more than once, every time she had a new argument, until the researcher succeeded at last to collect a suitable number of responses.

1.9 Thesis Structure

This thesis is organized as follows; Chapter Two presents a historical review from previous studies to identify the main barriers and benefits of developing and adopting a quality management system in the construction projects. Chapter Three discusses the main methodologies used in previous studies and the methodology adopted in this research to achieve the required goals. Chapter Four shows analysis, description and discussion of research results. Finally, Chapter Five presents conclusions and future research directions for this thesis.

Chapter 2

Literature Review

In this chapter, we will review the previous studies regarding the quality management in construction projects; we will attempt to illustrate the quality definition from different perspectives, reviewing the previous studies regarding our topic to be familiar with the previous results that other researchers had reached.

Another section will discuss the main difference between the quality assurance and the quality control, some models representing the quality management in construction projects will be discussed, the cost of quality and the role it act, as an improvement tool to reach a better performance level in the construction projects will be presented. Finally the main factors the affecting quality management in construction projects will be discussed.

2.1 Introduction

Quality is perceived differently by various people and various sectors. Yet, everyone understands what is meant by “quality” by the way that s/he interested in. In manufacturing sector, the customer as a user recognizes the quality of fit, finish, appearance, how does it look like, function, and performance. The quality of service maybe rated based on the degree of satisfaction by the customer receiving the service, for example the time required for satisfying that service, or the level of the customer service,

maybe, the same service perceived bad by one customer perceived excellent by the other. The relevant dictionary meaning of quality is “the degree of excellence.”

However, this definition is relative in nature; in other words, it can vary among different people and different sectors (manufacturing, services or construction sector). The ultimate test in this evaluation process lies with the consumer. The voice of customer must be heard, the customer’s needs must be translated into measurable characteristics in a product or service

Once the specifications and the standards are developed, different methods and techniques to measure and monitor the characteristics of the construction project need to be found. This provides the basis for continuous improvement in the product or service; this is the same concept of Deming's cycle, which is (PDCA) plan, do, check and act which we will discuss later. The ultimate aim is to ensure that the customer will be satisfied to pay for the product or service, because; the only concern for a firm or a company is the profit and revenue. This should result in a reasonable profit margin for the producer or the service provider.

So relationship with a customer is a lasting one, if not, the customer turn over average will increase due to the bad service, customer dissatisfaction, bad reputation for the company, even the customer who has prior a bad experience with the company will communicate his/her experiment with others, so we should not underestimate the word of mouth

weight or value. The reliability of a product plays an important role in developing this relationship.

In this chapter; we will highlight the way to implement quality management in construction projects in West Bank, as an important tool for achieving the desired outcomes of the projects, and as a crucial component rather than an inferior part after cost, and time.

2.2 Quality definition

There is more than one definition for quality, in each sector different definition for this concept can be used. In other words, the definitions of quality are abounding. For many years there have been attempts to define the meaning of this concept "quality", often in general terms, we attribute that to the diversity of purposes of this explanation, each side can show its point of view, some definitions result from authoritative documentation, while others express experiences, opinions, and conjecture.

The British Standard Institution defines quality as "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated and applied needs" (McCabe, 1998). Another definition is "fitness for purpose/use". This definition is driven by customer satisfaction, and has become the principal definition of quality in manufacturing and service industry, (El-Sawah, 1998).

There is a definition for quality concerned about comparing the product characteristics and process control within the design requirements or

tolerance edges which is “uniformity of the product characteristics or delivery of a service around a nominal or target value” (El-Sawah, 1998). A guide to the project management says that project quality management is a part, or small group of project management that includes the process required to insure that the project will meet the goals for which it was undertaken. It consists of stages which is quality planning, quality assurance and quality control (PMI, 2000). We can define Quality system as “organizational structures, procedures, processes and resources for implementing quality management, (McCabe, 1998).

Quality can be defined as satisfying the functional, aesthetic and legal requirements of a project. Requirements may be easy or hard to achieve, or they may be stated in terms of the end results required or as a detailed description of what is to be done. But, however expressed, quality is if the stated requirements are satisfy, and if the completed project meets the needs, so, quality is inversely proportional to variability (Arditi and Gunaydin, 1997).

Some design professionals stated that, quality is measured by the aesthetics of the facilities they design (Stasiowski and Burstein, 1994). Quality can also be defined from the view point of function, by how closely the project meets to its objectives. Using this definition, a high quality project can be showed by such terms as easy dealing with, understanding drawings, level of conflict in drawings and specifications in the tenders documents, economics of construction, ease of operation and build, ease of

maintenance, and energy efficiency. Quality is measured by the aesthetics of the facilities they design (Stasiowski and Burstein, 1994).

As every aspect of science has its own leaders, champions and gurus, the same is for the quality sectors; later in this section we will mention how these leaders perceive the quality concept. Quality guru Crosby states that Quality is conformance to requirements (Chandrupatla, 2009). The preceding definition needs the specifications and requirements to be already established. The next thing to look for is how much the product is matching to these requirements. Another frequently used definition comes from Juran, quality is fitness for use (Chandrupatla, 2009). This definition concentrates the value of the customer who will use the product.

W. Edwards Deming defined quality as good quality means a expectable degree of uniformity and dependability with a quality standard that satisfy the customer (Chandrupatla, 2009). The supporting philosophy of all meanings is uniform in which consistency and conformance to specifications and performance, and keeping the customer in mind.

One more definition that is widely spread for quality is the degree to which performance meets expectations (Chandrupatla, 2009). This definition supports a means to assess quality using a relative measure. The definition is used by the American Society for Quality (ASQ), quality denotes an excellence in goods and services, and particularly to the degree they meet the requirements and satisfy client.

One important definition for quality should be mentioned in this manner which is quality is proportional to variability, in other words, as the quality increased the variability will be decreased (Montgomery et al., 2011).

2.3 Previous Studies

The literature is plentiful with definitions of quality management. Basically quality management is a managerial philosophy which aims to achieve organizations main targets using all sources including employees. The main objective of QM is satisfying the customers both internal and external. In fact QM is a holistic and organization-wide approach that introduces a cultural change to the organization in order to improve the quality of products and services, manage the production time, cut down the costs, and finally meet the customers' priorities.

Many criticisms have been pointed to the construction as an industry. These projects are being showed as one with low quality level compared to other sectors like the manufacturing and service sectors. (Kubal, 1994; Kanji and Wong, 1998; Wong and Fung, 1999). Total quality management (TQM) is increasingly being used by construction firms as an initiative to solve quality problems in the construction industry and to meet the needs of the client On an ongoing basis (Fung and Wong, 1995; Jido 1996; Kanji and Wong, 1998; Sommerville, 1994; Wong and Fung, 1999).

Several researchers (Miguel and Pontel, 2004; Schiffauerova and Thomson, 2006) stated that many companies realize the necessity of the quality cost system; however, they keep to miss such system. So, the firms are not able to appreciate how much they lose due to poor quality (Schiffauerova and Thomson, 2006). This shows a real gap between existing theory and practical application regarding quality management.

TQM has the power to develop business implications, better client orientation and satisfaction, worker involvement and affiliation, team working and better management of workers within departments. Anyway, construction firms have been continually struggling with its installation (Haupt and Whiteman, 2004). The installation of a TQM approach within the company requires a serious cultural change (Sommerville et al, 1999) and it's being recognized as a vital tool of total quality development (Adebanjo and Kehoe, 1998).

The generally perceived factors that affect quality performance can be categorized under the headings of client, project environment, project team leaders, project procedures and project management action (Chan and Tam, 2000). The factors influencing building construction projects are design, contract, material, labor, equipment, subcontractors, site layout, systems, site staff, and execution (Abdel-Razeq et al., 2001).

Quality policy is the overall aspects and approaches of an organization related to quality issues, as formally crystalized by top management (McCabe, 1998).The elements affecting quality of building

construction projects in Taiwan is grouped into eight criteria: manpower able to achieve project mission, conformance to codes and standards, conformance to owner's requirements, conformance to design process and procedures, conformance to schedule requirements, conformance to cost requirements, and constructability (Tan and Lu, 1995).

TQM is greater than sum of quality, quality assurance and total quality. TQM is about continuously improving customer satisfaction by quality-led companywide management system. This goes beyond the mere application of total quality as a form of management itself (Wilkinson and Witcher, 1991). TQM is a journey and not a destination (Burati and Oswald, 1993). The definition of TQM varies from organization to organization and even from individual to individual. Accordingly Saylor describes TQM as "both a philosophy and a set of principles "which are the foundation of a continuous improvement of the organization, which gives an implicit picture of philosophical component of TQM based on "continuous improvement" as the heart of TQM in all aspects of the business, (Saylor, 1992).

TQM is interpreted as "a way of managing an organization to ensure the satisfaction at every stage of the needs and expectation of both internal and external customers, that is shareholders, consumers of its goods and services, employees and the community in which it operates, by means of every job, every process being carried out right, first time and every time"(Latham, 1994).

The approach to quality has evolved from control (QC) to management (QM) through assurance (QA) and reached policies like (TQM). In developed countries, where quality systems have been established long time ago, the principle has become to produce quality rather than to control it at the end. The new approaches are not only beneficial to the customer but also to the manufacturer as cost of quality are optimized to minimize the total loss. The results are less cost per unit of better quality, more shares in the market and increased profits (Davis et al., 1989).

In construction industry, the quality is generally considered to be very costly, and QC or QC/QA organizations are established only as a result of contractual requirements. In construction industry, production is different from factory or plant production; therefore quality considerations need special care. Especially when the production (construction/installation) is not in place, cost of remedial works may go extremely high if attention is not paid to quality assurance (Barrett, 2000).

2.4 Quality Assurance and Quality Control

Depending on the Manual of Professional Practice for Quality in the Constructed Project the Quality Assurance (QA) can be defined as a program covering all the activities necessary to enhance quality in the work to meet the project predefined requirements. QA involves creating policies for project, procedures, standards, training, guidelines, and system essential

to produce quality. The design manager and constructor team developing an appropriate program for each project.

QA provides protection shield against quality problems, difficulties through early warnings of trouble ahead. Such early warnings play as essential guard in the prevention of both internal and external problems; this procedure should be created before starting the construction phase.

On the other hand, quality control (QC) can be defined as the specific installation of the QA program and related activities. Effective QC reduces the possibility of changes, deviations and omissions, which in turn result in fewer conflicts and disputes; in other words in this stage we make sure that we are conforming to the original plan, we emphasizing the necessity to stick to the plan to avoid any un-predictable problems, (Arditi and Gunaydin, 1997).

In spite of the complexity of the construction projects, the long life-cycle of these projects, and the multi-parties that affect or even affect the decisions in sector, the process, or even the final product, quality in construction is too important to be left to chance, since we consider it one of the dimensions that indicate the success of the whole projects besides to the cost and the time-frame.

Recently, the construction management firms emerged as entities not responsible for design or construction (being a contracting firm), but performing only managerial functions representing the owner from the

inception phase (idea) to the completion of the construction phase (handing over day). Inspection and quality control that had traditionally been performed by architects and engineers were now performed by construction management firms, (Project Management Institute, 2000).

The terms quality assurance (QA) and quality control (QC) are frequently used interchangeably, few people can avoid the mistake to distinguish between these two concepts. Since quality control is a part of quality assurance, maintaining a clear distinction between them is difficult but important and essential. Quality assurance is all planned and systematic actions necessary to provide adequate confidence that a structure, system or component will perform satisfactorily and conform to project requirements, standards, and specifications. On the other hand, quality control is a set of specific procedures involved in the quality assurance process. These procedures contain planning, coordinating, checking, developing, scheduling, and reviewing the work. The quality control function is closest to the product in that various techniques and activities are adopted to monitor the process and to pursue the elimination of causes and sources, (Arditi and Gunaydin, 1997).

In the same context, the construction projects in Palestine especially the projects being funded by the USAID, or the donors in general are applying these concepts in which , the quality assurance plan and procedures are derived from the specification, standards, and it could be an

obligatory condition for any international or local contractors to submit for the bidding process.

On the other hand, and during the construction phase, we have a wide application for a job title called the quality control in the consultancy firm, or even in the contracting firm, and recently this job title is a significant and noticeable position in the construction organization' chart, that is supposed to be existing as a prerequisite criterion to submit to the bid.

2.5 The New Model for TQM

The new TQM model provides the basis of excellence in the industry and covers all angles and aspects of an organization and its operations no matter what is the sector. It is based on the excellent work done during the last century. Oakland (2000), presents a new model for TQM that addresses the hard and soft issues of quality that can improve the performance to higher level rather than the existing one. As shown in Figure (2.1), performance is developed by better planning, and the motivation of people and the management of processes in which they work. These are the keys to delivering quality products and services to end user. These four Ps are important in delivering quality products and services to end user. The early frameworks of TQM contain three Cs, culture, communication and commitment, which we can never underestimate as they are the bases of the TQM framework. Oakland adds these are the "soft foundations" which must encase the hard necessities of planning, people and processes.

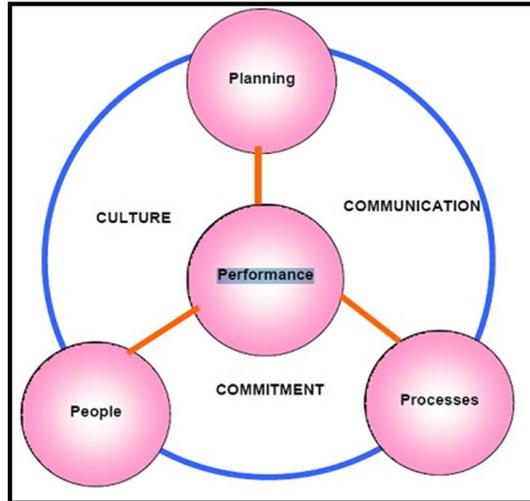


Figure 2-1 Okland TQM Model (Okland, 2000)

There are many models, and each model can provide an idea to any organization, but there is no model that can provide all the organization requirements. On the other hand, each organization can create the most suitable model or framework that has been most suitable for its nature and conditions. Therefore, quality models or quality systems provide a concrete foundation to communicate as to how an organization should work and identify the responsibilities of all members participating in the organization. Table (2.1) presents the different quality models, these models are general and suitable for all sectors, so we can consider them applicable for the construction projects, (Abdel-Razeq et al., 2001).

In West Bank, there is lack of interest in applying such models in construction projects, so one of these research objectives is to enhance the awareness about these models and frameworks significance to achieve the required level of quality in construction projects, and to achieve the desired projects goals in terms of cost, quality, and time.

2.6 Construction Sector in Palestine

Engineering and construction are unique combination of a specific need and design in a process that yields engineering works. The construction profession offers the opportunity to create works for the benefit of mankind, but in turn those who work in this profession accept substantial responsibilities (Osaily, 2010).

Table 2-1 different quality models (Abdel-Razeq et al., 2001).

Models	Description	Focuses	Most important elements have an impact on construction industry
TQMEF (TQM-Efficiency) Model	Process & Efficiency, Customer Focused Performance, People Management, Team Building & Business partner Development	Process & Efficiency	Processes, Customer, people management
Oakland Model	(3C) Culture, Communication, Commitment + (4P) Planning, Performance, Processes + People	Commitment	Commitment, Culture, people, processes
MBNQA (Malcolm Baldrige National Quality Award)	Leadership, Strategic Planning, Customer & Market, Information and analysis, Human Resource Focus, Process management, Business Results	Leadership	Leadership, Human Resources, processes
EFQM (European Foundation Quality Management)	Leadership, People, Policy & Strategy + Partnership & Resources + Processes + People Satisfaction+ Customer Satisfaction + Impact on Society + Key Performance	Leadership	Leadership, People, Customers, Processes, Society

Construction has many characteristics common to both manufacturing and service industries. Surely, as in other industries, there

are physical products. But in other ways, construction is more like a service industry because it does not accumulate significant amounts of capital when compared with industries such as steel, transportation, petroleum, and mining (Hamdia, 2008).

In light of the above and the need for improving the construction sector in Palestine; developing a quality management approach is a strategically important goal in Palestine as well as in other countries. We need to think of the future, being aware of such issue is one way in which we can guarantee a future with savings in time, cost, and resources that we require. In addition to that, there is shortage in the researches related to the TQM implementation in West Bank, so we will try to provide a study that facilitates the implementation of TQM in construction projects.

The construction sector is one of the key economic sectors and the main force enhancing the Palestinian national economy. In 1994, noticeable expansion in the construction sector is occurring. This lead to the recovery of the construction contracting as a profession and subsidiary industries; the construction sector has occupied the foremost position among the rest of sectors, mainly attracting investments and creating new jobs (Osaily, 2010). Construction sector contributes 33% to the Palestinian gross domestic product (GDP) (Osaily, 2010). It employs about 10.8% of laborers directly, and 30% indirectly in factories related to the construction sector and other service and productive sectors. This is a large proportion covered by this business, thus positively affecting

different economic, social, educational and vocational, academic sectors in addition to other Palestinian institutions (Palestinian contractors union , 2003).

