Arab American University
Faculty of Graduate Studies

Assessment of TQM Implementation in High-Rise Buildings in West Bank

By:
Abdul-Rahim Jadallah

Supervisor:
Dr. Fuad Barghouthi

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Master thesis approval

This thesis was defended successfully on.....
and approved by:

Committee members	signature
1 Dr. Fuad Barghouthi/Supervisor	.....
2 Dr.Yahya Saleh/ External Examiner	.....
3 Dr. Ashraf Almimi/Internal Examiner	.....

Declaration

The work provided in this thesis, unless otherwise referenced, is the student's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's name:

Signature:

Date:

Dedication

To the soul of my first educators:

Parents in their rest;

To my dear wife;

Sons and daughters;

Allah may bless them;

For their patience and encouragement that brought this work to light…

With great Love and Respect

Abdul-Rahim

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Abstract

The matter of housing is a basic need of human being; it provides him with a material and moral refuge. The human need for housing demands that TQM should receive a special attention. TQM in high-rise buildings is particularly important because of the specificity of these buildings, the commonalities that accompany the residents of the building itself and the specific needs of this type of housing.

This study aims to identify barriers that hinder the implementation of TQM in high-rise buildings in West Bank. The barriers categorized into cultural, legal, administrative, executive, logistical and financial reasons.

The study used the quantitative and qualitative approach as well; quantitative approach used to analyze the questionnaire statistically and qualitatively by analyzing an open-ended question.

The questionnaire revealed that respondents do not have a clear idea of the extent to which TQM practiced in the construction of high-rise buildings in West Bank. The main barrier impeding the implementation of TQM is the focus on profit and cost reduction. Respondents appreciate the importance of TQM regardless of their demographic criteria.

The study concluded with recommendations to improve the situation in the construction sector in West Bank such as organizing the construction sector, spreading the value of TQM, enacting legislation to promote TQM,

and not adopting the lowest prices as a main reason for awarding tenders to contractors.

Key word: TQM, high-rise buildings, the construction sector in Palestine.

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List of Abbreviations

1	ANOVA	Analysis of variance
2	COQ	Cost of quality
3	DF	Degrees of freedom
4	F	F-test
5	HMSO	Her Majesty's Stationery Office
6	IBID	Latin word used to refer to the source cited in the preceding note or list item.
7	PEA	Palestine Engineers Association
8	PCBS	Palestinian Central Bureau of Statistics
9	PCU	Palestinian Contractors Union
10	PFI	Palestinian Federation of Industries
11	PSI	Palestinian standards institute
12	p-value	Probability value
13	QM	Quantity management
14	QMS	Quantity management system
15	R & D	Research and development
16	SWOT	Strengths, weaknesses, opportunities and threats
17	TQM	Total Quality Management
18	WB	West Bank

Chapter One

Introduction

1.1 Overview

The Palestine society is a young one, the percentage of youth in the age group of (15-29 years) in Palestine comprises 30% of the total population, distributed by 36% in the age group of (15-19) years and 64% in the age group of (20-29) years old (Palestinian Central Bureau of Statistics (PCBS), 2017).This requires a lot of investment in construction, as well as other vital future needs.

Construction is one of the most vital human being needs; the home implies human's physical and psychological needs; therefore, construction sector booms as the population number grows up.

The construction sector is a key one in Palestine; it provides homes, job opportunities, and a significant contribution in Palestinian economy. The importance of construction sector in Palestine economy expresses itself by its contribution to GDP, which rose from $410 million in 1994 to $483 million in 1999 in the West Bank and Gaza Strip (Makhool & Atyani 2002).

High-rise buildings is an international case associated with modern construction; it prevails in Palestine as a solution to lack of land, and the need to reside in cities, especially West Bank cities. High-rise buildings has been booming in Palestine since more than two decades ago, but there is a considerable issue related to high-rise buildings that is quality; quality has been devalued due to weakness of controlling measures and the need of a big segment of Palestinians who can afford apartment prices that leads to devaluation quality on the expense of price. Quality performance in the construction has many definitions including: 'meeting expectations of the customer’,

‘reduced rework or defects’, ‘repeating business, ‘conformance to ISO 9000 criteria’, and ‘completion on-time and within budget’ (Honaker et al., 2010, 956).

Total Quality Management (TQM): - Total quality management can be summarized as a management system for a customer-focused organization that involves all employees in continual improvement. It uses strategy, data, effective communications and involvement of all level employees to integrate the quality discipline into the culture and activities of the organization (Kakkad & Ahuja, 2014).

TQM is one of the important approaches to the success of housing projects; the failure to apply TQM causes many problems for the dwellers of the apartments. The application of TQM is a competitive advantage in the booming real estate market in Palestine. The study is based on the assumption that TQM is an advantage to the customers and the real estate companies as well.

1.2 Statement of the Problem:

The absence of TQM implementation is a problem that affects several sides; it affects the relations between buyers and sellers of apartments, reputation of construction sector and it corrupts the living and aesthetic standards. If the problem was not solved, the state of random building would continue.

This study brings to mind the study of Al-Musleh (2010), that study which is more general about constructions, and it differs in that it talks about constructions in Qatar, while this study focuses on WB.