Through a complementary process, several parties participate in the Construction sector. the stakeholders are the public and private sectors, universities, academic research centers and institutes, donor countries, international financing institutions, united nations and banking sector. Stakeholders provide the availability of services; provide necessary materials, fund construction projects, and organize the construction contracting as a profession in consistent way with the laws and regulations enacted by governmental institutions (Osaily, 2010). However this sector is deeply fluctuating and hence its contribution to growth is deeply affected by vast numbers of barriers. The need for clarifying and prioritizing these barriers that prevent the implementation of a quality management approach; leading to the importance of this research and the main question: "what are the key barriers to implementing a quality management approach, and what are the benefits of adopting such approach in West Bank – Palestine?"

The number of members classified contractors throughout West Bank have been (379) (PCU, 2003). According to latest classification made for the year 2009-2010; (381) members have been classified in West Bank, (Osaily, 2010).

In 2011, the number of contractors increased to reach 422 contractors in West Bank (PCU, 2003). Figure 2.2 illustrates the three main categories A, B and C which represent 252 companies.

The contractors in Palestine are classified according to their capital, engineering and technical staff, experience, history of the achieved projects, and other issues (Najmi; 2011). The following figure shows the number of the 3 main classified contracting companies in West Bank.

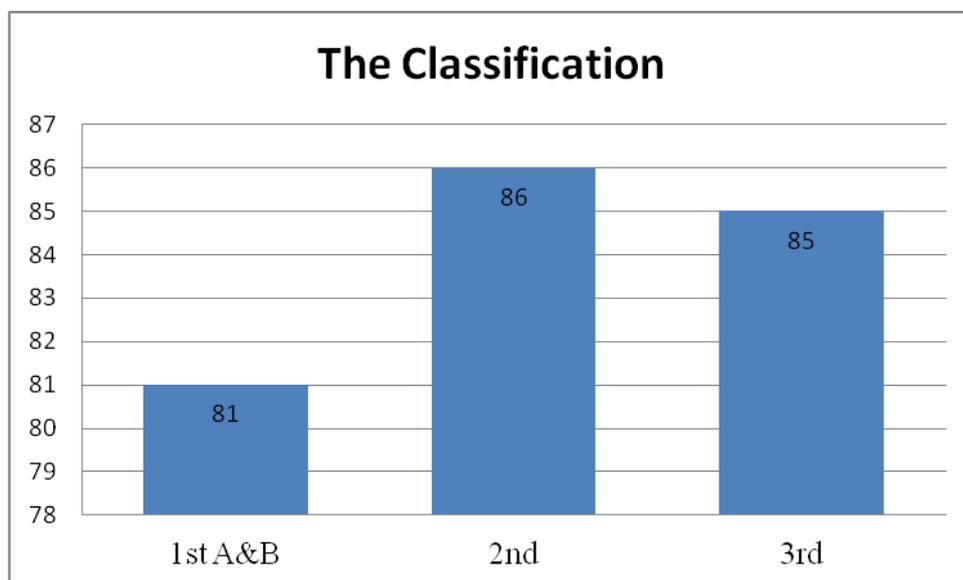


Figure 2-2 The Number of the Classified Contracting Firms in Palestine. (Najmi; 2011).

2.7 Cost of Quality

The concept of Cost of Quality (COQ) has been discussed many years ago. Dr. Joseph M. Juran in 1951 in his book *Quality Control* included a separate section about cost of quality. In 1961, The Quality Cost Committee under the Quality Management Division was established by the American Society for Quality (ASQ). However it was Philip B. Crosby who popularized the use of COQ because of his book *Quality is Free* in 1979, (Beecroft, 2010).

In this book, Crosby divided quality costs into two categories, price of conformance (POC) and price of non-conformance (PONC). POC includes the price paid for doing things right, and examples include inspection and quality appraisal. PONC is the cost of poor quality caused by product and service failure, such as rework and returns, (Al-Tmeemy, Abdul- Rahman, and Harun, 2012).

The most important category or model for quality costs is Prevention, Appraisal, and Failure model - PAF, which was first simplified by Feigenbaum (1961) (Beecroft, 2010). Prevention costs are incurred to prevent nonconforming units from being produced. The purpose of those costs is to make sure that defects are not occurring in the first place by assuring that standards of organizational quality and customer satisfaction are met. Examples of prevention costs include education and training, continuous improvement efforts, quality administration staff, process control, market research, field testing and preventive maintenance.

Appraisal costs come from the costs of necessary activities to check, verify, and determine the actual level of quality achieved relative to the desired levels of customer satisfaction and organizational quality standards .Appraisal costs are incurred to identify the units that nonconforming to standards before these are shipped to the end user. Examples of appraisal costs include receiving or incoming inspection for material, internal product audit, inspection activities, inventory counts continuously, quality administration salaries, supplier evaluation and prepare audit reports.

Failure costs, the costs incurred by a company because the product or service did not meet the requirements, standards or the specification, and the product had to be fixed or replaced or the service had to be repeated or even rejected by the client. These failure costs can be further detailed into two sub-groups – internal or external failures.

Internal failures include all the costs resulting from the defects or the parts that nonconforming the specification that are found before the product or service shipped to the customer. Examples include scrap, rework, extra inventory, re-design, salvage, corrective action reports and overtime due to nonconforming product or service.

External failures are all the costs incurred by the company resulting when the customer finds the failure or dealing directly with the deficient service. Examples of these costs include warranty charge, customer complaint administration, replacement product cost, recalls, shipping costs, analysis of warranty data, customer follow-up and field service departments that dealing with the products in the field, claims and dispute, and the worse thing is the implication of such failure which include the bad reputation, and losing in the market share, in addition to lose the quality as a major weapon for reaching and sustaining the competitive advantage. Figure (2-3) illustrates the categories of cost of quality.

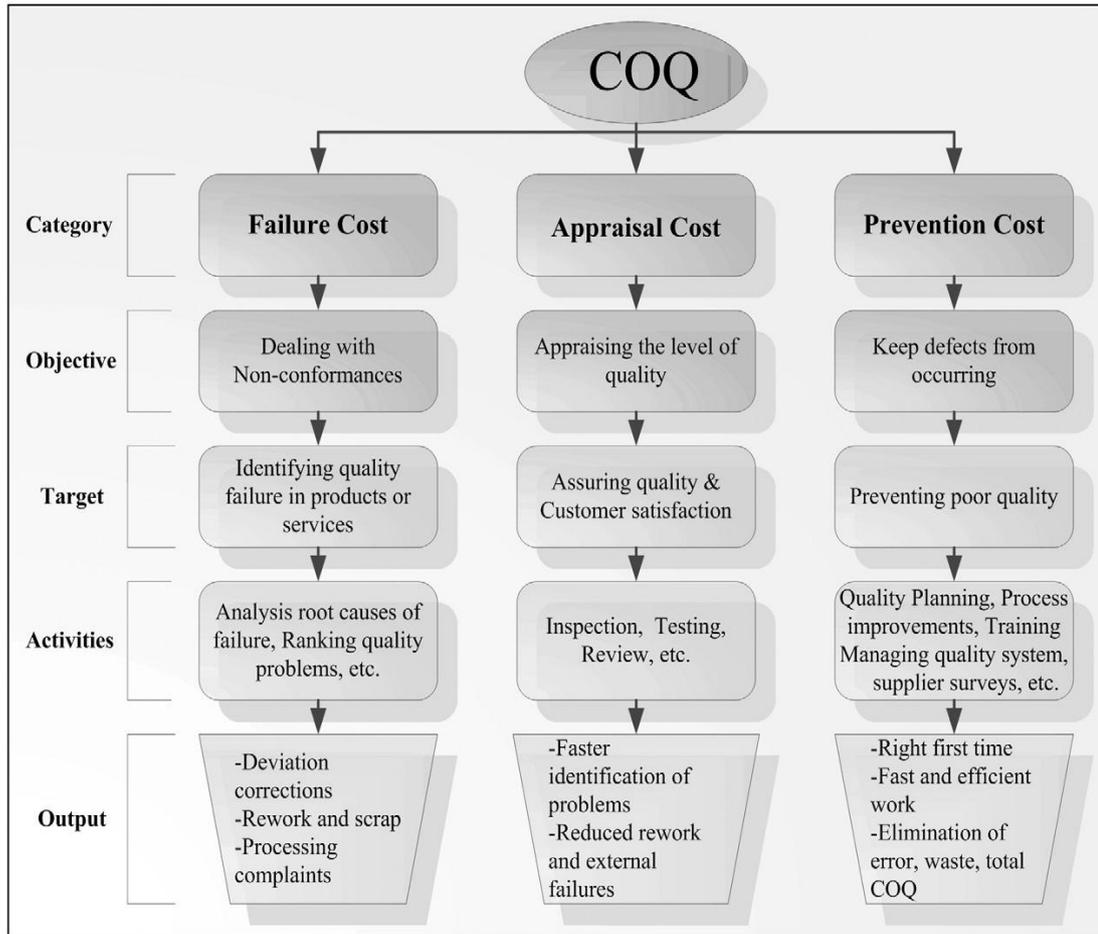


Figure 2-3 Mechanism of quality cost system. (Al-Tmeemy, et. al, 2012).

To sum it up, COQ is the total of all resources spent by an organization to ensure that the established quality plan consistently achieves or exceeds standards since the design phase, through the implementation or the construction phase, till reaching the operation and post-operation phase the maintenance stage. These resources are spent either for achieving quality or incurred due to lack of quality or the non-existing of a quality system at all, (Al-Tmeemy, et. al, 2012).

We discuss the cost of quality categories to be familiar with this concept, so when we develop a framework for implementing quality in construction project the cost issues will be under consideration.

2.8 Cost of Quality as an Improvement Tool

Quality management has various improvement tools that are used to reach the level of service that exceeds the customer expectation, or achieve the level of specification that the customer desires.

As an improvement tool, cost of quality which the objective of TQM that accomplish customer satisfaction at the lowest cost possible, it is necessary to do things correctly the first time. This is only possible if the cost of quality is measured and analyzed, (Selles et al., 2008).

A substantial reason for the failure of several companies in implementation of total quality programs is the lack of effective quality costs methods that differentiate the categories of the quality cost (Miguel and Pontel, 2004). According to Chang (2005), the ambiguity of the relationship between quality and quality cost, and insufficient differentiation can influence the nature of the managers' decisions on quality improvement efforts. The reporting of COQ with detailed information on the three categories of quality costs (i.e. prevention, appraisal and failure) can give a clear, understood picture of the relative distribution of quality costs incurred within a given period. This information serves three purposes. First, it helps to track quality problems by identifying the nature of these problems, and even categorizing and prioritizing these problems. Second, it shows the effectiveness of control efforts and highlights where improvements must be focused (in this stage we can apply the Pareto principle which states that, for many events, or

problems, roughly estimated 80% of the effects come from 20% of the causes). Third, it provides a base line measure for evaluating quality improvement efforts in future projects (this stage is utilized as a benchmarking, comparison tool to compare the past situation with the developed, improved current status). As shown in Figure 2-4, a minimum of 15 percent savings on total costs of construction can be expected through eliminating re-work and wasted work (Pheng and Ke-Wei, 1996).

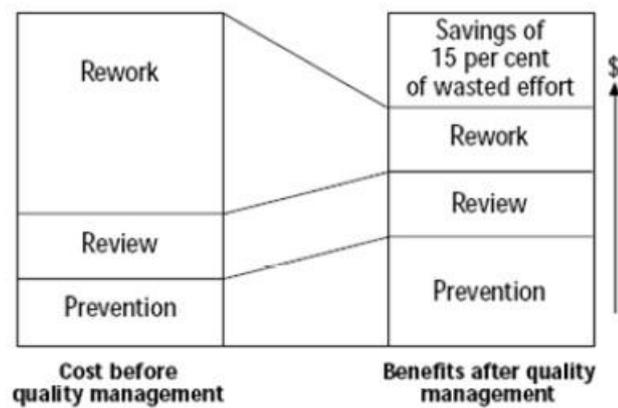


Figure 2-4: Cost Benefit of Quality Management (Pheng and Ke-Wei, 1996).

Chung (1999) indicated that if we implement a well-established quality system that results a cost advantage for the firm and it acts as a marketing tool where it enhance the image of the firm and offer a better competitive advantage for the firm. Analyzing seven building projects of different scope of works in Australia implies that implementing a quality system can result in 7% saving as benefit of preventive measure. See figure 2-5 that illustrates the saving.

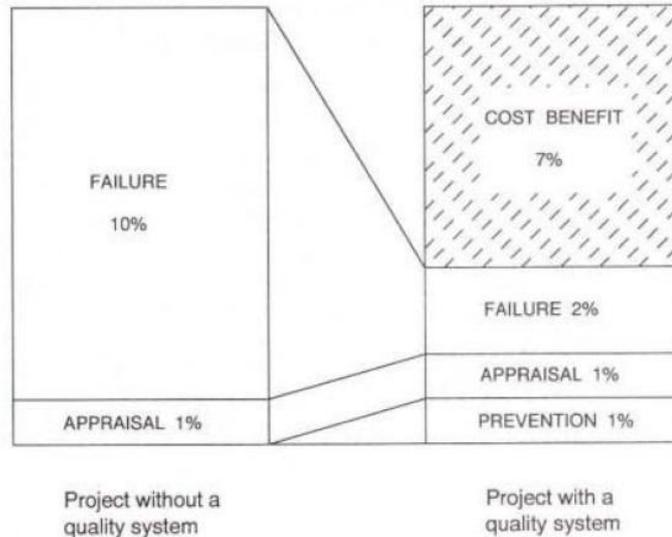


Figure 2-5 Quality Management Saving (Chung, 1999).

2.9 Factors Affecting the Implementation of Quality Management in the Construction Project

Few researchers, indicated that there is a group of factors that affect the implementation of quality management; in any organization whatever its nature (manufacturing, service sector, or even the construction companies) (Arditi and Gunaydin, 1997). These factors include leadership and top management commitment, customer management, training and education, teamwork, people management and empowerment, supplier partnership, quality planning and strategy, process management, rewards and recognition and effective communication (Haupt and Whiteman 2004)

2.9.1 Leadership and Top Management Commitment

The previous studies of TQM emphasize the essential role of leadership, and the top management in the installation process of TQM. TQM requires a great effort from everyone in the firm to meet the customer needs

continuously, so we can consider the quality is everyone's responsibility, whatever his/her position or his/her authorities and responsibilities. If we can consolidate this concept among our employees, and this cannot be achieved without the top management commitment by applying the principle of setting the example that we want the others to live by, for sure the subordinate will zig where their leaders zag, and they will commit themselves to the quality approach as their managers did, (McAdam and Kelly, 2002).

Without clear and consistent quality leadership, quality cannot hope to succeed, consistency in this manner means that emphasizing the concept of quality, rather than make it as an optional issue, the employee can commit themselves to it at the time they wish, and abandon at the other times. This requires that quality concept to be made a strategic objective that we have to attain especially in the construction companies to achieve and sustain the competitive advantage. This means that the leader provides the suitable environment to provide the most comfort condition for the employees to improve their performance and productivity.

Top management commitment has been identified as one of the major determinants and critical component of successful TQM implementation. According to Juran (1974) most of the problems associated with quality are attributed and caused by bad management behavior, and in-appropriate attitudes against the quality implementation among the projects, and for sure that is involving the construction project.

This implies that successful quality management implementation is highly dependent on the level of top management commitment to this concept and how much they concern about implementing the quality in their projects. This requires that top management commitment to quality should conduct the philosophy that quality will receive a higher level of priority over cost or schedule, and that on the long term rang, consistent, permanent and superior quality will lead to improved performance in cost and time.

2.9.2 Customer Management

Customers are an economic asset. They are not on the balance sheet, but they should be. Deming calls for total transformation. In the supply management science the customer is the only source for the profit, because he is the only party in the supply chain who pays the money in return of the service or the product. In spite of that, they are not on the balance sheet, and the customer did not get his/her own whole rights as it is supposed to be.

Deming asks for total shift from existing management methods to achieve a culture of continuous improvement for continual client satisfaction and that is obvious in Deming's cycle (PDCA) which means, plan, do, check and finally act. Plan for the change you intend to make, do the necessary steps for this change and apply it on a small pilot or a prototype, check the results and implication you attain from this implementation of the specific change on your product, service, or even

your organization if it is good or bad for your objectives and finally, act by adopt this change or abandon, (Montgomery et. al, 2011).

The importance of client satisfaction or customer-driven quality is recognized by many scholars and researchers as a major success factor for the quality management effort, (Rao et al., 1996; Oakland, 2000). A strategic concept of customer satisfaction is concerned with achievements such as customer retention and market penetration (Rao et al., 1996), states measuring customer satisfaction as the mortar of the cornerstone for TQM.