This study focused on exploring barriers facing the implementation of TQM, so as to help in solving the problem.

1.3 Objectives of the Study:

The study's main objective is to investigate the TQM implementation in high-rise buildings in West Bank cities. The specific objectives are:

1. Evaluating of TQM in high- rise buildings.
2. Studying the barriers that face implementing TQM.

1.4Questions of the Study:

The study's main question is "what are the barriers that hinder implementing TQM in high-rise buildings in West Bank cities". Other questions this research study include:

1. What is the evaluation of the current level of the implementation of quality management in high-rise buildings in West Bank cities?
2. To what extent TQM is applied in the construction of high-rise buildings in West Bank cities?
3. What are the barriers that face implementing TQM in high-rise buildings in West Bank?

1.5 Study Hypotheses:

Hypothesis 1:

H0: There is no significant difference among respondents in perception of the extent to which TQM is applied in the construction of high-rise buildings in West Bank cities at $\alpha=0.05$.

Hypothesis 2:

H0: There is no significant difference among respondents in perception of the barriers that face implementing TQM in high-rise buildings in West Bank cities at α=0.05.

Hypothesis 3:

H0: There is no significant difference in perception of the advantages of implementing of TQM in High-rise buildings in West Bank cities at α=0.05.

1.6 Importance of the study:

The study's importance stems from the importance of housing, especially in Palestine, where displacement, land confiscation by Israelis, and refugee life is a style of the daily life of the Palestinian people. The return of thousands of Palestinians to their homeland after the establishment of the Palestinian Authority necessitated the resorting to the style of high-rise buildings; the great demand on housing and the weakness of controlling on it cause some problems.

1.7 Organization of the Study:

The study consists of five chapters organized as follows:

Chapter one, contains an overview, statement of the problem, objective of study, research question, hypotheses of the study, importance of the study, organization of the study and limitations of the study.

Chapter two, contains literature review covering construction industry in Palestine, TQM and high-rise buildings.

Chapter three presents the methodology of the study, which contains an overview, study procedures, strategy and approach to data collection, questionnaire development and data collection.

Chapter four discusses data collected by the questionnaire, about the barriers that face implementing TQM in high-rise buildings in West Bank cities.

Chapter five includes the conclusions and recommendations.

1.8 Study Limitations:

1. The study focuses on high-rise buildings construction projects only; low-rise building construction will not be discussed in the study.
2. The study is limited only to West Bank.

Chapter Two

Literature Review

2.1 Overview

This chapter covers the following topics: construction industry in Palestine, construction industry size and importance, construction industry composition in Palestine, obstacles encounter by the Palestinian construction sector, total quality management (TQM), TQM definition, TQM tools and techniques, barriers to improve quality in the construction industry, reasons badly affect the quality, benefits of TQM,TQM Importance and Practice in Palestine , Requirements to Implement a TQM Program, cost of quality, high-rise buildings, high-rise buildings definition, high-rise buildings creation and development, why tall buildings, high- rise buildings (towers) design standards, eco-friendly high-rise buildings design standards, types of high-rise buildings, high-rise buildings in Palestine, types of high-rise buildings in Palestine, TQM implementation in high-rise buildings in Palestine; codes, regulations, and standards for high- rise buildings construction, the Palestinian contractors union (PCU),studies on QM in the construction sector, and comparison of this research to other related researches.

2.2Construction Industry in Palestine

2.2.1 Construction Industry Size and Importance

The construction sector is a promising one regarding its importance as well as its contribution in Palestinian GDP and its contribution in the employment. According to census 2017, there are 1,195,848 housing units, 627,488 buildings in West Bank and

Gaza Strip (Palestine central bureau of statistics (PCBS), 2018). In Ramallah and Al-Bireh cities, there are 108,748 housing units (Palestine central bureau of statistics (PCBS), 2018), and the population number of Ramallah and Al-Bireh cities are 322,193 capita(Palestine central bureau of statistics (PCBS), 2018).

The total number of industrial firms working in the construction industry is 350 working facilities regardless of the size of the enterprise and the field of specialty. Whereas the sector is distributed all over the West Bank, the average existing life of the industry is 15 years. Construction industry comprises 73% of the total market share in the West Bank (Palestinian Federation of Industries (PFI), 2009).

The statistical indicators refer to an increasing demand for housing units:

The average latent annual demand for housing in the period 2013-2025 is about 33.3 thousand housing units annually in the West Bank and about 20.2 thousand housing units annually in the Gaza Strip, increasing from about 28.6 thousand units in the West Bank and about 16.4 thousand units in the Gaza Strip in 2013, 37,000 units in the West Bank and approximately 24.15 thousand units in the Gaza Strip in 2025. The average annual growth rate was about 2.19% annually in the West Bank and approximately 3.27% annually in the Gaza Strip Abdel Razeq (2015). The increasing of demand for housing units incites growth of the construction sector.

2.2.2 Construction Industry Composition in Palestine

According to PFI, (2009),the construction industry it is mostly composed of: ready mix concrete, bricks, stone crushers, asphalt products, cement precast manholes, cement pipes, carpe stone and cement tiles PFI (2009).The multi-disciplinary linkages and relations with other sectors in the economy are buildings and contracting, engineering

works and design, metal industries, furniture industries, marble and stone industries, chemical industries, plastic industries and financial services and transportation PFI (2009).

2.2.3 Obstacles Encounter by the Palestinian Construction Sector

The study of Abuhantash &Salah(2009) studied the difficulties arise externally of the Israeli occupation and internally related to the performance of the Palestinian public institutions and weaknesses of mortgage lending. The external and internal difficulties have led to a chronic gap between demand and supply of houses, currently estimated at 50,000 units per year; whereas the study of Makhool and Atyani (2002) aimed to identify the role of the construction and housing sector in the Palestinian economy and the impact of the Israeli measures on it since September 2000, as well as the presentation of the housing units and their characteristics and the cost of building them.

According to Mairs (2017), Weston Williamson claims the needs of the majority of Palestinian households are not being met by the present housing market, with up to 70 per cent unable to afford average house prices.

Office of the Quartet Representative report talked about challenges facing the construction sector represented in titling, land registry and fragmented ownership ,tight mortgage lending standards and lengthy permit process for new construction in East Jerusalem (Representative Office of the Quartet, 2014).

With regards to price, low and middle income population cannot afford house construction; average unit prices are higher than housing budget of 50% to 80% of the population (representative Office of the Quartet, 2014, p. 43).

2.3 Total Quality Management (TQM)

2.3.1 TQM Definition

Total quality management (TQM) is a management system for a customer-focused organization that involves all employees in continual improvement. It uses strategy, data, effective communications and involvement of all level employees to integrate the quality discipline into the culture and activities of the organization (Kakkad& Ahuja, 2014).

TQM is more than good equipment installed in a nice building; rather it is to generate the ethics of high quality throughout the organization. It is also a procedure that guarantees that everything is in compliance with the appropriate standards (Woodward, 1997).

TQM is a continuous improvement process that starts with planning, problem identification, and change order handling and the training of employees (Clough et al., 2000, p. 126).

In the construction sector, quality has three main meanings: implementation of the project on time, the final specifications of the project compliance with the agreed basic requirements, implementation of the project in accordance with the specified budget (Karaman, 2011).

2.3.2 TQM Tools and Techniques

Some techniques are relevant to the production of materials for the project industries; these techniques include sampling and 100% testing. Sampling is used when someone wants to ensure the materials comply with the specific standards; 100% testing when all

work has to be inspected. Sampling and 100% testing could be used when test in not destructive (Woodward, 1997).

The on-going process of improvement is a requirement of TQM. According to CH et al.(2015) the techniques of TQM are: check-sheet, check list, histogram, Pareto diagram, cause-and- effect diagram (fishbone diagram), scatter chart and flowchart (CH et al., 2015, p.1244).

Ali & Reza (2017) added to the techniques mentioned above the control chart technique, and excluded checklistand Cause and Effect Diagram.

The process of improvement must be a continuous one, there are several ways to achieve continuous improvement: administrative review, corrective actions, preventive actions, customer satisfaction and auditing process. The continuous improvement depends on the application of SWOT analysis (strengths, weaknesses, opportunities and threats).

Karaman (2011) explained the ways to achieve continuous improvement as follows: Administrative Review: Annual or semi-annual periodic meetings chaired by the Director General to review the adequacy of the company's strategy, objectives, policies and processes in relation to market changes.

Corrective actions: A corrective action is an act to remove the cause of the non-conformity detected or other undesirable situation.

Precautionary action: is an act to remove the cause of potential nonconformity or other potential undesirable status.

The principles of TQM create a basis for the development of the system in the company in order to plan, control and improve quality. These principles are achieved with the assistance of six basic support elements: leadership through the role of senior

management in the company, education and training, supporting structure represented by the administrators responsible for implementing the quality strategy, measurement, and communication (Karaman, 2011, p. 83).

2.3.3 Barriers to Improve Quality in the Construction Industry

Several barriers may hinder the process of improving quality; the primary barrier to management system implementation success seems to be the natureof the construction process.The projects are often very large, labour intensive and seldomsituated in the same location; the workforce tends to be transient; and demand fluctuates,subject to the client's perception of the value of the construction project (Sommerville,1994 as cited in Hoonakker et al. (2010). A second barrier to quality implementation is the contradicted interests of the three primary participants: the owner (or customer), the architect/ designer/engineer, and the (general) contractor.Sub-contractors and suppliers can be added to the parties involved in construction industry.A third barrier to quality implementation is non-standardisation, no universal standard or specification can be applied to the product, which leads to difficulties in quality assurance.A final and important barrier to quality implementation and management is the bidding process in which competitiveness may entail endeavor to reduce involvement in safety and/or quality management which can be very costly to a contractor, if they encounter accidents during the project. They may also experience schedule delays for many reasons: weather, labour shortage, late delivery of equipment or materials, andother events beyond the control of the contractor (Hoonakker et al., 2010, pp. 962-963).

Due to the role and interference of the owner in many stages in the construction process, quality in construction vary when compared with other manufacturing or service sectors (Al-Musleh, 2010).