TQM requires that all efforts in the organization to focus on customer satisfaction, because especially in the construction projects the only criteria to determine whether this project is successful or not is customer satisfaction.

2.9.3 Training and Education

As any other sector, the training and continuous education and updating the skills are very essential technique to keep the employees updated with the quality issue, memorizing them with its importance.

According to Rao et al. (1996) TQM training must be taken by all levels of the firm since executives who understand the TQM process are not only able to break down barriers within their own firms, depending on the says "set the example you want the other to live by" , so, they can also serve as role models for others who may resist changing.

Feigenbaum (1961) pointed out that the importance of training is to ensure that the skills of the workforce do not become obsolete in a dynamic environment of change.

In contrast to the prevailing assumption, TQM training must be taken by all levels of the firm since executives who understand the TQM process are not only able to break down barriers, and challenges within their own firms, as aforementioned that the top management should set the examples they want the others to live by, and they can also serve as role models for others who may resist to change.

The training and education should direct to all whom will be involved by the change, since, if they understand the objective of the change they will flow with the process smoothly and the resistance will be minimized.

2.9.4 Teamwork

By enhancing the principle that quality is everyone responsibility, encourage the teamwork concept, since the success will be achieved by integrating everyone's efforts to reach the stated vision, and the failure will result from any shortage from any member acting in a specific team within the organization. This is definitely applicable in the construction companies due to the complexity of the project and multi-parties involved in the activities.

So the most important concept that should be developed in the construction projects is cooperation rather than competition, or at least not being an obstacle for whole project progress or achieving a specific milestone during the construction project life-cycle.

Teams are an essential part of any TQM initiative because teamwork enables different parts of the firm to work together within a group to meet customer needs in manner that cannot be done through individual job effort (Kanji and Wong, 1998). In their business excellence model, they considered teamwork as a core concept to achieve the principle of people based management, and for sure, the organization that have the team work culture always reach its objectives faster and easier than the others.

In Oakland's (2000) TQM model, teams are considered one of the major components of the model. He said that good teams have three main attributes: high task fulfillment and achievement records that noticeably attractive and high team maintenance, and ability to fix its relation and internal conflicts smoothly and low self-orientation, the good and benefit for all rather than selfishness.

Teamwork is universally accepted as the vehicle for change and the organizational mechanism for involving people in quality improvement by letting them feel like they are an essential part of the whole process, letting them see their effects on the final product (Mahmood et. al, 2006).

2.9.5 People Management and Empowerment

While management's role is critical to achieving total quality, it is often the most overlooked part of the process, and most managers ignore this side, that you have to empower the people, or the employees who are dealing directly with the end users, or in construction case they work in the sight dealing with equipment, materials, and labors. Employee involvement evolved out of business's need to improve performance, due to the direct, instantaneous remedy to the problem.

The impact of human resources in the organization depends on the kind of empowerment given to them. However, when the managers keep the subordinates involved, take their idea under consideration, they keep them motivated and enhance them to do their best. Kanji and Wong (1998) said that the best way to obtain TQM is by involving everyone and make them daily committed. So the employees' involvement has a positive effect on company performance and internal business conditions, and the work environment as all.

Thus, employee involvement approaches can be seen as real opportunities for organizations in today's competitive environment, to compete and as a significant tool for excellence.

With employee involvement we can transform an organization's culture to utilize, take the advantage of the creative, positive energies of all employees that we have in the company for problem solving and for

making improvements and to be extremely competitive (Mahmood, et. al, 2006). In construction sector, empowering the site engineers or the people in the site who deal with skilled labors is very important to reach the required level of quality.

2.9.6 Supplier Partnership

Supplier quality management is a major part of TQM since materials and purchased component are usually a serious source of quality problems, simply because if you have a problem in the components and materials, then, definitely you will find serious issues in the final product. Poor quality of supplier products results in an extra costs for the purchaser, because his/her final product will suffer quality wise, and for the buyer if not financially at least that will shake the market image and the reputation of its products. It follows that a substantial portion of quality problems will be due to the supplier, and his/her defects products.

In order for both parties to succeed and their business to grow, and keep their image strong enough to keep competing and sustain their market share, a partnership is important, so that companies should deal with their supplier as long-term business partners. The companies must create and sustain supply chain partnerships to keep motivating suppliers to provide materials needed to meet customer needs.

Many authors advocated that companies must establish supply chain partnerships to motivate suppliers to provide materials needed to meet

customer expectations (Wong and Fung, 1999). They stated that partnership with suppliers will lead to quality results from the supply chain. According to Kanji and Wong (1998), the creation and enhancement of the customer-supplier partnership is a major quality practice.

The quality gurus believe that supplier should be viewed as an integral part of the organization's business operations that can provide, rather than supporting the quality management within an organization (Crosby, 1989; Deming, 2000). Crosby (1989) stated that one of the most essential components of the quality development process is the relationship between supplier and buyer. Firms world-wide are creating teams to improve the quality of their final products and services and recognize that this team should contain suppliers.

It is known that the supply chain is starting from the supplier to end with the customer, so as we emphasize the customer relation management to attain the level of quality we are looking for, definitely, we have to manage the supplier relation to enhance the quality management in business.

In construction projects, one of the most noticeable methods to provide a supplier partner, and keep the supplier committed to a certain level of quality is the SLA, which is the Service Level Agreement, in which the supplier commit him/herself to a consistent service level, and in case s/he violates this level, for sure there are consequences like penalties or extra charge to pay.

2.9.7 Quality Policy and Strategy

Juran (1974), stated that strategic quality management could be defined as the “process of establishing long-range quality goals and defining the approach to meeting those goals”. Quality scholars strongly mention the importance of strategic planning process based on total quality (Deming, 2000). Juran even said that in his trilogy, quality planning, quality control, and quality improvement to establish a universal thought process for quality.

Crosby (1979) viewed quality policy as a standard for practice that sets priorities of what to do and what not to do, he considered it as a specific procedure to reach an intended milestones, he recognized that without a formal policy, people will develop their own individual thoughts to follow through the projects, and create a deviated standards of practice (Mahmood, et.al, 2006). Juran emphasized that most successful TQM organizations ensure the quality goals are incorporated in the overall business plan.

That is for sure, is widely applicable in the construction companies, in which these companies supposed to make their vision, or mission statements implying the quality concepts.

2.9.8 Process Management

All organizational activities can be considered as processes that are included too many activities. Therefore, if the aim of the TQM initiative is

to achieve overall quality performance, then process management appears to be an essential requirement. Process management is the concern of quality of conformance. In this manner construction sector is highly criticized as a weak industry in term of the process management.

Process management could be defined as the concern of quality of conformance. One important matter in process management is to make sure that process capability can meet production predefined requirements (Zhang, 2000). Oakland (1993) said that process management is the key to get subordinates responsible for what they are doing in specific manner related to the final product, and the satisfaction of the customer. In process management we are taking care with every single detail about the method of statement, and how the work is get done.

2.9.9 Rewards and Recognition

An important feature of any quality improvement initiative is implying consideration for improved performance by any individual throughout the task, section, and department or division within the firm. Crosby (1979) mentioned recognition as one of the most essential components of the quality improvement process.

By rewarding the quality conformist employee, we enhance the approach within the organization, because recognition and reward activities should effectively stimulate employee commitment to quality improvement. Crosby (1989) considered recognition as one of the most

important steps of the quality improvement process; he considered the recognition procedure as basic to increasing the involvement of all employees in the operation of the business. Zhang (2000) stated that recognition and reward activities should effectively stimulate employee commitment to quality improvement. Recognizing the importance of reward and recognition systems in TQM processes is an important affair that management should take care of through the implementation of a quality system. To effectively support organization's quality endeavors, they need to implement a subordinates compensation system that deeply links quality and customer satisfaction with salary, (Rao et al., 1996)

However, rewards do not have to be monetary; it could be as a promotion or enhancing the authorities of the employee who committed him/herself to this case. Recognition for outstanding and appreciating client service and support, for being on a team that delivers continual process improvement, and for initiating new positive issues within organizations are all important rewards in any organization.

In construction, the engineer who conform to specification through the design, or construction phase is an employee who deserve to be honored and get monetary reward or even a promotion (Mahmood et al., 2006).

2.9.10 Effective Communication

The most important characteristics that should present in a manager is the communication skills, how s/he deals with others, how can s/he manage issues and act under stress and pressure, the same is in a quality system, if you pass the vision and the purpose of quality to the stakeholders, then, half of the mission is accomplished. Effective communication is considered the cement that adhere together the bricks of the total quality process. Crosby (1979) said that in each department there should be a quality committee, or a council, which would include a quality professionals and experts who would act as a regular center for communication relating to the program. Effective communication is seen as a major means for keeping momentum, energy and morale for quality improvement process. It is important to achieve the firm vision to communicate it as clear as you can to reduce the reluctance to the minimum degree. Effective communication is important in all the stage of implementing the quality management in construction projects.

The use of teams is a successful means for cross-functional communication in organizations, because the main goal of forming teams is to exchange and communicate the ideas among the colleagues. Effective communication is important for the success of any quality initiative, since the communication can influence the employees; let them live the future to work towards it. The importance of communication across the organization

is to provide continuous customer satisfaction. Communication about TQM can cover a broad range of the ambiguity surrounding this concept.

TQM will significantly change the way many organizations operate and “do business”. This change will require direct and clear communication from the top management, or even from the broad of directors and executives to all staff and employees, to explain the need to focus on processes, and final product quality. Everyone needs to know what s/he supposed to do to reach a higher level of performance and increase the productivity with a consistent level of quality. The key for motivating the employees and gaining their commitment to TQM is a face-to-face communication and visible management commitment (Oakland, 2000).

In construction and due the complexity in the nature of these projects, communication is an important tool to enhance the quality management, and therefore to improve the project’s overall performance.

One of the major obstacles in the construction project is the communication, and coordination issues between the site and the office, so one of the major goals for implementing the quality management in the construction projects is to increase the communication channels between the multi-parties whom involved in the construction projects.

2.10 Conclusion

In this chapter, quality management in construction projects has been discussed, so the importance of the quality management to construction sector has been highlighted.

This research aims to implement the quality system in construction sector in West Bank. Next chapter presents the methodology that is used in this research to collect data, to touch the status quo related to TQM implementation in construction sector in West Bank, find out the gap in the existing implementation of TQM in construction projects in West Bank, and to find out a way to bridge such a gap.

Chapter 3

Research Methodology

3.1 Introduction

This chapter shows an overview of the methodological approach the researcher used for studying quality management in construction projects in West Bank. This is done through studying the current situation in contracting companies, and developing a framework to improve the performance of the construction projects through the quality management philosophy; this is empowered by the literature review which will help the researcher in selecting the way to conduct the analysis. The survey is distributed and being analyzed to build the framework according to the survey results, and the conclusion and recommendations are formulated depending on the analysis results.

The adopted methodology used to accomplish this study includes review of literature related to construction companies, personal interviews, questionnaire, and analysis of construction companies, and the current quality system adopted in these companies. This chapter illustrates the research strategy, research population and location. In addition, data analysis, and study limitations are also included. In this chapter, the methodology is presented in order to develop the framework for implementing the quality management through the construction projects in West Bank.

3.2 Research Methodology Diagram

To summarize the methodology used in this research which starts with the selection of the topic and finish with the conclusion and recommendations, involving the questionnaire design and the data collection and developing the framework.

The first phase includes identifying and defining the research problems, establishing the study objectives and the research plan. The second phase of the research includes literature review to investigate researches and studies related to the quality management in construction projects.

The third phase of the research includes conducting preliminary study for surveying the Palestinian situation about implementing quality management in construction projects, by interviewing some local firm owners, consultants, contractors and managers of donor countries' institutions to collect data about the status quo.

In the questionnaire design stage, experts were contacted, to test if the questionnaire contents are clear and whether the information that would be obtained from answering its questions would be useful to achieve the target of this research and to develop the framework, the questionnaire was modified according to these experts' notes and recommendations.

The next step of the research was distributing the questionnaire to collect the required data that will be analyzed to achieve the research objective. Around (300) questionnaires were distributed to the research sample.

After that the data was statistically analyzed to perform the required analysis. The next phase is to develop a framework to enhance and enrich the implementation of the quality management in the construction projects in West Bank. The final phase includes the research conclusions and the related recommendations.

3.3 The Research Approach

Selecting a research method is a quite crucial decision the researcher needs to study the approaches to know which of them will satisfy the objectives of the study and the researcher needs, comparing the available information with the needed information. There are two main approaches for research, the quantitative and qualitative approaches or the mixed method (Creswell, 2009). Both approaches have benefits and disadvantages; however there are researches where one is more useful or more appropriate than the other.

The quantitative approach uses the numerical values, the closed-end questions, the questionnaire and survey method, and it does seek to confirm a hypothesis. While the qualitative approach uses the textual results, the open ended questions, the interviews and focus groups method, and it seeks to explore phenomena (Creswell, 2009).

A quantitative method is used to predict and measure to achieve final course of action using numbers and numerical values, while the qualitative one is used to understand thoughts and perception and how people think about issues, opinions and construct a basis for decision making. For the purpose of this research the researcher used qualitative method mainly and quantitative method when needed to help in understanding the status quo.

The mixed method is used in this study for data collection, which entail a combination of quantitative and qualitative approaches. The following strategies were undertaken: “The sequential transformative strategy, which has two distinct data collection phases, one following the other” (Creswell, 2009). In this research, the initial phase was qualitative followed by the second phase which was quantitative that is built in the earlier phase. The researcher can be able to explore the problem from diverse perspectives and ends with call for action (Creswell, 2009).

Then, the sequential explanatory strategy was adopted, which is characterized by the collection and analysis of quantitative data in a first stage followed by collection and analysis of qualitative data in the second stage that builds on the results of the initial quantitative implications. This design is typically adopted to explain and interpret quantitative implications, particularly when unexpected results arise from a quantitative study (Creswell, 2009).

3.4 The Sample Size

The questionnaire was designed to measure and get an obvious picture about implementing the quality management in the construction projects in West Bank, a sample of 300 questionnaires were distributed to the participant.

It was not an easy task to determine the number of the contractors because it is allowed for the contracting firms to have several categorizations in different specializations, so one firm may be counted more than one time. The researcher decided to consider each firm once according to its highest classification then we decide to make a comprehensive sample.

In 2011, the number increased to reach 422 contractors in West Bank, the sample involved mainly the three main categories A, B and C which consist of 252 companies. Other classified contractors will be consulted with inferior priority. The classification is depends on the capital, staff, experience, history of the achieved projects, and other issues (Najmi, 2011).

The researcher chose the three main categories A, B and C; because it was found that about 95% of the total projects' values in West Bank were done by the first three degrees of the registered classified contractors (PCU records). Therefore, the researcher intended to focus on the contractors of these three degrees because they implement the highest percent of projects

in West Bank, the other classified contractor will be consulted with inferior priority. Figure (2.2) illustrates the classification of the contractors in West Bank.

The researcher will measure the perception about implementing the quality management in construction projects in West Bank from the contracting companies' perspective regardless of its location; Figure (3.1) shows the percentage of the executed projects according to the classification degree. Also, Figure (3.2) shows the location distribution of the contracting companies throughout the West Bank.