2.3.4 Reasons badly affect the Quality

According to Syaj (2015), the reason contractors gain bids are offering low prices for them; insufficient knowledge of practicing of QMS; lack of continuous education, training and awareness in the field of their business. Moreover, there is a lack of implementation of safety measures, review drawings, and be on time in fetching materials required for construction. Syaj (2015) identified 60 factors needed to implement TQM in Palestine.

The study of Ali and Reza (2017) mentioned some causes of bad quality such as inadequate technical experts and the proper design mix (Abdullah, 2015, p.95); while Al-Musleh (2010) found out that lack in communication, poor workmanship and lack of site supervision are causes of poor quality.

2.3.5 Benefits of TQM

Reducing rework, attaining customer satisfaction, improving schedule performance and mutual relationships among partners are some of the benefits of quality management (Hoonakker et al., 2010, 962).(Love et al.,1999 as cited in Hoonakker et al., 2010) found that the costs associated with rework (having to redo a step or portion of construction due to poor craftsmanship or change in plan) were as high as 12%of the total project costs and required as much as 11% of the total project working hours (Hoonakker et al., 2010, p. 962).

The benefits of the quality control system according to Alwan (2013) are: improving the quality of the product required, reducing the cost of manufacturing the product by reducing the damage rates of products, improving the market share of the company's sales, contributing to the success of production and operations management in the company, reducing the number of times the production line/s stop, and the possibility of reducing the prices of selling the product to the consumer because of the reduction of the cost of production (Alwan, 2013, p. 49).

2.3.6 Requirements to Implement a TQM Program

The study by CH.et al. (2015) observed that the requirements to implement a TQM program are a stable behavior and attitude process, availability of logistics in TQM, employee understanding and commitment and continuous education and training.

2.3.7 TQM Importance and Practice in Palestine

Quality is so important in the construction sector. Since dwelling is a long-lasting product, it must have a high quality to satisfy the consumer needs, as well as give the contractor and designer a good reputation.

According to PFI (2009), not all firms have acquired the Palestinian Standards (PS) for their products, and even those which acquired it are hardly able to maintain and keep it. The construction industry is weak in the processes of validation, inspection and frequent controls and checks. Moreover, PSI lacks sufficient resources and mechanisms to control the whole process (PFI, 2009, p.18).

2.3.8 Cost of Quality

If a construction company faces any failure, it will pay a heavy price for that, this is part of cost of quality the research is going to address.

Major components of cost of quality (COQ) are generally divided into costs of conformance and costs of nonconformance.

Costs of conformance are divided into prevention cost- these are the cost of any action taken to investigate, prevent or reduce the risk of non-conformity or defect- such as planning, preparation, training, preventive maintenance and evaluation; and the appraisal costs, which are the costs of evaluating the achievement of quality requirements including the cost of verification and control performed at any stage of the quality loop; such as production trial, test and measurement (San, 2000,p.4).

Costs of nonconformance are divided into internal failure costs, which are the costs arising within organization due to non-conformity or defects at any style of the quality loop, such as costs of scrap, rework, retest, re-inspection, modification,downtime, overtime, corrective action and redesign. Moreover, the external failure costs, these are the costs arising after delivery to the customer due to non-conformities or defects, such as equipment failure, downtime, warranty, administrative costs in dealing with failure and loss of customer's goodwill (San, 2000).

Many studies recognize that the costs of poor quality in construction projects are more than other related costs such as design, sales, production/ operation, and other activities, which can be budgeted, measured and analyzed, Oakland (2006) cited in (Al-Musleh, 2010, p. 76).

The cost of quality is incurred by all parties involved in the construction process, and according to Al-Musleh (2010) extra cost can be incurred as a result of poor quality; so

it is vital for project managers to understand the client's requirements in terms of cost, quality and time.

Al-Musleh (2010) divided the cost of quality into two areas: costs related to not doing things right, and costs related to trying to prevent them from going wrong. He stated it in the formula: Cost of Quality = Cost of Non-conformance + Cost of Prevention. The cost of nonconformance includes the direct and indirect costs and emerges from not doing things right the first time, examples is accidents on sites, being late, errors, and poor workmanship, which then lead to rework, penalties, increased insurance costs, and removal of defects are some examples of the costs.

Attaining good quality is far more important than any cost could be incurred compared with bad consequences resulted of inferior quality.

Woodward (1997) divided cost of quality into three categories: the cost of failure, the cost of quality control and the cost of prevention, in regard of cost of failure, he mentioned that an HMSO (Her Majesty's Stationery Office) publication found that cost of poor quality in buildings is mounted to 10-18% of total cost in an industry where profit is less than 1.5%. The study showed that 50% of faults originate at the design stage, 40% relate to site work, and less than 10% to material quality.25% of all faults were due to poor information provided to the site, and less than 10% were due to new materials or methods (Woodward, 1997, p. 116).

The costs which have to be considered regarding faults in construction include the following: repair in cases where this is possible, and replacement with new work in cases where repair is not possible; actual demolition may be necessary for buildings work; delay in progress of the project may be one of the less obvious costs but is certainly a real one (Woodward, 1997).