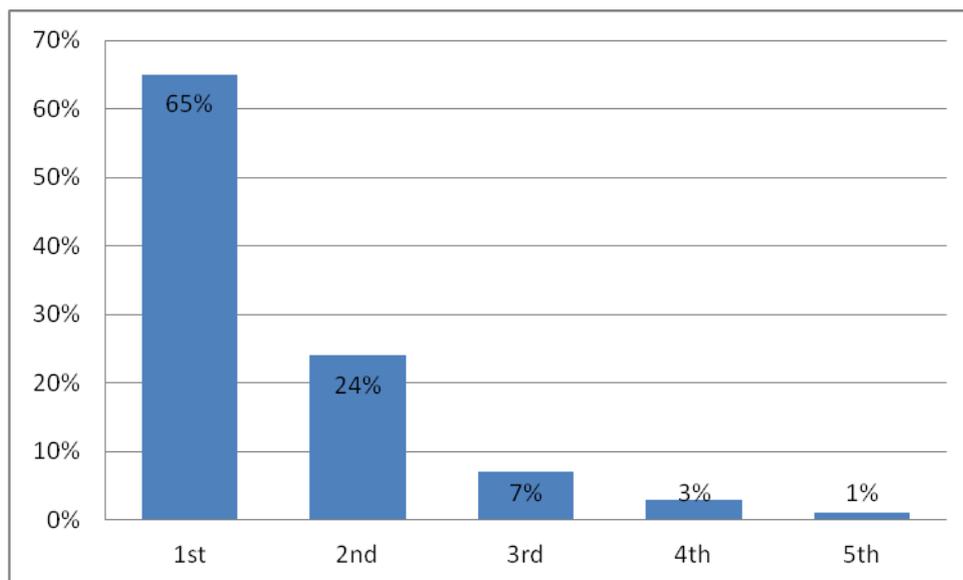


Figure 3-1 Percentage of the executed projects according to the classification degree for the registered classified contracting companies in West Bank (PCU, 2003)

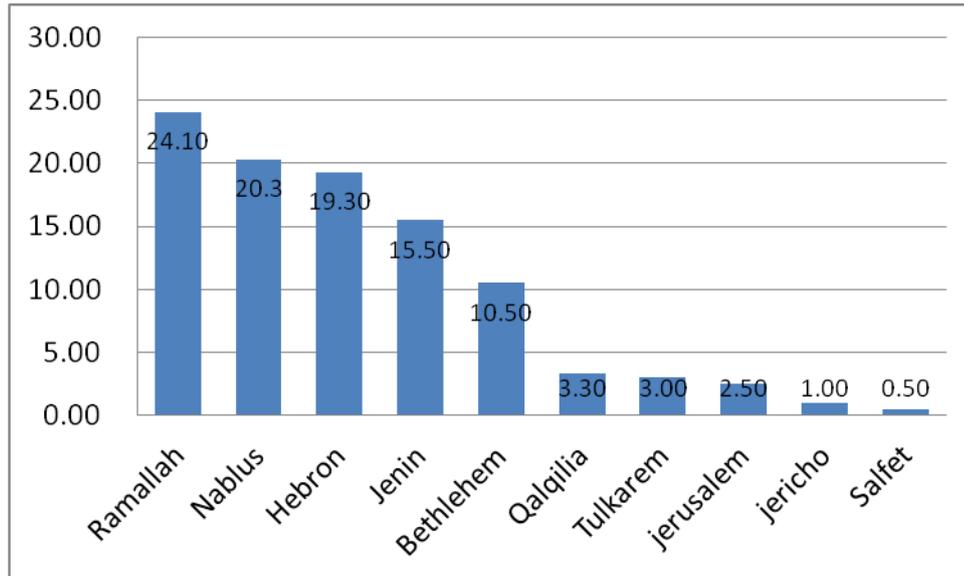


Figure 3-2 percentage of classified contractors with respect to the location in the West Bank (PCU, 2003)

3.5 Designing the Questionnaires

The current situation revealed that there is a lack of awareness towards the TQM concepts and principles (Osaily, 2010). It became apparent that there is confusion in understanding the quality philosophy and advantages it can offer. This led the researcher to present the TQM principles as a questionnaire to conduct a detailed survey to measure the contractors' perception about implementing the quality management in construction projects in West Bank, to develop the framework to enhance that implementation. The questionnaire is the basic tool for the field study, and is used in a large scale by the researchers to get the facts about the circumstances and methods that already exist. The main reasons that led to use of the questionnaire as a tool for field research is to access information that cannot be obtained from other resources such as official

records, given enough time for the questioners for thinking before answering, and the possibility to organize the results and interpret of data.

The questionnaire was designed in Arabic in order to be easily-understood by contractors especially that most of them are not familiar with English language. It is then translated into English language and it is available in the Appendix A.

The questionnaire consisted of three sections starting with a covering letter that explains the purpose of the research, the importance of information presented, the confidentiality of information presented. In order to accomplish the aim of the research, the questionnaire was divided into three sections:

-Part one: basic information

-Part Two: knowledge of quality

-Part Three: data acquisition method

3.6 Interviews

Two sets of interviews were conducted:

First, a group of interviews: A preliminary study was held with some involved contractors in the construction sector to collect its related problems, benefits, success factors and the most important techniques to implement quality system in the construction projects according to their experience and the literature review. Open conversations were held with

interviewees, asking them about the aforementioned issues. The collected data were used in formulating the questionnaire to assess their importance degrees.

Second, a group of interviews: After analyzing the questionnaire outputs, interviews with some contractors were held to check the outputs reliability and enrich the research results. Interviewees were asked for explanations about the extreme results and unexpected results.

3.7 Sampling, Instrumentation and Procedure

The sample consisted of 300 contractors who work in West Bank in the 2013/2014, the respondents were 230. Those contractors aged from 20 to more than 60 years, their qualifications ranged from (Diploma to Ph.D. and other qualifications). Moreover, the respondents were varied in terms of job title and years of experiences. The demographic variables are shown in Tables 3.1 and 3.2.

Table 3-1 Distribution of Sample According to Study Independent Variables of the Contractor

Variable	Class	Frequency	Percentage %	Rank
Qualification	Diploma	21	9.1	3
	B.A	148	64.3	1
	M.A	51	22.2	2
	Ph.D.	4	1.7	5
	Others	6	2.6	4
Age	20-29	108	47.0	1
	30-39	78	33.9	2
	40-49	24	10.4	3
	50-59	17	7.4	4
	More than 60	3	1.3	5
Job Title	Resident engineer	111	48.3	1
	Quality control manager	12	5.2	5
	General Manager	38	16.5	3
	Director	18	7.8	4
	Others	51	22.2	2
Years of Experience	Less than 5 years	99	43.0	1
	5-9	51	22.2	2
	10-14	36	15.7	3
	15-19	18	7.8	5
	More than 20	26	11.3	4
Total		230	100%	

Table 3-2 Distribution of Sample According to Study Independent Variables of the company

Variable	Class	Frequency	Percentage %	Rank
The main-sector of projects that company dealing with	Building	104	45.2	2
	infrastructure	111	48.3	1
	Electro-mechanical	6	2.6	4
	others	9	3.9	3
Number of projects that the company has accomplished so far	0-9	54	23.5	2
	10-49	78	33.9	1
	50-100	44	19.1	3
	more than 100	54	23.5	2
Number of employees that the company have	Less than 50	95	41.3	1
	50-100	48	20.9	2
	100-150	63	27.4	1
	150-200	15	6.5	3
	More than 200	9	3.9	4
Number of engineers that the company have	Less than 5	62	27.0	1
	5-10	60	26.1	2
	10-15	36	15.7	4
	15-20	18	7.8	5
	More than 20	54	23.5	3
Total		230	100%	

3.8 Instrumentation

To achieve the objectives of the study, the researcher used a 30-item questionnaire adapted from the researcher's own experience in the field of engineering. The questionnaire consisted of three sections; the first one focused on the demographic profile of the contractor and the company such as (qualification, age, job title, experience, the main-sector of projects that company dealing with, number of projects that the company

has accomplished so far, the number of employees that the company has and the number of engineers that the company has), whereas the second and third ones consisted of the following domains: (critical successes variables (dependent and independent) which can have an impact on quality management, number of barriers for implementing quality management in construction projects, number of benefits for implementing quality management in construction projects and number of techniques for implementing quality management in construction projects). The scores of responses to each item were calculated according to a five-point Likert scale, in which strongly agree = 5 points, agree = 4 points, undecided = 3 points, disagree = 2 points and strongly disagree = 1 point.

3.9 Validity of the Questionnaire

To ensure the validity of the questionnaire, it was rated by a jury of two experts in the field of engineering at the engineering faculty at (An-Najah National University). The questionnaire, then, was piloted on 10 contractors with similar levels of demographic data. The purpose of the pilot study was to determine whether the questions were comprehensible and can be interpreted by the contractors. The contractors who were involved in the pilot study were excluded from the actual research. The respondents' comments and the jury's suggestions were taken into consideration to modify and improve the questionnaire's content and wordings by omitting, adding or rephrasing items bringing the number of items to 30.

3.10 Reliability of the Questionnaire

The reliability of the questionnaire is measured through Cronbach Alpha formula by the SPSS, and it was (0.93) which is acceptable for the purpose of the study (Creswell, 2009).

The final draft of the questionnaire was given to the contractors who are 300 to be distributed through the West Bank. It took about six weeks for the instrument to be distributed, collected, and returned to the researcher. The total number of the returned questionnaires was 234 and only 230 were analyzed because 4 questionnaires were excluded as their responses were neither consistent nor completed.

3.11 Study Barriers

There are many constraints and barriers that faced the researcher during the conduction of the research. The most important barrier was determining the number of the contractors because it is allowed for the contracting companies to have several classifications in different specializations, so one company may be counted several times.

Most of the contractors showed lack of cooperation, they considered the research as an academic material lacking the ability to be practiced and implemented; some contractors delegated the answers to office engineers, or to an inferior position in the firm. The researcher had no control to ensure the most appropriate person was assigned by each company to be interviewed although they had done their best.

The willingness of the respondents to reveal weaknesses in their respective organizations was uncertain due to cultural issues in which persons did not like to show their weakness even if the researcher kept reminding them that this is a research for academic purposes only.

Due to work commitment, some respondents could not fully concentrated on during the interview sessions, this caused the intended in-depth interview could not be fully achieved. The contractors did not have enough time to respond due to the work pressure, so the researcher had to keep reminding them to respond to the questionnaire to achieve a good percentage of responsiveness.

Chapter 4

Data Analysis

4.1 Introduction

The data collected were analyzed using Statistical Package for Social Science (SPSS) to provide answers to the questions of the study. Means, frequencies, standard deviations, One-Way Analysis of Variance (ANOVA), were used to find out descriptive statistical analysis. To analyze the findings, the researcher used the following scale to represent the estimation level of contractors' responses: 3.5 and more represent High level, 2.5-3.49 represents Medium level, and less than 2.5 represents Low level.

4.2 Analysis

There are 31 items in this section that the contractors were asked, how they behave and what they believe in critical successes Variables (dependent and independent) which can have an impact on quality management, number of barriers for implementing quality management in construction projects, number of benefits for implementing quality management in construction projects and number of techniques for implementing quality management in construction projects). Tables 4.1, 4.2, 4.3 and 4.4 respectively show the results.

Table 4-1 Main factors affecting quality management in construction

No.	Item	Means	standard deviations	Estimation level
1.	Leadership and Top Management Commitment(I)	3.83	1.02	High
2.	Overall customer management(I)	3.72	0.88	High
3.	Training and education(I)	4.04	0.71	High
4.	Skilled work force(I)	4.05	0.94	High
5.	People management and empowerment(I)	3.85	0.82	High
6.	Supplier partnership (I)	3.81	0.85	High
7.	Rewards and recognition(I)	3.84	0.87	High
8.	Effective communication(I)	3.88	0.85	High
9.	Subcontractors' involvement (I)	3.42	1.04	High
10.	Organizational culture (D)	3.84	0.90	High
11.	Construction teamwork satisfaction(D)	3.73	0.93	High
12.	Client satisfaction(D)	3.72	0.96	High
13.	Project performance(D)	3.98	0.95	High
Total		3.82	0.63	High

Table 4.1 shows that the total degree of contractors' responses about the critical successes variables (dependent and independent) which can have an effect on quality management in the contractor's firm was 3.82 which suggest a high level of attitudes. The highest means was given to the item "Skilled work force (I)" which is scored (4.05 out of 5.00).

On the other hand, the lowest means was given to the item "subcontractors' involvement" which is scored 3.42 for each.

Table 4-2 Means and Standard Deviations of the barriers for implementing quality management in construction projects

No.	Item	Means	standard deviations	Estimation level
1.	Lack of knowledge and skills	4.06	0.89	High
2.	Product problems	3.58	0.97	High
3.	Turnover in company	3.48	1.16	Medium
4.	Lack of consultant supervision	3.64	0.92	High
5.	Unrealistic deadline	3.71	1.00	High
6.	Worker personality and attitude	3.79	0.96	High
7.	Ineffective communication	3.91	0.87	High
8.	Lack of coordination between the site and office	3.81	0.98	High
9.	Too much of paper work and documentation	3.26	1.28	Medium
10.	Problems with sub-contractors	3.70	1.06	High
11.	Difficulties in understanding the quality system	3.58	0.96	High
12.	Unwillingness of Project Staff to Accept the Quality System	3.45	1.07	Medium
13.	Lack of proper equipment and tools	3.70	0.95	High
14.	Bad, and hard working conditions	3.42	1.09	Medium
15.	Working with inexperienced people	3.67	1.02	High
16.	Awarding the contracts to the lowest bidders	3.54	1.25	High
17.	Contractors union environment	3.40	0.93	Medium
Total		3.64	0.58	High

Table 4.2 shows that the total degree of contractors' responses about the barriers for implementing quality management in construction projects was 3.64 which suggest a high level of attitudes. The highest means were given to the item "Lack of Knowledge and Skills" which is scored 4.06. On the other hand, the lowest means were given to the item "Too much of paper work and documentation" which scored (3.26)

Table 4-3 Means and Standard Deviations of the benefits for implementing quality management in construction projects

No.	Item	Means	standard deviations	Estimation level
1.	Helps to identify the problems area	3.98	0.93	High
2.	Helps in improve cost estimating	4.03	0.76	High
3.	Achieve the desired outcomes and keep the customer satisfied	4.02	0.68	High
4.	Improve warranty claims	3.87	0.79	High
5.	Attain and sustain the competitive advantage	4.05	0.75	High
6.	Keep improving the performance	4.16	0.81	High
7.	Maintain a consistent level of products and services	4.01	0.75	High
8.	Improved safety	4.01	0.83	High
9.	Increase the firm market share	4.01	0.83	High
10.	Develop the firm image and being a qualified competitor –market position-.	4.07	0.91	High
11.	Reduced rework	4.02	0.74	High
12.	Improved employee job satisfaction	3.84	0.84	High
13.	Lower employee turnover	3.66	0.97	High
14.	Improved schedule performance	3.95	0.87	High
Total		3.98	0.59	High

Table 4.3 shows that the total degree of contractors' responses of the benefits for implementing quality management in construction projects was 3.98 which suggest a high level of attitudes. The highest mean was given to the item “*keep improving the performance*” which is scored 4.16.

On the other hand, the lowest means was given to the item “Lower employee turnover” which is scored 3.66.

Table 4-4 Means and Standard Deviations of the techniques for implementing quality management in construction projects

No.	Item	Means	standard deviations	Estimation level
1.	project quality plan	4.03	0.93	High
2.	Daily report	3.86	0.89	High
3.	weekly or bi-weekly site reports	3.75	0.95	High
4.	work method statement	3.98	0.80	High
5.	inspection	4.10	0.83	High
6.	laboratory experiment	4.18	0.85	High
7.	direct supervision	3.92	1.07	High
Total		3.97	0.69	High

Table 4.4 shows that the total degree of learners' responses of the techniques for implementing quality management in construction projects was 3.97 which suggest a high level of attitudes. The highest mean was given to the item “laboratory experiment “which is scored 4.18. On the other hand, the lowest means was given to the item “weekly or bi-weekly site reports” which is scored 3.75.

Also, the knowledge of quality and the data acquisition method that the contractors' have about implementing quality management in construction project in West Bank were tested. Tables 4.5 and 4.6 respectively show the results.

Table 4-5 the responses to the knowledge of quality

Variable	Class	Frequency	Percentage %
In your opinion, which of these words best define quality?	Fitness to use	66	28.7
	Appearance	18	7.8
	Teamwork	15	6.5
	value for money	24	10.4
	Increase profit	30	13.0
	Satisfying customer	12	5.2
	Reliability	32	13.9
	Inversely proportional to variability, consistency	30	13.0
	Others.	3	1.3
What is your organizations' perception of quality?	Contract Requirement	84	36.5
	Marketing Tool	21	9.1
	Management Approach	62	27.0
	competitive advantage	48	20.9
	Others.	15	6.5
Do you have a quality system in your organization?	Yes	108	47.0
	No	66	28.7
	In process	41	17.8
	Don't know	15	6.5
Does your company have a quality department?	Yes	81	35.2
	No	87	37.8
	In process	44	19.1
	Don't know	18	7.8
Did your company get the ISO certificate?	Yes	48	20.9
	No	114	49.6
	In process	32	13.9
	Don't know	36	15.7
Do you think that achieving the ISO certificate is an indicator for good performance and maintaining a consistent level of quality?	Strongly Agree	83	36.1
	Agree	114	49.6
	Disagree	24	10.4
	Strongly Disagree	6	2.6
	Others.	3	1.3
Do you think that achieving the ISO certificate is an	Strongly Agree	83	36.1
	Agree	114	49.6
	Disagree	24	10.4

indicator for good performance and maintaining a consistent level of quality?	Strongly Disagree	6	2.6
	Others.	3	1.3
Did you motivate your employees and your engineers to keep the quality concept in mind? ?	always	98	42.6
	never	51	22.2
	sometimes	81	35.2
Does your company award the employee or the engineer who maintain the quality in their performance?	Yes	83	36.1
	No	72	31.3
	Sometimes	63	27.4
	Don't know	12	5.2
How would you rate the customer satisfaction in your company?	None	21	9.1
	Low	45	19.6
	Medium	57	24.8
	High	72	31.3
	Very high	35	15.2
From your point of view which is the most important?	Cost	45	19.6
	Time	30	13.0
	Quality	98	42.6
	Safety	45	19.6
	Others.	12	5.2
Will a total quality management TQM program be beneficial to your organization?	yes	96	41.7
	No	77	33.5
	Don't know	57	24.8
Total		230	100%

Table 4.5 shows that 28.6% of the study sample defined quality term as fitness to use, 36.5% have perception of quality as contract requirement, 47.0 % working for a company with quality system and 35.2 % with quality department. Moreover, 20.9% of the study sample their companies have ISO certificate, whereas 49.6% do not have.

Around 85.0% of the study sample responded positively about the question of achieving the ISO certificate as an indicator for good performance and maintaining a consistent level of quality, 42.6% of the employers always do motivate their employees and engineers to keep the quality concept in mind; 36.1% award the employee or the engineer who maintain the quality in their performance.

Rating the customer satisfaction in the company is scored 15.2% with (high degree, 31.3% with (high degree), and 24.8% with (medium) degree. The rest is 28.7% with low and no degrees. Arranging the work factors in the company showed that quality factor is the most important with 42.6%, whereas, safety and cost scored 19.6% for each. The lowest was for others with 5.2% followed by time factor with 13.0%.

Finally, the results indicated that 41.7% of the study sample believed that quality management TQM program will be beneficial to their organizations.

Table 4-6 The responses according to the data acquisition method

Variable	Class	Frequency	Percentage %
Do you collect data to measure the performance of operations?	yes	96	41.7
	No	77	33.5
	Don't know	57	24.8
How do you measure customer satisfaction?	Not measured	101	43.9
	Questionnaire survey	45	19.6
	By the number of complaints	75	32.6
	Others.	9	3.9
If your company has a quality system, do you think there is a relation between the quality implementation in construction projects and increasing the customer satisfaction?	Yes	155	67.4
	No	36	15.7
	Sometimes	39	17.0
If your company has a quality system, do you think there is a relation between the quality implementation in construction projects and increasing the company performance?	Yes	149	64.8
	No	33	14.3
	Sometimes	48	20.9
Do you think that rating the suppliers/subcontractors based on quality performance is?	Not Significant	36	15.7
	Moderately Significant	45	19.6
	Slightly Significant	66	28.7
	Very Significant	44	19.1
	Exceedingly Significant	39	17.0
Are suppliers/subcontractors rated based on quality performance?	Yes	96	41.7
	No	54	23.5
	Sometimes	56	24.3
	Don't Know	24	10.4
Did the suppliers/subcontractors pay for the defects they made in regard to quality?	Yes	152	66.1
	No	21	9.1
	Sometimes	51	22.2
	Don't Know	6	2.6
Total		230	100%

Table 4.6 shows that 41.7% of the study sample collect data to measure the performance of operations. Number of complaint scored the highest method of measuring customer satisfaction. 67.4% of the study sample thinks that there is a relation between the quality implementation in construction projects and increasing the customer satisfaction. On the other hand, 64.8% of them think that there is a relation between the quality implementation in construction projects and increasing the company performance.

As for the process of rating suppliers/subcontractors based on quality performance, 28.7% agreed that it is exceedingly significant; 19.1 % agreed with very significant and 19.6% agreed with moderately significant. When they are asked if suppliers/subcontractors rated based on quality performance, 41.7% responded positively. Similarly, when they are asked if the suppliers/subcontractors pay for the defects they made in regard to quality, 66.1% responded positively.

4.3 Results and Discussion

Analysis:

Hypotheses (1)

Is there a statistical relationship at ($\alpha = 0.05$) between the benefits domain and the critical success factors, table 4-1, and table 4-3. In order to test the study, Pearson Correlation Matrix has been used and the results are shown in Table 4-7

Table 4-7: Pearson Correlation Matrix between benefits and Critical Success Factors

Benefits / Critical Success Factors		Training and Education	Skilled work force	People Management and Empowerment	Effective Communication	Subcontractors' involvement	Project performance
Helps to identify the problems area	Pearson Correlation	.215**	0.253**	0.253**	0.094	0.047	0.103
	Sig. (2-tailed)	.001	0.000	0.000	0.156	0.477	0.120
	N	230	230	230	230	230	230
Helps in improveing cost estimating	Pearson Correlation	.139*	0.269**	0.092	0.127	0.107	0.162*
	Sig. (2-tailed)	.035	0.000	0.163	0.055	0.106	0.014
	N	230	230	230	230	230	230
Achieve the desired outcomes and keep the customer satisfied	Pearson Correlation	.130*	0.059	0.146*	0.051	0.094	-.0040-
	Sig. (2-tailed)	.049	0.376	0.027	0.446	0.153	0.550
	N	230	230	230	230	230	230

Improve warranty claims	Pearson Correlation	0.005-	0.166*	0.092	0.193**	-0.022-	.171**
	Sig. (2-tailed)	.944	0.012	0.162	0.003	0.742	0.009
	N	230	230	230	230	230	230
Attain and sustain the competitive advantage	Pearson Correlation	.140*	0.235**	0.117	0.231**	0.151*	0.074
	Sig. (2-tailed)	.034	0.000	0.075	0.000	0.022	0.265
	N	230	230	230	230	230	230
keep improving the performance	Pearson Correlation	.165*	0.210**	0.076	0.184**	.141*	0.104
	Sig. (2-tailed)	.012	0.001	0.253	0.005	0.032	0.115
	N	230	230	230	230	230	230
maintain a consistent level of products and services	Pearson Correlation	.193**	0.055	0.131*	0.244**	0.247**	0.092
	Sig. (2-tailed)	.003	0.410	0.048	0.000	0.000	0.164
	N	230	230	230	230	230	230
Improved safety	Pearson Correlation	.152*	0.183**	0.060	0.310**	0.131*	0.215**
	Sig. (2-tailed)	.021	0.005	0.363	0.000	0.048	0.001
	N	230	230	230	230	230	230
increase the firm market share	Pearson Correlation	.138*	0.183**	0.177**	0.215**	0.261**	0.083
	Sig. (2-tailed)	.037	0.005	0.007	0.001	0.000	0.208
	N	230	230	230	230	230	230
develop the firm image and being a qualified competitor – market position-	Pearson Correlation	0.168*	.347**	0.277**	0.218**	0.263**	.228**
	Sig. (2-tailed)	0.011	0.000	0.000	0.001	0.000	0.000
	N	230	230	230	230	230	0230
Reduced rework	Pearson Correlation	.145*	0.092	-0.037-	0.189**	-0.016-	0.038

	Sig. (2-tailed)	0.028	0.165	0.578	0.004	0.812	0.570
	N	230	230	230	230	230	230
Improved employee job satisfaction	Pearson Correlation	0.012	-.072-	0.062	0.110	0.174**	-0.035-
	Sig. (2-tailed)	0.851	0.275	0.348	0.095	0.008	0.594
	N	230	0230	230	230	230	230
Lower employee turnover	Pearson Correlation	.159*	.204**	0.136*	0.304**	0.141*	0.094
	Sig. (2-tailed)	0.016	0.002	0.040	0.000	0.033	0.156
	N	230	0230	230	230	230	230
Improved schedule performance	Pearson Correlation	0.163*	0.241**	0.082	0.083	0.116	0.000
	Sig. (2-tailed)	0.013	0.000	0.213	0.210	0.080	0.992
	N	230	230	230	230	230	230

*. Correlation is significant at the 0.01 level (2-tailed).

Table (4-7) shows that there are significant relationship at ($\alpha = 0.05$) between the followings:

1. Helps to identify the problems area (benefits) and training and Education, skilled work force, and people management and empowerment (critical success factors).
2. Helps in improve cost estimating (benefits) and training and education, skilled work force, and project performance.
3. achieve the desired outcomes and keep the customer satisfied and training and education, and people management and empowerment (critical success factors).
4. Improve warranty claims (benefits) and skilled work force, effective Communication and project performance (critical success factors).

5. Attain and sustain the competitive advantage (benefits) and training and education, skilled work force, effective communication and subcontractors' involvement (critical success factors).
6. Keep improving the performance (benefits) and Training and Education, Skilled work force and Effective Communication (critical success factors).
7. Maintain a consistent level of products (benefits) and services and training and education, people management and empowerment, effective communication and subcontractors' involvement (critical success factors).
8. Improved safety (benefits) and training and education, skilled work force, effective communication, subcontractors' involvement and Project performance (critical success factors).
9. Increase the firm market share (benefits) and all paragraphs except for Project performance (critical success factors).
10. Develop the firm image and being a qualified competitor –market position (benefits) and all paragraphs (critical success factors).
11. Reduced rework (benefits) and training and education (critical success factors).
12. Improved employee job satisfaction (benefits) and subcontractors' involvement. (critical success factors).
13. Lower employee turnover (benefits) and all paragraphs except for Project performance (critical success factors).

14. Improved schedule performance (benefits) and Training and Education and skilled work (critical success factors).

These results will be taken under consideration with the framework that we intend to develop in which we intend to propose conducting a training courses and quality workshop to enhance the quality concept in the construction projects, this way and by increasing the skills of the workers we guarantee to keep the improving the performance regarding the quality issues in the construction projects.

Hypotheses (2)

Is there a statistical relationship at ($\alpha = 0.05$) between the benefits domain and the barriers, table 4-2, and table 4-3.

In order to test the study, Pearson Correlation Matrix has been used and the results are shown in Table 4-8.

Table 4-8: Pearson Correlation Matrix between benefits and Barriers

Benefits / Barriers		Lack of Knowledge and Skills	Unrealistic deadline	Worker personality and attitude	Ineffective Communication	Lack of Coordination Between the Site and Office	Lack of proper equipment and tools
Helps to identify the problems area	Pearson Correlation	0.252**	0.065	0.070	-0.017-	0.048-	0.110
	Sig. (2-tailed)	0.000	0.324	0.293	0.793	0.470	0.098
	N	230	230	230	230	230	230
Helps in improve cost estimating	Pearson Correlation	.341**	0.235**	0.171**	-0.014-	0.081	0.152*
	Sig. (2-tailed)	0.000	0.000	0.009	0.827	0.223	0.021
	N	230	230	230	230	230	230
Achieve the desired outcomes and keep the customer satisfied	Pearson Correlation	0.040	0.087	0.048	0.004	0.025	0.196**
	Sig. (2-tailed)	0.546	0.191	0.469	0.954	0.708	0.003
	N	230	230	230	230	230	230
Improve warranty claims	Pearson Correlation	0.215**	0.346**	0.205**	0.166*	0.197**	0.098
	Sig. (2-tailed)	0.001	0.000	0.002	0.012	0.003	0.140
	N	230	230	230	230	230	230
Attain and sustain the competitive advantage	Pearson Correlation	-0.005-	0.208**	0.105	0.166*	0.237**	0.163*
	Sig. (2-tailed)	0.939	0.001	0.113	0.012	0.000	0.013
	N	230	230	230	230	230	230
keep improving the performance	Pearson Correlation	0.039	0.107	0.062	0.076	0.127	0.179**
	Sig. (2-tailed)	0.559	0.105	0.349	0.251	0.054	0.006
	N	230	230	230	230	230	230
maintain a consistent level of products and services	Pearson Correlation	0.038	0.213**	0.095	0.282**	.234**	0.170**
	Sig. (2-tailed)	0.568	0.001	0.153	0.000	0.000	0.010
	N	230	230	230	230	230	230
Improved safety	Pearson Correlation	0.016	0.254**	0.150*	0.146*	0.280**	0.124

	Sig. (2-tailed)	0.804	0.000	0.022	0.027	0.000	0.060
	N	230	230	230	230	230	230
increase the firm market share	Pearson Correlation	0.034	0.162*	0.152*	0.195**	0.241**	0.152*
	Sig. (2-tailed)	0.610	0.014	.021	0.003	0.000	0.021
	N	230	230	230	230	230	230
develop the firm image and being a qualified competitor – market position-	Pearson Correlation	0.139*	0.237**	0.212**	0.162*	0.205**	0.192**
	Sig. (2-tailed)	0.035	0.000	0.001	0.014	0.002	0.003
	N	230	230	230	230	230	230
Reduced rework	Pearson Correlation	-0.003-	0.115	0.100	-0.098-	-0.016-	0.051
	Sig. (2-tailed)	0.969	0.081	0.132	0.139	0.807	0.446
	N	230	230	230	230	230	230
Improved employee job satisfaction	Pearson Correlation	0.014	0.070	0.089	0.053	0.051	0.338**
	Sig. (2-tailed)	0.837	0.289	0.179	0.426	0.441	0.000
	N	230	230	230	230	230	230
Lower employee turnover	Pearson Correlation	-0.065-	0.261**	0.079	0.037	0.140*	0.220**
	Sig. (2-tailed)	0.327	0.000	0.235	0.573	0.034	0.001
	N	230	230	230	230	230	230
Improved schedule performance	Pearson Correlation	0.020	0.208**	0.145*	0.087	0.133*	0.160*
	Sig. (2-tailed)	0.758	0.001	0.028	0.191	0.043	0.015
	N	230	230	230	230	230	230

*. Correlation is significant at the 0.01 level (2-tailed).

Table (4-8) shows that there are significant relationship at ($\alpha = 0.05$) between the followings:

1. Helps to identify the problems area (benefits) and lack of knowledge and skills (barriers).

2. Helps in improve cost estimating (benefits) and lack of knowledge and skills, unrealistic deadline, worker personality and attitude and lack of proper equipment and tools (barriers).
3. Achieve the desired outcomes and keep the customer satisfied (benefits) and lack of proper and all paragraphs except Lack of proper equipment and tools (barriers).
4. Attain and sustain the competitive advantage (benefits) and unrealistic deadline, lack of coordination between the site and office and lack of proper equipment and tools (barriers)
5. Keep improving the performance (benefits) and Lack of proper equipment and tools (barriers).
6. Maintain a consistent level of products and services (benefits) and unrealistic deadline, ineffective communication, lack of coordination between the site and office and lack of proper equipment and tools (barriers).
7. Improved safety (benefits) and unrealistic deadline , worker personality and attitude, ineffective communication and lack of coordination between the site and office (barriers).
8. Increase the firm market share (benefits) and unrealistic deadline , worker personality and attitude, ineffective communication ,lack of coordination between the site and office., and lack of proper equipment and tools (barriers).
9. Develop the firm image and being a qualified competitor –market position (benefits) and all paragraphs (barriers).

10. Improved employee job satisfaction (benefits) and lack of proper equipment and tools (barriers).
11. Lower employee turnover (benefits) and unrealistic deadline, lack of coordination between the site and office and lack of proper equipment and tools (barriers).
12. Improved schedule performance (benefits) and unrealistic deadline, worker personality and attitude, lack of coordination between the site and office and lack of proper equipment and tools (barriers)

These results suggest conducting training courses and quality workshop to enhance the quality concept in the construction projects. The training should involve all the parties involved in the projects even they are a skilled workers, unskilled workers, foremen, engineers, and project managers. Developing their knowledge should focus on the most important benefits of implementing the quality issues in the construction projects, to meet the required specification according to the contractual documents.

Hypotheses (3)

Is there a statistical relationship at ($\alpha = 0.05$) between the benefits domain and the techniques for implementing quality management, Table 4-3, and Table 4-4.

In order to test the study, Pearson Correlation Matrix has been used and the results are shown in Table 4-9.

Table 4-9: Pearson Correlation Matrix between the Benefits and the Techniques

Benefits/ The techniques		project quality plan	Daily report	weekly or bi-weekly site reports	work method statement	inspection	laboratory experiment	direct supervision
Helps to identify the problems area	Pearson Correlation	0.553**	0.280**	0.157*	0.297**	0.270**	0.183**	0.169*
	Sig. (2-tailed)	0.000	0.000	0.017	0.000	0.000	0.005	0.010
	N	230	230	230	230	230	230	230
Helps in improve cost estimating	Pearson Correlation	0.600**	0.429**	0.334**	0.513**	0.403**	0.350**	0.323**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	230	230	230	230	230	230	230
Achieve the desired outcomes and keep the customer satisfied	Pearson Correlation	0.406**	0.262**	0.288**	0.430**	0.430**	0.373**	0.181**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.006
	N	230	230	230	230	230	230	230
Improve warranty claims	Pearson Correlation	0.463**	.216**	0.267**	0.490**	0.256**	0.343**	0.173**
	Sig. (2-tailed)	0.000	0.001	0.000	0.000	0.000	0.000	0.009
	N	230	230	230	230	230	230	230
Attain and sustain the competitive advantage	Pearson Correlation	0.422**	0.359**	0.288**	0.433**	0.364**	0.350**	0.263**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	230	230	230	230	230	230	230
keep improving the performance	Pearson Correlation	0.352**	0.301**	0.205**	0.304**	0.263**	0.294**	0.210**
	Sig. (2-tailed)	0.000	0.000	0.002	0.000	0.000	0.000	0.001

	N	230	230	230	230	230	230	230
maintain a consistent level of products and services	Pearson Correlation	0.391**	0.414**	0.387**	0.371**	0.416**	0.365**	0.295**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	230	230	230	230	230	230	230
Improved safety	Pearson Correlation	0.554**	0.214**	0.217**	0.452**	0.337**	0.495**	0.207**
	Sig. (2-tailed)	0.000	0.001	0.001	0.000	0.000	0.000	0.002
	N	230	230	230	230	230	230	230
increase the firm market share	Pearson Correlation	0.319**	0.251**	0.268**	0.296**	0.205**	0.255**	0.193**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.002	0.000	0.003
	N	230	230	230	230	230	230	230
develop the firm image and being a qualified competitor – market position-.	Pearson Correlation	0.504**	0.335**	0.456**	0.361**	0.248**	0.303**	0.234**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	230	230	230	230	230	230	230
Reduced rework	Pearson Correlation	0.508**	0.302**	0.304**	0.464**	0.398**	0.366**	0.201**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.002
	N	230	230	230	230	230	230	230
Improved employee job satisfaction	Pearson Correlation	0.324**	0.287**	0.260**	0.133*	0.191**	0.131*	0.059
	Sig. (2-tailed)	0.000	0.000	0.000	0.044	0.004	0.047	0.373
	N	230	230	230	230	230	230	230
Lower employee turnover	Pearson Correlation	.386**	0.205**	0.246**	.379**	0.123	.089	0.100
	Sig. (2-tailed)	.000	0.002	0.000	0.000	0.062	0.177	0.131

	N	230	230	230	230	230	230	230
Improved schedule performance	Pearson Correlation	0.402**	0.362**	0.268**	0.242**	0.347**	.134*	0.220**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.043	0.001
	N	230	230	230	230	230	230	230

***. Correlation is significant at the 0.01 level (2-tailed).**

Table (4-9) shows that there are significant relationship at ($\alpha = 0.05$) between Benefits domain and the techniques except between Lower employee turnover and (inspection, laboratory experiment and direct supervision).