In regard to the cost of quality control, this is the sum total of inspection costs, including tests and reporting thereon, the delays caused while work is inspected, and the overhead costs of maintaining and operating a quality control system (Woodward, 1997).

2.4 High-Rise Buildings

2.4.1 High-Rise Buildings Definition

The definition of a high-rise building is an elusive one, it may vary according to several reasons, and one of them is cultural and architectural style.

In regard of height, which Pietrzak (2014) considered 100 meters as the minimal height of the high-rise buildings, King (2010) described a "high-rise building" that is any building having an occupied floor(s) located more than 75 feet above the lowest level of Fire Department vehicle access. A high- rise buildings , or tower, is defined by Farouk (2011) as a building which exceeds in its height 36 meter, or more than 12 floors; the high- rise buildings uses could be residential, administrative or as a hotel.

More classification was done in regard of storeys of the buildings by (bureau of planning and sustainability 2013), the classification stated that low-rise = 1-6 storeys, mid-rise = 7-12 storeys, high-rise = 13 stories and above.

Eldemery (2007) stated that a high – rise building is essentially a building with a small footprint, small roof area, and a very tall facade. In addition, what differentiates it from conventional low rise and medium rise buildings is that it needs special engineering systems due to its height.

Far away from height criterion which is controvorsial one, Farouk (2011) sets other conditions to judge on buildings as a high- rise one or not, such as its affection by

lateral forces resulting from earth quakes and wind forces to the extent that such forces will play a major role in the process of design.

In Palestine, the article (69) of decision of the cabinet No. (6) for the year 2011 on the system of buildings and organization of local bodies stated that the total height of the buildings does not exceed 72 m of the natural ground level.

2.4.2 High-rise Buildings Creation and Development

According to Farouk (2011), the beginning of high rise-buildings was in Rome, it was a four- storey wooden residential building, and the wood was replaced by bricks. The Monadnock buildings in Chicago 1891 was constructed of sixteen storeys. The buildings continued to increase in height until it reached the height of 60 storeys in year 1913.the Empire State buildings was completed in the year of 1931with a 102 storey Farouk (2011).

In regard of its aesthetical and scene considerations, Farouk (2011) considers that high-rise building has special importance and visual advantage, due to its height, obviousness and dominance over the other elements of the scene. In addition, high-rise buildings play a major role in creating a panoramic view of the city where the buildings lie. As well as high-rise buildings are easy to be located.

Several factors fastened modern city buildings; some of them, according to Ede (2014) are the intense rural – urban population drift and the ensuing pressure on the limited land resources.

The establishment of some high-rise buildings represent a prominent stage in the process of such buildings: the 11- story metal framed Home Insurance Buildings in Chicago in 1883, the 9-storey first all-steel framed Rand-McNally Buildings in1889, the

20-storey vertical trussed Masonic Temple in 1891, the 60-storey Woolworth Buildings in New York in 1913. The American tall buildings development got to its crowning point in 1931 with the 102-storey braced steel frame of Empire State Buildings that attained the height of 381m.A step forward was made when a 110-storey framed-tube World Trade Centre Twin Towers in New York, and quickly followed in 1974 by the 442m tall bundled-tube Sears Tower in Chicago (Ede, 2014, pp. 12-13).

Although the most significant high- rise buildings where built in the U.S.A, other countries in Europe and Asian countries like Hong-Kong, China, Japan, Korea, and Malaysia followed the American footstep. Ede (2014) noted that nowadays there is a speedy growth of High-rise construction in Asia recently, and the decline in growth of High-rise construction in North America.

2.4.3 Why Tall Buildings?

The purpose of high- rise buildings has varied over time; while it was for defensive purposes or religious purposes (roman temples, Pharaonic, churches……), Farouk (2011) states that it was in the eighties of the nineteenth century for the purpose of either residential or administrative, then it became to meet the requirements of hotels and other touristic needs as well Farouk (2011).

The innovation in buildings requires high-rise buildings phenomenon, the growing population , intensifying urbanization , economic requirements, efficiency, size and speed, prestige status, and aesthetics as causes to high-rise buildings phenomenon Eldemery (2007).Ede (2014) added to the mentioned to the above other factors such as socioeconomic problems that accompanied industrialization in the nineteenth century

and the increasing demand for land in urban cities were the driving forces for tall buildings construction.

2.4.4 High- rise Buildings (Towers) Design Standards

Farouk (2011) stated that there are many buildings design standards that must be taken into consideration when design high-rise buildings. They are as follows:

- Location and surrounding buildings planning.

- Project's scale and the general view.

- Keeping an open city view.

-Handling environmental issues such as wind, shadows and others.

- Transportation and car parking.

- On the level of ground floor policies.

- Infrastructure, energy efficiency and sustainable development.

- Management and operation.

- Safety and security and buildings standards.

- The buildings must achieve all buildings laws related to internal spaces.

- The buildings must apply modern technological systems.

- The buildings must be constructed using suitable structure systems.

- The buildings should have a unique style.

- Application of all civil defense requirements related to safety and firefighting.

- Provision of all services (car parking – firefighting water tanks – water supply tanks, etc.).