According to the contractors perspectives there is no relation between the laboratory experiments and keep improving the performance, the contractors consider these two issues are independent from each other's. They said that they conduct the experiment to make sure of the quality of the materials used in the construction projects rather than developing the performance.

4.4 Conclusion

Depending on the results that we have found after analyzing the data that we collected through our distributed questionnaire and the interviews that we conducted we can develop the framework that we think it will help in developing the quality perception through the construction projects in West Bank.

According to Table 4.4 that discussed the critical factors that affect the implementation of quality system in the construction projects, the

highest item with the first rank is the skilled work force with score of 4.05 and this lead to create training program in the construction organizations for the labor and Technicians to increase their abilities, capabilities and skills.

According to Table 4.5 regarding the barriers that faced the quality system in construction projects; the highest rank is the lack of the knowledge and skills which recorded the highest rank with 4.06, in the same way creation of training and internship will be discussed in the framework that will be proposed in the next chapter.

Regarding the benefits of implementing quality system in construction project according to Table 6, the highest rank is to keep improving performance; as a result of that it is suggested to make the auditing and feedback of quality as a continues process and to make the benchmarking in which we compare our current performance with rivals and competitors and in the same time with our performance last periods.

Regarding techniques according to Table 7, the respondents ranked the lab experiment as the most important tool to be used to improve the quality in the construction project, so the top management commitment to conduct the required experiment is very essential to keep an accepted and consistent level of quality in the project.

On the other hand, we have to launch a training session for the contractors engineers to improve their perception about the lab experiment

to make them consider it as a crucial process to make sure of the quality of the performance, structure and component of materials; rather than consider it as a rubber stamp process, or a routine process with no beneficial result.

Moreover, daily, weekly and biweekly reports are the least important technique to enhance the quality issues in the construction project according to our sample. Perhaps, the contracting companies consider the documentation issue is an exhausting process with no advantage regarding the quality.

Chapter 5

The Framework

5.1 Introduction

This chapter discusses how to implement Total Quality Management in construction projects in West Bank. The developed framework is based on the TQM literature, critical success factors perceived by quality managers in construction projects in West Bank basically the information attained from the distributed questionnaire, and the interviews conducted with respondents to get a deeper level of understanding about implementing quality management in construction projects in West Bank.

The TQM in the construction industry could be described as the processes of comprehensively planning and organizing, for the purpose of developing and improving the administrative and technical performance of the top management and all employees in the organization. This is realized through participation of the leadership, training and continuous improvement, to improve output effectively, saving time and effort while meeting the needs of both internal and external customers. In other words, all involved must function as an integrated system to achieve the desired goals with efficiency and high quality, but without developing a framework we cannot move to the implementation phase. So basically the framework serves as a guideline allowing us to implement quality management in construction projects in West Bank smoothly.

The framework is usually a well-liked output which serves as a means of presenting ideas, concept, and plans in a non-prescriptive manner. So the developed framework as a suggestion rather than a constant rule the contracting companies had to obey and stick by. Aalbregtse et al. (1991) provided reasons, justifications why a framework is essential and extremely needed to implement TQM, such as, illustrating an overview of TQM to communicate a new vision of the firm, or updating the existing one, providing an insight into the firm's strength and weaknesses to accurately evaluate the current situation. Finally, one of the most important reason why a framework is essential to implement TQM support implementation and to improve the chances that TQM adoption will be successful and to make such an attempt to be fact rather than a desired wish.

5.2 Framework Development Requirements

In general, the criteria, requirements for developing a framework can be considered as a guide in developing a good framework (Yusof and Aspinwall, 2000), in which they explained the most important requirement for developing a framework, such as, systematic and easily understood by keeping it away from the complicated phrases and un-necessary practices; simple in structure; having clear links between the elements or steps outlined, in other words smoothly overflow; wide enough to suit different contexts, in which not too general in which we cannot control, and in the same time not too detailed to be implementable; represent a road map and planning tools for implementation; Implementable at reasonable cost and

connected to timeframe in which the planning, implementation, and evaluation stages is clear and easy to be followed.

5.3 The Developed Framework

The framework is highly dependent on Deming cycle (PDCA), plan, do, check and act. Figure 5-1 illustrates the Deming cycle.

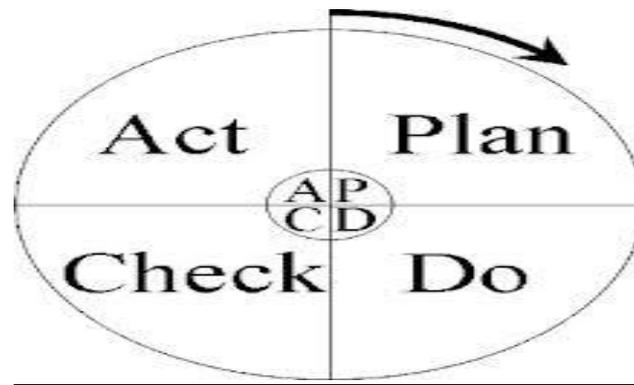


Figure 5-1 Deming cycle (PDCA) (Montgomery et al., 2011).

5.3.1 Plan

Establish the objectives and processes necessary to obtain implications in accordance with the expected results (the target or goals), that help to draw a road map that facilitate reaching the desired results. By establishing output expectations, the completeness and accuracy of the specification are also a part of the targeted improvement; starting with a pilot study to generalize the results.

5.3.2 Do

Implement the plan, execute the process, and make the product, in other words implementing the plan on a small pilot to check the expected results.

Collect data for charting and analysis in the following "CHECK" and "ACT" steps.

5.3.3 Check

Reviewing the real results (measured and collected in "DO" above), that delivered after launching a small pilot, and compare against the expected results (targets or goals from the "PLAN"), that formulated as milestones in the plan stage to ascertain any differences. Look for deviation in implementation from the plan and also look for the appropriateness, correction actions and completeness of the plan to enable the execution, to reach the desired end goals.

5.3.4 Act

Corrective actions are requested on significant differences between actual and planned results. The differences are analyzed to determine their root causes. Determine where to apply changes that will include improvement of the process or product. In this stage the decision should be taken whether to adopt or abandon the action. If the adoption decision is taken then go further to implement the plan in a wide scope, on the other hand, if the decision to the abandon the plan, then the cycle should be started over to have more beneficial results.

5.4 The Stages of the Framework

The main purpose for this research is to develop a framework for the implementation of TQM in construction projects in West Bank. Figure 5-2 shows that framework, but it should be highly considered that the success of the construction projects in quality is not based only on the implementation of this framework, but there are other factors such as career security, the human factor and the satisfaction of employees...etc. But the implementation of this framework will raise noticeably the chance of creating a consistent level of quality through the projects that the company constructs.

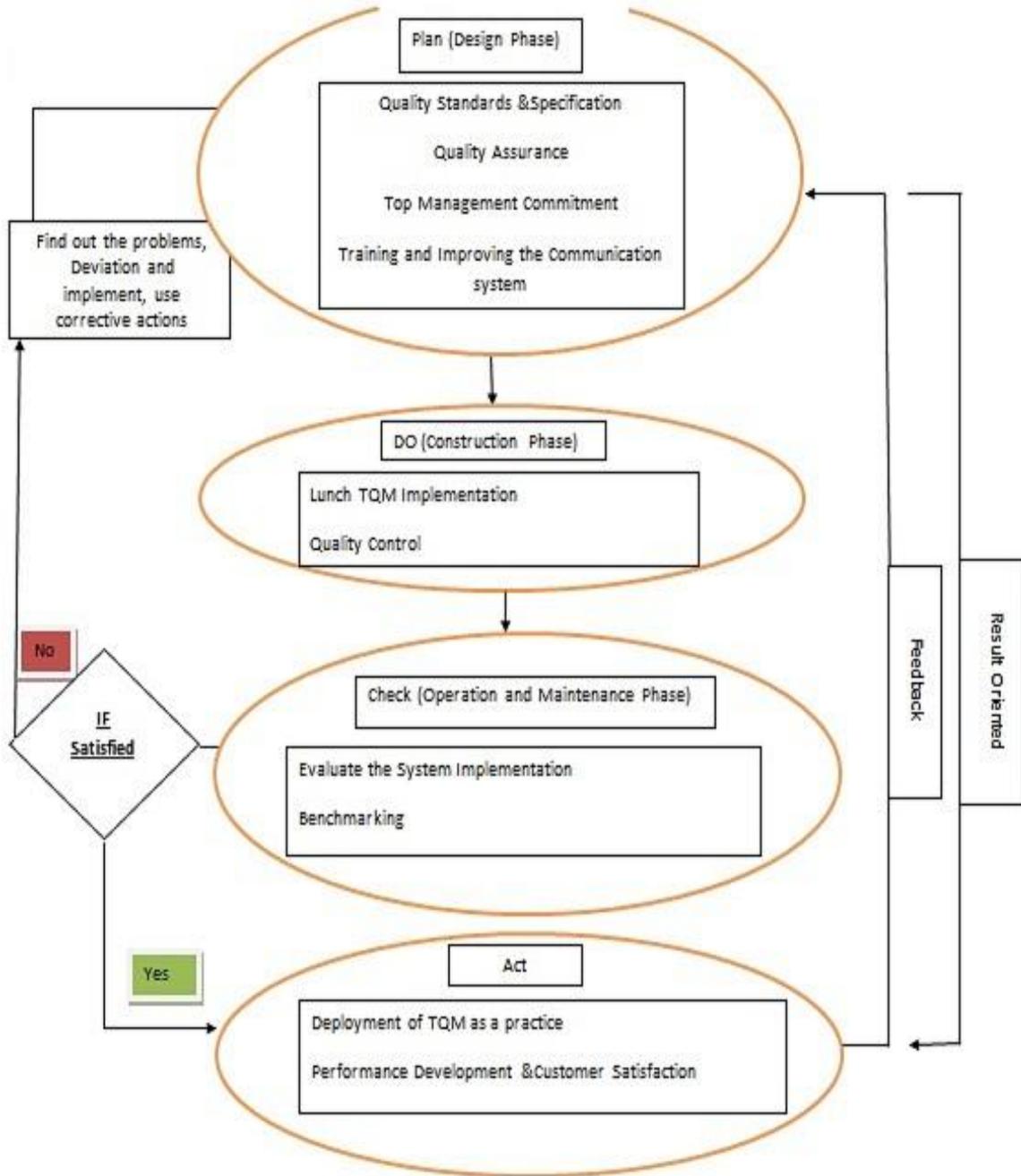


Figure 5-2 Framework for implementing TQM in construction projects in West Bank

5.4.1 Plan (Design Phase)

In this phase, the guidelines and polices should be formatted, some requirements for ensuring the applicability of the quality system through the lifecycle of the construction projects should be considered such as the quality of codes and standards, quality of drawings and specification, the constructability of the design, and for sure the ISO standards should be apriority throughout the projects (Arditi and Gunaydin, 1997). This phase contain the quality standards, quality assurance, top management commitment and holding a training sessions, and utility of codes and standards.

In this phase, the planner should keep in mind that the framework is a result oriented which means the plan and the implementation should be the most appropriate tool to reach the desired results; in other words they keep the results as the engine to motivate them in every single step in this process.

5.4.1.1 Quality standards and specification

Standards are the measures that specify if the product or the final outcomes are accepted or as required, the primary purpose of standards is to protect the public health and safety (Arditi and Gunaydin, 1997) compliance with standards should be an issue addressed early in the design phase especially in the construction projects.

Specification is the set of documents given to the contractor that provide technical information on materials, performance of the constructed project, and quality requirements. Providing the contracting company with these two sets of documents will be very useful toward implementing quality management in construction projects in West Bank.

5.4.1.2 Quality Assurance

Depending on the Manual of Professional Practice for Quality in the Constructed Project the Quality Assurance (QA) can be defined as a program covering all the activities necessary to enhance quality in the work to meet the project predefined requirements. QA involves creating policies for project, procedures, standards, training, guidelines, and system essential to produce quality. The design manager and constructor team developing an appropriate program for each project.

QA provides protection shield against quality problems, difficulties through early warnings of trouble ahead. Such early warnings play as essential guard in the prevention of both internal and external problems; this procedure should be created before starting the construction phase. (Arditi and Gunaydin, 1997).

5.4.1.3 Top management commitment

The successful quality management implementation is highly dependent on the level of top management commitment to this concept and how much they concern about implementing the quality in their projects. This requires

that top management commitment to quality must support the philosophy that quality will get a higher rank over cost or time, and that on the long term range, consistent, permanent and higher quality will lead to development in cost and time performance.

5.4.1.4 Training and improving the communication system

Feigenbaum (1961) pointed out that the importance of training is to ensure that the skills of the workforce do not become obsolete in a dynamic environment of change, in other words to develop the skills, refreshing the information and increasing the knowledge.

In contrast to the prevailing assumption, TQM training should be taken by all levels of the organization since executives who understand the TQM process are not only able to break down barriers, challenges within their own firms, as we mentioned that the top management should set the examples they want the others to live by, and they can also serve as role models for others who may resist to change.

In construction sector in Palestine as we noticed through the distributed questionnaire, there is lack in recognition to the training significance as a pivot tool to achieve the required level of quality throughout the construction projects in West Bank. On the other hand, effective communication is part of the cement that holds together the bricks of the total quality process. In construction sector in West Bank, its noticeable the weaknesses in the communication and even the coordination

issues especially in the large projects, lack of communication can generate a distrust situation between the office and the site, that will lead to critical problems that can negatively affect the project and the construction firm as all, so in our framework we highly consider the communication issues.

More than one initiative tried to improve communication and flow management (Ballard and Howell, 2003), others endeavored to enhance say briefing, designing or tendering activities (Al-Momani, 2000). They either addressed only one or two quality issues, such as communication issue; here we are trying to develop a comprehensive framework to facilitate the implementation of quality throughout the construction projects; as a result of that the communication issue should be deeply discussed.

5.4.2 Do (The Construction Phase)

After the drawings, specifications and codes is approved from the previous stage and within the implementation phase. Project design, drawings, specifications and construction planning are carried out based upon a standard, requirements taken from relevant codes, owner requirements, and design company standard practice. Construction is then should be managed with appropriate way to conform to this composite standard as implemented by the constructor (Al-Momani, 2000). This stage contains lunch TQM implementation, and the quality control practice.

5.4.2.1 Lunch TQM implementation

In this stage we are moving from the planning phase to the implementation phase, in which a projection from the plans and instruction to the project

site is made, in this phase we have to make sure that there is no deviation from the approved plans, the agreed direction should be kept, or at least implement with in-noticeable differences.

5.4.2.2 Quality Control

Quality Control (QC) is the specific installation of the QA package and related activities. Effective QC reduces the possibility of changes, deviations and mistakes, which in turn result in fewer problems, disputes and conflict. So the contracting firm should deeply focus to apply this concept by hiring quality controls engineers and even creating a quality control department (Arditi and Gunaydin, 1997).

5.4.3 Check (the operation and maintenance phase)

After handing over the construction project and the final product, a new process should be started to check the results of implementing the aforementioned system, if there is any deviation from the required implications that we are looking for, or the lunched system is essential and efficient to be deployed throughout the rest of the firm project, this phase contain the evaluation process and benchmarking.

5.4.3.1 Evaluate the system Implementation

In this stage the implementation process must be evaluated, checking the initial indications for the implementation phase, this stage could be considered as go or not go indicator if the initial results are inadequate. So

the stop decision should be taken right there, before more losses, or at least using another plan that could be more consistent with the current situation. On the other hand and if the initial results are satisfied, we have to go through the whole process.

5.4.3.2 Benchmarking

In this stage comparing our firm, or project and its performance indicators to other related competitors, or even our performance in the past to see the differences, dimensions typically measured are quality, time and cost.

This then allows our firm to develop plans on how to make improvements or adapt specific best practices, usually with the aim of increasing some aspect of performance. In this stage and the previous one, a clear decision could be crystallized, if the decision maker is going deeper in this framework or go back and make essential or slight changes to make a noticeable improvement for our project performance related to quality issues.

5.4.4 Act (the Extension)

It is the final phase for the framework in which the performance is improved and the customer satisfaction is attained. This phase includes the deployment of TQM as a practice, to increase the revenue, reach and sustain the competitive advantage.

5.4.4.1 Deployment of TQM as a practice

If the results that found through the last two stages are satisfied, then the quality as dominant tendency in our construction projects must be deployed.

The main core for this step is to make the quality management as a practice rather than an event, a review of the essential elements of TQM, and based on the questionnaire results exposed a lack of actual, practical implementation of the processes within the construction sector. The main factors contains a lack of essential financial capabilities, failure to plan for quality adequately, insufficient training at all levels except for executives or senior management positions, and little recognition given to those who work for quality development on their projects.

The proposed framework is an iterative process, due to the complexity inherent in the construction projects. So what we are trying to do through this framework is to make the quality implementation in construction projects as prevailing pattern that everyone related to the project committed to.

5.5 Conclusion

In this chapter, based on the literature review, and the distributed questionnaire results, and the interview results from analyzing the questionnaire, comparing the condition in our region to other countries, a customized framework is developed to facilitate the implementation of quality management throughout the construction projects in West Bank and make it easier and feasible.

It is believed that the proposed framework has directed toward most of the problems, limitations found in the survey results mentioned in an earlier chapter. It considers quality from various perspectives; it covers the whole construction activities, and offers quality improvement ways to support the activities of such a process and a guide to install them.

The main purpose of such framework is to act as guideline or a road map toward achieving the desired level of quality rather than been as a fixed rules that the companies should follow and stick to.

As shown in figure 5.2, this framework provides an understanding of the components of TQM success in the construction sector. This framework considers the quality training, top management commitment, quality benchmarking, and quality deployment as a practice as starting points for a TQM process.

Evaluations of the quality initiative ensure challenges face to be noted and finally feedback about these results to increase the organization's involvement in improving quality. The framework proposed is derived

from the quality management practices of these organizations, problems they faced in the implementation of their quality management and the critical success factors perceived to be significant by the quality managers, contractors the researcher notice through the interviews. The proposed framework is flexible so it can be applicable for a wide number of companies with different characteristics rather than a specific company.

Chapter 6

Conclusions and Recommendation

6.1 Introduction

The aim of this research is to develop a framework for total quality implementation in the construction projects in West Bank and to achieve this, a number of objectives which were guided by research questions were set. In this chapter, the objectives and research questions are reviewed once again to bring into the scenes the extent to which the goal of the study has been reached throughout the various stages of the research based on the results of the research. The chapter also illustrates conclusions and recommendations based on the implications of this study work. Once again, the problems, limitations that were faced throughout the research are also brought to light.

The construction industry in Palestine is also under pressure to meet future demands and changes especially regarding the quality issues, to have consistent and competent construction sector in Palestine, but it would be difficult to obtain sustainable development in this challenging world if these changes do not occur. These issues among others are particularly challenging in the complicated situation that is facing Palestine as an occupied country with limited resources and restricted access to the outside world.

The West Bank has witnessed major developments positive as well as negatives in the construction sector in the last decade. In order to meet future demands and foster successful projects, one of the major components that witnessed noticeable change is the quality component, it is hoped that this study may contribute to the development of Palestine.

6.2 Conclusions of the Research:

The construction sector in Palestine is one of the key economic sectors and is the main force enhancing the national economy. While it did not take its required improvements because of many challenges and obstacles, which should be well reviewed to be solved and bypass.

Therefore, this research was conducted which aims to survey the construction quality issues in West Bank from the different local contractors' Perspectives. It should be emphasized that the purpose of this research was to shed light on the issues of quality management in West Bank, and to identify the problems and the obstacles facing QM and the construction industry; the research looked closely at the situation in the contractor's sector related to projects, and analyzed the current situation where construction projects face problems regarding quality issues.

According to the literature review and the interviews that we conducted there is a direct linkage between the total project management dimension especially the quality dimension and the construction organization performance, for example when the contractor constructs the

structural element in appropriate way since the first time in such way the contractor saves the time, material and overhead, rather than repeats the work if the quality is inconsistent or not compliant to the specification.

Based on the results of the research, the main findings that are concluded are:

1. The survey showed that the majority of Palestinian contractors are educated; the results indicated that more than (90%) of contractors are university graduates, with different degrees, so enhancing their knowledge and perception about the TQM will be easier.

2. A sizable proportion of respondents contracting companies (45.2%) have buildings projects as the major work for their companies. The data showed also that the majority of these companies (33.9%) accomplished 10-49 projects

3. The survey results showed that most of contracting companies (41.3%) have less than 50 employees, and that an indication that the contracting companies in West Bank tend to the sub-contracting which is a process in which the main contractor sold the contract to other company and keep a constant percentage of the contract as a guaranteed profit, and that lead to some obstacles regarding the quality of the construction.

4. As results indicated that (27%) of the contracting companies have less than 5 engineers, and that definitely affect the performance of the construction projects, because usually the contractor engineers tend to be

over-loaded have many tasks to do, and often been stressed and for sure that will affect the performance of the project and the overall quality of the structure.

5. Based on the results of the distributed questionnaire, we conclude the following which leads to the importance of the proposed framework that we illustrated previously:

_ 28.7 % of the respondents have no Quality System in their firms and organizations.

_37.8% of the respondents has no quality department in the organizational structure of their firms.

_49.6% of the respondents has no ISO-Certificate in their firms and organizations.

_28.7% of the respondents rating the customer satisfaction with low or none degree, which is an evidence of low awareness of customer relation issues and its direct relation with the successful implementing of total quality system.

_ 42.6% of the respondents rank the quality as the most important factor among the work factor that affecting the construction project, on the other hand, 41.7% of the sample believe that the TQM will be beneficial for the organization; and that insist the importance of creation a framework that

facilitate the developing and implementing a TQM in the construction projects in West Bank.

6.3 The Research Contribution

This research adds a contribution to the construction contracting studies in West Bank. This contribution is represented by enlightening and clarifying very important issues related to the quality issues and its implementation in the construction projects in West Bank.

After reviewing the literature, several interviews were conducted to measure the contractors' perception about implementing the quality management in construction projects in West Bank, the researcher distributed a questionnaire, by checking other researchers in other countries attempts and investigating the current situation in the West Bank using the results attained from analyzing the questionnaire, comparing the condition in our region to other countries, a customized framework were developed to enhance the quality concept in region; pass the obstacle to improve the performance of the construction projects and reach the required level of the quality to reach the customer satisfaction.

The core of this research is presented through the developed framework to facilitate the implementation of quality management in construction projects on West Bank that the research recommend to be highly considered from the contractors union, engineers association and the other cooperation in West Bank to increase the awareness about the

importance on implementing the quality concepts in the construction projects in West Bank due to its noticeable benefits. To the author knowledge, this framework for implementing quality management in West Bank construction projects is considered to be the first customized framework in the region that handles the quality implantation stages in parallel with construction project life cycle.

6.4 Recommendations

The following are practical recommendations to the all interested institutes; owners and to contractors which could lead to better quality system practices in West Bank:

1. Referring to the Table 4-5, that shows around 43% of the respondents ranking the quality as the most important component of any construction projects, so the funder is recommended to introduce polices toward awarding tenders to the most accurate cost and not necessarily to the lowest price, the accurate cost for sure will take into account the quality issues.
2. The funder, owner, or generally the client is advised to make high control and upgrade the contracts items and do not allow any violation regarding the quality issues, and to motivate the contractors not to treat the quality issues as a contractual requirement, but to encourage him to stick to the quality management concepts.
3. Referring to table 4-1and 4-2 that shows the main factors affecting the quality, the main barriers of implementing quality, It is highly

recommended to PCU and Association of Engineers to conduct continuous training and education programs through training courses, lectures, seminars, and workshops that helps them to be familiar with quality concepts and primarily its benefits. These training programs aim to increase contractors realizing and understanding of quality importance and to improve their practices for future quality management.

4. Contractors are advised to review all contracts documents very well before signing the contract. They should give themselves enough time to study these documents and make necessarily site visits to take a good picture of the contract conditions and the quality issues related to the proposed work. Moreover, they should take advice, support, and assistance from experts to explain any ambiguous item or unclear sentences, moreover they should review the method of statement they submitted to the consultant this method of statement should be reliable and applicable.

5. Referring to Table 4-4 that shows the most important tools of implementing quality which is laboratory experiments, and Table 4-5 that shows that around 40% of the contracting firms have no quality departments, and around 50% of the firms have no quality certifications, so contractors are advised to move seriously toward achieving a comprehensive quality system in their organizations, that include creating a quality department in the organization structure; hiring a quality control engineers; and to achieve a certified degrees in quality commitment the ISO certificate as an example.

6. Referring to Table 4-5 that shows that a noticeable percentage of the contractors underestimate the sub-contracting effects on their firms, so contractors should think deeply before making any sub-contracting with other firms, evaluate the situation and the condition, if it's beneficial or it will harm the firm interest and damage the quality system of the firm, this may lead to lose the competitive advantage of being a considerable rival in the construction sector.

7. The contractors should think deeply about the tradeoff of the projects component, because the quality is more important than the cost in some cases to keep the firm reputation, so they have to judge after evaluating the whole situation rather than thinking based on the cost perspective.

8. Successful implementation of TQM in the construction projects can be achieved through developing effective quality management system, persistence, and positive hands on leadership. Accomplishment in quality performance requires that top management should be dedicated to that ambition. In other words, those in top management must provide the initiative, direction commitment, resources for successful quality assurance practices and must support the quality program in the organization if such a program is to be successful.

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Appendix A

Interviews

Dear Sir,

This is an interview that will be conducted with contractors in the West Bank as a tool for a master degree in Engineering Management, to study the contractors' perception about implementing quality management in construction project in West Bank. The information in this interview will be used only for academic research purposes to help in developing the questionnaire that will be distributed, with a complete commitment to absolute confidence.

Regards.

1. In your opinion, which of these words are best define quality?
2. What is your organizations' perception of quality?
3. What are the most important success factors that affect the implementation of quality management in the West Bank construction projects?
4. What are the most important barriers for implementing the quality management in construction projects?
5. What are the most important benefits for implementing the quality management in construction projects?

6. What are the tools and techniques for monitoring the quality issues within the construction projects?
7. What is the most important component for the projects?
8. What do you think about the sub-contracting policy?

Questionnaire

Dear Sir,

This is a questionnaire that will be conducted with contractors in the West Bank as a tool for a master degree in Engineering Management, to study the contractors' perception about implementing quality management in construction project in West Bank. The information in this questionnaire will be used only for academic research purposes, with a complete commitment to absolute confidence.

Prepared by

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Part one: Basic Information

1. What is your education level?

Diploma

Bachelor

Master

PhD

Others

2. What is your age in years?

20-29

30-39

40-49

50-59

More than 60

3. What is your job title?

Resident engineer

Quality control manager

General Manager

Director

Others. Specify.....

4. What experience do you have in years?

Less than 5

5-9

10-14

15-19

More than 20

5. What is the main-sector of projects your company is dealing with:

Building

infrastructure

Electro-mechanical

others

6. How many projects does your company accomplish so far?

0-9

10-49

50-100

more than 100

7. How many employees does your company have?

Less than 50

50-100

100-150

150-200

More than 200

8. How many engineers does your company have?

Less than 5

5-10

10-15

15-20

More than 20

Part Two: Knowledge of Quality

9. In your opinion, which of these words best define quality? (Not limited to single answer)

Fitness to use

Appearance

Teamwork

value for money

Increase profit

Satisfying customer

Reliability
consistency

Inversely proportional to variability,
 Others. Specify.....

10. What is your organizations' perception of quality?

Contract Requirement

Marketing Tool

Management Approach

competitive advantage

Others. Specify.....

11. Do you have a quality system in your organization?

Yes

No

In process

Don't know

12. Does your company have a quality department?

Yes

No

In process

Don't know

13. Did your company get the ISO certificate ?

Yes

No

In process

Don't know

14. Do you think that achieving the ISO certificate is an indicator for good performance and maintaining a consistent level of quality?

Strongly Agree

Agree

Disagree

Strongly Disagree

Others. Specify.....

15. Did you motivate your employees and your engineers to keep the quality concept in mind ?

always

never

sometimes

16. Does your company award the employees or the engineers who maintain the quality in their performance ?

Yes

No

Sometimes

Don't know

17. How would you rate the customer satisfaction in your company?

None

Low

Medium

High

Very high

18.From your point of view which one is the most important?

Cost

Time

Quality

Safety

Others. Specify.....

19. Below are a number of critical successes Variables (dependent and independent) which can have an impact on quality management in your firm. Please evaluate how each one can influence quality management (Please mark just one appropriate box)

1=Strongly disagree

3=Natural

2=I don't agree

4=Agree

5=Strongly agree

Critical Successes Factors	1	2	3	4	5
Leadership and Top Management Commitment(I)	<input type="checkbox"/>				
Overall Customer Management(I)	<input type="checkbox"/>				
Training and Education(I)	<input type="checkbox"/>				
Skilled work force(I)	<input type="checkbox"/>				
People Management and Empowerment(I)	<input type="checkbox"/>				
Supplier Partnership (I)	<input type="checkbox"/>				
Rewards and Recognition(I)	<input type="checkbox"/>				
Effective Communication(I)	<input type="checkbox"/>				
Subcontractors' involvement (I)	<input type="checkbox"/>				
Organizational culture (D)	<input type="checkbox"/>				
Construction teamwork satisfaction(D)	<input type="checkbox"/>				
Client satisfaction(D)	<input type="checkbox"/>				
Project performance(D)	<input type="checkbox"/>				

20. Below are a number of barriers for implementing quality management in construction projects. Please evaluate how each one can influence the implementation of quality management (Please mark just one appropriate box)

1=Strongly disagree

3=Natural

2=I don't agree

4=Agree

5=Strongly agree

The Barriers	1	2	3	4	5
Lack of Knowledge and Skills	<input type="checkbox"/>				
Product problems	<input type="checkbox"/>				
Turnover in company	<input type="checkbox"/>				
Lack of consultant supervision	<input type="checkbox"/>				
Unrealistic deadline	<input type="checkbox"/>				
Worker personality and attitude	<input type="checkbox"/>				
Ineffective Communication	<input type="checkbox"/>				
Lack of Coordination Between the Site and Office	<input type="checkbox"/>				
Too Much of Paper work and Documentation	<input type="checkbox"/>				
Problems with Sub-contractors	<input type="checkbox"/>				
Difficulties in Understanding the Quality System	<input type="checkbox"/>				
Unwillingness of Project Staff to Accept the Quality System	<input type="checkbox"/>				
Lack of proper equipment and tools	<input type="checkbox"/>				
Bad, and hard working conditions	<input type="checkbox"/>				
Working with inexperienced people	<input type="checkbox"/>				
Awarding the contracts to the lowest bidders	<input type="checkbox"/>				
Contractors Union environment	<input type="checkbox"/>				

21. Will a total quality management TQM program be beneficial to your organization?

Yes

NO

Can't say

Others

22. Below are a number of benefits for implementing quality management in construction projects. Please evaluate how each one can be beneficial for the projects and for the firm (Please mark just one appropriate box)

1=Strongly disagree

3=Natural

2=I don't agree

4=Agree

5=Strongly agree

The Benefits	1	2	3	4	5
Helps to identify the problems area	<input type="checkbox"/>				
Helps in improve cost estimating	<input type="checkbox"/>				
Achieve the desired outcomes and keep the customer satisfied	<input type="checkbox"/>				
Improve warranty claims	<input type="checkbox"/>				
Attain and sustain the competitive advantage	<input type="checkbox"/>				
keep improving the performance	<input type="checkbox"/>				
maintain a consistent level of products and services	<input type="checkbox"/>				
Improved safety	<input type="checkbox"/>				
increase the firm market share	<input type="checkbox"/>				
Develop the firm image and being a qualified competitor –market position-.	<input type="checkbox"/>				
Reduced rework	<input type="checkbox"/>				
Improved employee job satisfaction	<input type="checkbox"/>				
Lower employee turnover	<input type="checkbox"/>				
Improved schedule performance	<input type="checkbox"/>				

26. If your company has a quality system, do you think there is a relation between the quality implementation in construction projects and increasing the customer satisfaction?