- Fire escape stairs should consist of two flights each flight must not be less than 90 cm wide.

- Fire escape staircase must connect to outside of the buildings.

- Ease of access of all floors to civil defense units.

- The buildings must be constructed out of fire resistant materials (or materials with a high rate of fire resistance).

- The main stair case flight must not be less than 135 cm wide.

- The main staircase and elevators should be present in every main core of the buildings.

- Provision of sufficient parking slots to the number of the buildings users and designing the basement floors with all the suitable systems to the required use.

2.4.5 Eco-Friendly High-Rise Buildings Design Standards

Environmental issues must be taken into consideration throughout the process of designing high-rise buildings. Few preconditions mentioned by Farouk (2011)to achieve sustainable buildings to maintain the efficiency, the preconditions are:

use of renewable energies, use of eco-friendly construction materials, water rationalization inside the high- rise buildings, air quality inside the high- rise buildings, proper lighting inside of the buildings, color selection philosophy, acoustic design, buildings security issues and its design, environmentally compatible architectural style (Farouk, 2011, p. 5).

2.4.6 Types of High-Rise Buildings

The use of a building has considerable influence on its security and fire life safety needs. There are different types of high-rise buildings classified according to their primary use. Craighead (2009) addresses the following ones:

1. Office buildings. An office building is a "structure designed for the conduct of business, generally divided into individual offices and offering space for rent or lease."

2. Hotel buildings. "The term 'hotel' is an all-inclusive designation for facilities that provide comfortable lodging and generally, but not always food, beverage, entertainment, a business environment, and other 'away from home' services."

There are also hotels that contain residences. Known as hotel-residences, this type of occupancy is later addressed in mixed-use buildings.

3. Residential and apartment buildings: a residential building contains separate residences where a person may live or regularly stay. Each residence contains independent cooking and bathroom facilities and may be known as an apartment, a residence, a tenement, or a condominium. An apartment building is "a building containing more than one dwelling unit." "Apartment buildings are those structures containing three or more living units with independent cooking and bathroom facilities, whether designated as apartment houses… condominiums, or garden apartments."

4. Mixed-use buildings. A mixed-use building may contain offices, apartments, residences, and hotel rooms in separate sections of the same buildings. Hotel-residences are another type of mixed-use occupancy. "The hotel residences trend is notably different from its predecessors such as fractional/time share hotel units, which are not wholly owned, or condo hotels, which are wholly owned hotel rooms without, for example, kitchens. Not only do hotel residences have kitchens and everything else an owner would expect in atypical abode, they also include amenities such as maid and room service, plus restaurants, spas and gyms …. Typically, [these] residences are on the top floors of hotels."

In addition, there are two types of structures commonly associated with buildings that technically are classified as high-rises, but usually are not required to conform to high-rise buildings laws, codes, and standards (particularly the laws requiring the installation of approved automatic sprinkler systems). These structures are (1) buildings used solely as open parking structures and (2) buildings where all floors above the high-rise height limit are used for open parking (Craighead, 2009, pp. 21-22).

2.5 High-Rise Buildings in Palestine

Palestine architecture has been influenced with Islamic architecture, as well as with different Islamic states' architecture that ruled Palestine.

For centuries, Palestinians prefer buildings with a simple sketch to what was built of buildings of complex composition, and that the Arab architectural after Islam was saved from the local arts that do not conflict with Islam (Arab Architecture, 1984, p. 317).

The Umayyad caliphates interested in buildings decorated palaces and other facilities throughout Palestine; the Umayyad monuments are scattered in Jerusalem, Jericho and Haifa and others. These buildings in Palestine never exceed in height few storeys until the second half of the twentieth century.

In his book on the palaces of the Al-Nimr family in Nablus, Ihsan Al-Nemer mentioned that the palace consisted of three storeys: The Douwain square is known as Salamlik (i.e., salaam and hospitality (p. 446); the second floor was to store the grain, the kitchens, the bathroom, the servants' quarters; on the third floor, there was the dwelling for the inhabitants of the princes and their wives (Al-Nemer, 1975, part 2, pp. 446-451).

In Gaza, El-Sakka (2018) states that a new buildings law was adopted in 1938 setting the height of the buildings with a ceiling of 10 meters. Gaza City was free of high-rise

buildings until the establishment of Al-Zaharna buildings in the early 1980s, which consisted of 13 storeys. Gaza did not know the huge buildings until the nineties of the last century (pp. 138-141).

2.5.1 Types of High-Rise Buildings in Palestine

The pattern of vertical construction in the city of Nablus- one of the major cities in Palestine- has been apparent since the early 1960s; the lower demand for housing in the meantime, the technological development in the architecture of buildings, and the nature and culture of society and its relations entail a small proportion of the high- rise buildings do not exceed 8% built between 1960 and 1975.On the other hand, no more than 20% of existing buildings were built during 1975-1985 era (Dawoud, 2003, p.115).

In many cities in the world, high-rise buildings function takes the following forms:

• Residential buildings only, often far from the city centers and main streets that are the core of business life.

• Buildings limited to business only; these buildings often occupied by shops and offices. Thus it become impossible for housing either for high, or for reasons of convenience and stability; which is incompatible with commercial movement.