YES No

Sometimes

27. If your company has a quality system, do you think there is a relation between the quality implementation in construction projects and increasing the company performance?

YES No

Sometimes

28. Do you think that rating the suppliers/subcontractors based on quality performance is?

Not Significant Moderately Significant

Slightly Significant Very Significant

Exceedingly Significant

29. Are suppliers/subcontractors rated based on quality performance?

Yes No

Sometimes Don't Know

30. Did the suppliers/subcontractors pay for the defects they made in regard to quality

Yes No

Sometimes Don't Know

استبيان حول إدارة الجودة في المشاريع الإنشائية في الضفة الغربية

الأخ المقاول/ المهندس الفاضل :

بعد التحية، أتقدم بجزيل الشكر للمساهمة بجزء من وقتكم وجهدكم لتعبئة هذا الاستبيان.

يهدف هذا الاستبيان إلى دراسة إدارة الجودة في المشاريع الإنشائية في الضفة الغربية، وهو جزء من البحث التكميلي لنيل درجة الماجستير في الادارة الهندسية من جامعة النجاح الوطنية ، آمليين أن تؤدي هذه النتائج إلى تحسين إدارة الجودة في المشاريع الإنشائية في الضفة الغربية.

مع العلم أن المعلومات المعبأة في هذا الاستبيان هي فقط من اجل أغراض البحث العلمي وسوف يتم التعامل معها بمبدأ السرية التامة.

الباحث: م. أحمد راشد

بريد الكتروني : rashed18688@gmail.com

الجزء الأول : معلومات عامة

1.المؤهل العلمي لمعبي الاستبيان؟

دبلوم بكالوريوس ماجستير دكتوراه غير ذلك

2.العمر لمعبي الاستبيان ؟

29-20 39-30 49-40 59-50 أكثر من 60

3.المركز الوظيفي لمعبي الاستبيان؟

مهندس مشروع مهندس ضبط جودة مدير مشروع مدير تنفيذي غير ذلك

4. عدد سنوات الخبرة لمعبي الاستبيان ؟

أقل من 5 سنوات 5-9 سنوات 10-14 سنة 15-19 سنة أكثر من 20 سنة

5. نوع المشاريع التي تركز عليها الشركة ؟

مبانى بنية تحتية كهروميكانيك غير ذلك

6. عدد المشاريع التي تم انجازها بواسطة الشركة حتى الآن ؟

0-9 مشروع 10-49 مشروع 50-100 مشروع أكثر من 100 مشروع

7. عدد الموظفين في الشركة؟

أقل من 50 موظف 50-100 موظف 100-150 موظف

150-200 موظف أكثر من 200 موظف

8. عدد المهندسين في الشركة ؟

أقل من 5 مهندسين 5-10 مهندسين 10-15 مهندس

15-20 مهندس أكثر من 20 مهندس

الجزء الثاني : مقدار الوعي والمعرفة عن الجودة

9. من وجهة نظرك، أي الجمل التالية هو أفضل تعريف للجودة (لست ملزما بإجابة واحدة)؟

الملائمة للاستخدام المظهر العمل الجماعي القيمة المالية للمنتج

زيادة نسبة الأرباح رضا الزبائن الدقة الحفاظ على ثبات اداء المنتج

غير ذلك، الرجاء التوضيح.....

10. كيف يتم إدراك مفهوم الجودة من وجهة نظر شركتكم؟

- كجزء من متطلبات العقد كأداة تسويقية لزيادة الأرباح مبدأ إداري يتم تنفيذه من قبل المؤسسة
- للوصول للميزة التنافسية غير ذلك، الرجاء التوضيح.....

11. هل يوجد لديكم نظام جودة في مؤسستكم ؟

- نعم لا جاري تطوير النظام لا اعرف

12. هل يوجد لديكم دائرة متخصصة بنظام الجودة في مؤسستكم ؟

- نعم لا جاري تطوير الدائرة لا اعرف

13. هل حصلت شركتكم على شهادة الايزو للجودة ؟

- نعم لا جاري التحضير للحصول عليها لا اعرف

14. هل تعتقد أن الحصول على شهادة الايزو للجودة هو مؤشر جيد للأداء الفعال والمحافظة على مستوى ثابت من الجودة ؟

- موافق بشدة موافق اعترض اعترض بشدة غير ذلك، وضح

15. هل تحافظ شركتكم على تحفيز وتشجيع موظفيك ومهندسيك للاعتناء بمسألة الجودة وإبقائها قضية ذات أهمية وأولوية ؟

- دائما أبدا أحيانا

16. في شركتكم هل يتم تكريم الموظفين والمهندسين الذين يحافظون على ثبات مستوى الجودة في أدايتهم وأعمالهم ؟

- نعم لا أحيانا لا اعرف

17. من وجهة نظرك ما هو مدى أهمية رضا الزبائن عن شركتكم ؟

- غير مهم قليل الأهمية متوسط الأهمية مهم في غاية الأهمية

18. من وجه نظرك ماهو أكثر مركبات المشروع أهمية ؟

التكلفة الوقت الجودة الحماية والأمان غير ذلك، وضح.....

19. بالأسفل عدد من العوامل ذات تأثير على تطبيق نظام الجودة في الشركات (عوامل مرتبطة ومستقلة)، من وجهة نظرك هل تعتقد ان هذه العوامل تؤثر على تطبيق نظام الجودة (الرجاء اختيار خيار واحد فقط).

1=أعترض بشدة 2=أعترض 3=محايد 4=موافق 5=موافق بشدة

العامل	1	2	3	4	5
التزام الإدارة العليا (مستقل)	<input type="checkbox"/>				
ادارة الزبائن (مستقل)	<input type="checkbox"/>				
التدريب والتعليم (مستقل)	<input type="checkbox"/>				
القوى العاملة المهنية والمدربة (مستقل)	<input type="checkbox"/>				
إدارة الأفراد والتفويض (مستقل)	<input type="checkbox"/>				
الشراكة مع الموردين وإدارة سلاسل الإمداد(مستقل)	<input type="checkbox"/>				
المكافآت والتقدير (مستقل)	<input type="checkbox"/>				
التواصل الفعال (مستقل)	<input type="checkbox"/>				
اشراك مقاول الباطن في العملية (مستقل)	<input type="checkbox"/>				
الثقافة السائدة في المؤسسة (مرتبط)	<input type="checkbox"/>				
رضا فريق العمل (مرتبط)	<input type="checkbox"/>				
رضا الزبائن (مرتبط)	<input type="checkbox"/>				
اداء العمل في المشروع (مرتبط)	<input type="checkbox"/>				

20. بالأسفل أهم معيقات تطبيق إدارة الجودة في المشاريع الإنشائية في الضفة الغربية، من وجهة نظرك ما مدى تأثير كل

من هذه المعيقات على تطبيق إدارة الجودة في المشاريع الإنشائية في الضفة الغربية (الرجاء اختيار خيار واحد فقط).

1= أعترض بشدة 2=أعترض 3= محايد 4=موافق 5= موافق بشدة

العائق	1	2	3	4	5
نقص في الموارد والإمكانيات في المؤسسة	<input type="checkbox"/>				
مشاكل متعلقة بطبيعة المنتج	<input type="checkbox"/>				
تخلي الموظفين عن الشركة في مرحلة معينة من عمر المشروع	<input type="checkbox"/>				
نقص في عملية الاشراف من قبل الاستشاري	<input type="checkbox"/>				
وضع مواعيد زمنية غير دقيقة	<input type="checkbox"/>				
عوائق متعلقة بطبيعة القوى العاملة وتعاملها مع المستندات	<input type="checkbox"/>				
نظام اتصال وتواصل غير فعال	<input type="checkbox"/>				
ضعف التنسيق ما بين مواقع العمل وبين المكاتب	<input type="checkbox"/>				
الإرهاق المتعلق بكثرة أعمال الورقيات والتوثيق	<input type="checkbox"/>				
مشاكل متعلقة بالمقاول الباطن وإهماله لنظام الجودة في المشاريع الإنشائية	<input type="checkbox"/>				
صعوبات وعقبات متعلقة بفهم مبدأ نظام الجودة وكيفية تطبيقه	<input type="checkbox"/>				
عدم الرغبة من الطاقم في الشركة لتطبيق نظام الجودة وممانعتهم لتطبيق هكذا نظام	<input type="checkbox"/>				
نقص في المعدات والالات	<input type="checkbox"/>				
طبيعة ظروف العمل السيئة والشاقة	<input type="checkbox"/>				
التعامل مع موظفين وفنيين غير مؤهلين	<input type="checkbox"/>				
احالة العطاءات للشركات على اساس اقل سعر فقط	<input type="checkbox"/>				
امور تتعلق بظروف اتحاد المقاولين	<input type="checkbox"/>				

21. هل تعتقد أن برنامج ونظام الجودة هو شيء مفيد لمؤسستكم؟

نعم لا لا تعليق غير ذلك

22.بالأسفل أهم الفوائد من تطبيق نظام إدارة الجودة في المشاريع الإنشائية في الضفة الغربية، من وجهة نظرك ما مدى تأثير كل من هذه الفوائد من تطبيق إدارة الجودة في المشاريع الإنشائية في الضفة الغربية (الرجاء اختيار خيار واحد فقط).

1=أعترض بشدة 2=أعترض 3=محايد 4=موافق 5=موافق بشدة

العائق	1	2	3	4	5
تساعد في تحديد أماكن المشاكل بدقة	<input type="checkbox"/>				
تساعد في تطوير تقدير التكلفة للمشروع	<input type="checkbox"/>				
الوصول للنتائج المرجوة من المشروع والحصول على رضا الزبائن بشكل دائم	<input type="checkbox"/>				
تساعد في تقليل مصاريف الكفالة والادعاءات من قبل الاستشاري أو المالك	<input type="checkbox"/>				
الوصول والمحافظة على الميزة التنافسية	<input type="checkbox"/>				
المحافظة وتطوير الأداء بشكل مستمر	<input type="checkbox"/>				
المحافظة على مستوى ثابت من جودة المنتج والخدمة	<input type="checkbox"/>				
تطوير امور ومتطلبات السلامة في المشروع	<input type="checkbox"/>				
الحصول على حصة سوقية اكبر وبالتالي زيادة المبيعات والأرباح	<input type="checkbox"/>				
تطوير صورة الشركة من وجهة نظر الزبون والوصول إلى مرتبة قوية مقارنة بالمنافسين	<input type="checkbox"/>				
تقليل نسبة الاعمال غير المطابقة للمواصفات	<input type="checkbox"/>				
زيادة نسبة رضا العاملين في المشروع	<input type="checkbox"/>				
تقليل نسبة خروج الموظفين من الشركة	<input type="checkbox"/>				
زيادة انتظام المشروع ومطابقته للجدول الزمني	<input type="checkbox"/>				

الجزء الثالث: طريقة الحصول على المعلومات :

23.هل تقوم مؤسستكم بجمع المعلومات لقياس أداء العمليات التي يتم تأديتها ؟

نعم لا لا اعرف

24.بالأسفل أهم الوسائل والتقنيات المستخدمة لقياس الجودة التي يتم تطبيقها في المشاريع الإنشائية، من وجهة نظرك ما مدى أهمية وتأثير كل من هذه التقنيات في تطبيق إدارة الجودة في المشاريع الإنشائية في الضفة الغربية (الرجاء اختيار خيار واحد فقط).

1==أعترض بشدة 2=أعترض 3=محايد 4=موافق 5=موافق بشدة

التقنية	1	2	3	4	5
خطة الجودة للمشروع	<input type="checkbox"/>				
التقرير اليومي	<input type="checkbox"/>				
التقرير الأسبوعي أو تقرير الأسبوعين	<input type="checkbox"/>				
طريقة تنفيذ الأعمال	<input type="checkbox"/>				
الفحص الدوري	<input type="checkbox"/>				
التجارب المخبرية	<input type="checkbox"/>				
الإشراف المباشر	<input type="checkbox"/>				

25. في مؤسستكم كيف يتم قياس رضا الزبائن عن المشاريع ؟

لا يتم قياسها إجراء استبيان من خلال عدد الشكاوي غير ذلك، وضح.....

26. إذا كان لدى مؤسستكم نظام جودة، هل تعتقد أن هناك علاقة بين تطبيق نظام الجودة في المشاريع الإنشائية وزيادة معدل رضا الزبائن؟

نعم لا أحياناً

27. إذا كان لدى مؤسستكم نظام جودة، هل تعتقد أن هناك علاقة بين تطبيق نظام الجودة في المشاريع الإنشائية وزيادة فعالية أداء الشركة؟

نعم لا أحياناً

28. هل تعتقد أن تصنيف الموردين/ مقاولين البطن على أساس جودة الأداء؟

1= غير مهم 2=مهم إلى حد ما 3=مهم 4=مهم جدا 5= في غاية الأهمية

29. هل تقوم مؤسستكم بتصنيف الموردين/ مقاولين البطن على أساس جودة الأداء ؟

نعم لا أحياناً لا اعرف

30. هل يتم تحديد الأخطاء في أعمال مقاول البطن الذي تتعامل معه شركتكم وهل يتكفل بتصليح الأخطاء والأعمال غير المطابقة للمواصفات ونظام الجودة ؟

نعم لا أحياناً لا اعرف

جامعة النجاح الوطنية

كلية الدراسات العليا

اطار عمل لتطبيق ادارة الجودة في المشاريع الانشائية في
الضفة الغربية

إعداد

أحمد راشد

إشراف

د. محمد عثمان

قدمت هذه الاطروحة استكمالاً لمتطلبات الحصول على درجة الماجستير في الادارة الهندسية ،
بكلية الدراسات العليا ، جامعة النجاح الوطنية، نابلس - فلسطين

2014

ب

اطار عمل لتطبيق ادارة الجودة في المشاريع الانشائية في الضفة الغربية

إعداد

أحمد راشد

إشراف

د. محمد عثمان

الملخص

تحاول الشركات حول العالم تحقيق مستويات دولية مقبولة للجودة لضمان وضعها في السوق الدولية الناشئة، لاسيما تلك الشركات من الاقتصاديات النامية. للأسف قطاع الانشاءات تحلف عن الصناعات الاخرى في تطبيق نظام الجودة الذي يوفر رضا الزبائن من خلال التحسينات المستمرة للمنتجات، العمليات أو الخدمات.

السبب الرئيسي لتخلف قطاع الانشاءات عن الصناعات الاخرى في تطبيق نظام الجودة هو الاعتقاد بأن نظام الجودة هو للصناعات الاخرى كالخدمات او القطاعات الانتاجية اكثر مما هو لقطاع الانشاءات.

الهدف من هذا البحث هو دراسة تنفيذ إدارة الجودة في المشاريع الانشائية في الضفة الغربية. حيث يعتبر قطاع الانشاءات والتشييد كقطاع حيوي في اقتصاد اليوم، وذلك بسبب التطور في هذا القطاع في العالم بصورة عامة والضفة الغربية بصورة خاصة.

تم توزيع (300) استبانة على شركات المقاولات المسجلة في اتحاد المقاولين الفلسطيني وذلك لاستقصاء آرائهم عن اهم عوامل نجاح تطبيق نظام الجودة في المنطقة وأهم المعوقات ، وما هي اهم الفوائد التي يمكن الحصول عليها في حال تم تطبيق هكذا نظام في قطاع الانشاءات في الضفة الغربية. أما المعلومات والارقام التي تم الحصول عليها من الاستبانات فقد تم جمعها وتحليلها من خلال البرنامج الاحصائي (SPSS).

اشارت النتائج الى انه وبالرغم من ادراك الشركات لاهمية نظام الجودة الا ان ادراكهم لمفهوم نظام الجودة لا يتجاوز الاجراءات التصحيحية بعد حدوث الاخطاء، لكنهم لم يصلوا بعد لمرحلة الاجراءات الوقائية والتي تمنع وقوع الخطأ حتى قبل حدوثه.

النظام، وغياب الالتزام والوعي سواء من قبل العاملين او من قبل الادارة العليا للشركة باهمية هذا النظام.

اما اهم فوائد تطبيق نظام الجودة في المشاريع الانشائية في الضفة الغربية فقد اشارت نتائج الاستبانة الى استمرار تحسين الاداء بشكل متواصل، تحسين صورة الشركة ورفع مكانتها في السوق ووصولها لكونها منافس قوي في سوق الانشاءات، الوصول والحفاظ على الميزة التنافسية في سوق الانشاءات تعتبر من اهم فوائد تطبيق هذا النظام.

بالاعتماد على النتائج التي تم الحصول عليها من خلال الاستبانة التي تم توزيعها فقد تم تطوير اطار عمل ليسهل ويحقق تطبيق نظام جودة في المشاريع الانشائية في الضفة الغربية.