• Multi-purpose buildings, i.e. residential and commercial together and these types are abundant in neighborhoods and on the main streets so that the lower floors are occupied by businesses, while the upper floors are for residential purposes (Dawoud, 2003, p.118).

2.5.2 TQM Implementation in High-Rise Buildings in Palestine

The construction process has several shortcomings, Abdullah (2015)categoriesed the shortcomings in three points:

Technologies of construction are traditional, unfriendly to environment, wasteful of natural wasters, heavy in weight, energy-inefficient, and relying on unskilled, untrained employees; technologies installation methods are low-quality one.

Technologies do not get enough consideration in tender documents, institutions, construction sector and different size of businesses.

The development of construction technologies is not prompted by mortgage finance for housing purposes, engineering designs, investors in housing sector and the follow- up institutions Abdullah, 2015 (pp. 3-4).

High- rise buildings in Palestine technologies sometimes are far away from any quality management procedures. In Gaza, where the life quality is downgraded, buildings situation will be the same definitely.

Director of Security and Safety in the Palestinian Civil Defense, Wael Lulu, said that 60% of the high buildings in Gaza, ranging from 6 to 18 floors, are licensed by the Municipality of Gaza. Only 6% of buildings have final licenses - which is granted to high buildings that meet the safety conditions - While the rest did not meet the licenses, i.e., they did not meet the requirements of security and safety Barood (2013).

Lulu said: if the owners of high- rise buildings and investors obtain preliminary permits, they think that they can continue construction without taking into account the safety conditions, as evidenced by the fact that only 9% of the buildings in Gaza have complied with the conditions and the rest are not," (Barood, 2013).

Safety conditions committed by some high-rise buildings are ineffective, fire extinguishers, water hoses and alarm devices are out of services. The walls of the water and electricity rooms are non-waterproofing and do not enjoy any of the required conditions, their doors are not fire-resistant; therefore, the percentage of danger in all high- rise buildings in Gaza is 100 %, Barood (2013).

2.5.3 Codes, Regulations, and Standards for High- Rise Buildings Construction

On theoretical basis, there are principles and design standards related to use construction systems mentioned before by Farouk (2011) more specifically.

In the Palestine context, there is the decision of the cabinet No. (6) for the year 2011 on the system of buildings and organization of local bodies, which handles the issues related to requirements in buildings. The related items mentioned in Appendix C, they are the articles no. (25), (51), (65), (70), (78), (84) and (94).

2.5.4 The Palestinian Contractors Union (PCU)

In Palestine, there is The Palestinian Contractors Union (PCU), it was established on 1/6/1994, and Jerusalem is the main center of (PCU). The Union has two main branches in the West Bank and Gaza Strip. (PCU) is entitled to open centers and branches in other Palestinian cities by a decision of the Federation Board of Directors. PCU is a Palestinian socio-economic professional body, represented by the local contractors of the Union. It aims to organize the practice of entrepreneurship in Palestine and abroad and plays a positive role in national economic development (PCU) (2016).

(PCU) Message:

The establishment of the PCU came at a time when the stage requires the rehabilitation of the Palestinian contractor and preparing it for the establishment of an independent Palestinian state. Therefore, (PCU) adopted the following main tasks: increasing the efficiency of the construction sector; stimulating the construction of high quality infrastructure and lower cost; enhancing the competitiveness of the construction sector, creating a legal environment conducive to work; developing the standards of construction.

Objectives of (PCU):

In order to meet the requirements of the Palestinian contractor and the development of the construction sector, (PCU) since its establishment has taken the following main objectives: organizing the profession of contracting and working to raise the level by various means; cooperating with the competent authorities to develop methods of planning projects, bidding, organizing contracts and the conditions of carrying out their work; encouraging the investment of capital in the establishment of industries supporting the work of the contracting and services necessary for their growth; cooperating with the competent authorities in the matters related to the contracting work, including the development of the contracts and the resolution of professional disputes related to design and supervision and the development of professional and technical aspects in the contracting; defending the interests of members, maintaining the traditions and honor of practicing the profession and helping to resolve the differences arising between them; developing the national enterprise sector and its contribution to the economy of the country and the protection of national enterprises from harmful

competition risks; representing of the contracting sector in the membership of Arab, regional and international bodies and institutions.

Someone may ask whether PCU succeeded in achieving its objectives, the answer can be found in the results of current buildings quality and practices, which is not an encouraging one.

2.6 Studies on QM in the Construction Sector

The study of Syaj (2015)provides the necessary information needed to better manage the quality of construction sector in Palestine. The aim of the study is to identify the current status and to identify the main problems and obstacles faced by construction companies in the implementation of TQM and to determine the success factors necessary for the implementation of TQM at construction sector in Palestine.

Qualitative and quantitative research methodology was used in the study, and the questionnaire was used to collect data. The population of the research consisted of managers and engineers in construction companies in main cities of Palestine. The sample which was randomly chosen consists of 174 managers and engineers in construction companies.

The results of the study indicate that awarding the tender on the basis of lower prices is the most important problem affecting QM then lack of expertise in Quality Management System (QMS), lack of education and training, and lack of owner's awareness about the importance of quality. In addition, the most important factors affecting quality are: implementing safety program, review drawings and specification before tendering and fetch materials in a timely manner. Clarity of work instruction, awarding the tender to the most accurate bidder is also among the factors affecting quality. The results also

indicate that there are twelve critical success factors with 47 critical sub factors were needed for the successful implementation of TQM in Palestinian construction companies.

It is recommended that raising awareness about QMS be required by giving special workshops and courses. Moreover, contracting and consulting firms must develop a QS. Also, using the developed model as a tool to measure quality and identify the weakness points that lower the degree of quality and improve it.

The research by Karaman (2011) illustrates a new experience in applying quality management systems in a steel Construction Company in Syria (ISO9001:2008).

Throughout this work, the study has proposed 52 Data Forms, intended to ensure quality at every stage throughout the construction of projects (Contract – Design – Manufacturing – Erection). Compliance with the requirements of the standard ISO9001:2008 has led to identify a mechanism of continual improvement at every stage and at the level of overall achievement of the project. These forms used are based on precise analysis of current status of quality in the company by analytical study for about 50 projects and interviews with the heads of workshops, project managers and engineers of Quality Control Department. More than ten international experiences were also considered throughout this research.

Ali and Reza (2017) find out that due to care taken in the success of high- rise buildings construction project, quality is the significant factors, and who is responsible for managing, performing and verifying the quality related activities at project site. Every year a significant amount of the budget is spent for maintenance on high-rise buildings construction project. The main objective to identify and evaluate the major factors affecting quality control measure of buildings construction projects in India. For

analyzing the major factors for quality control measure in buildings construction projects, adopting literature review and questionnaire surveys are used to assemble data. For the questionnaire survey, Likert Scale (five-point scale) is used for rating the opinions. The five-point scale is transferred to Relative Importance Index for each factor. Afterward adopting Pareto analysis to evaluate the major factors for improving the quality in buildings construction project. A case study on Group Housing Residential Apartment project, Gurgaon has been undertaken to compare the result. This research identifies twenty major factors, in which the quality of workmanship is one of the major factors focuses in the construction site for the improvement of quality followed by inadequate technical expert, not maintaining proper design mix and other factors. From this research, by adopting Pareto Analysis (80-20 Rule) found that if 80% quality problems measure/ improve by implementing 20 major factors on site. Further, 20 % quality problems improves by implementing remaining factors. With the improvement of quality of project, saving time and cost.

Kakkad and Ahuja (2014) defined total quality management (TQM) an approach that seeks to improve quality and performance, which will meet or exceed customer expectations. This can be achieved by integrating all quality-related functions and processes throughout the company. TQM looks at the overall quality measures used by a company, including managing quality design and development, quality control and maintenance, quality improvement, and quality assurance. TQM takes into account all quality measures taken at all levels involving all company employees. A paper by Kakkad and Ahuja (2014) aimed at the implementation of TQM in a local firm “Kakkad Developments”. For the same initial assessments were made about the various parameters which influence implementation of TQM. Further questionnaires were

prepared on each parameter namely, Top Management Commitment, Human Resource Management, Employee Involvement, Process Improvement and Customer Satisfaction. The questionnaires distributed amongst the selected firms, the questionnaire were distributed to top management, employees as well as the customers of the firms. The responses to questionnaires were then judged based on their performance indices and the firm that had the highest performance index for each parameter was taken as the benchmark firm. Comparing the scores of "Kakkad Developments" with other firms, parameters and sub-parameters were noted where they needed improvement. Further suggestions were made to "Kakkad Developments" on each noted parameter on how they could improve their performance and implement TQM.

C H et al. (2015) study considers the primary purpose of TQM is to provide excellence in customer satisfaction through continuous improvements of products and processes by the total involvement and dedication of each individual who is in any way a part of that product/process. It is a structured approach to improvement. If correctly applied, it will assist a construction company in improving its performance. Unfortunately, the construction industry has lagged behind other industries in implementing TQM. The main reason for that has been the perception that TQM is for manufacturing only. One aspect of TQM that has frustrated the construction industry the most has been "measurement". The main aim of C H et al. (2015) study was to produce a measurement model – with tools and methodologies for the recognition and measurement of construction processes for continuous improvement and client satisfaction. Analysis of questionnaire survey indicates that the major obstacles to implement a TQM program are changing the behaviour and attitude, lack of expertise/resources in TQM, lack of employee commitment/understanding, lack of education and training to drive the

improvement process. The client satisfaction index, the cause and effect diagram and the improvement index were developed to find out the major sources of client satisfaction and dissatisfaction in the construction industry. The outcomes of this survey show that customer satisfaction can be greatly raised by improving construction underestimation, project management, coordination, pattern changes by clients and change orders from procurement department. For the local construction industry, this project has the potential to demonstrate tangible benefits of using TQM in their organizations CH et al.(2015).

The main aim of Al-Musleh (2010)study is to develop and present to the construction companies in Qatar a new model that could not only improve the understanding of Total Quality Management (TQM) within their sector, but also to help in developing a TQM framework in all sections of a company.

Thestudy suggests a model based on existing and new quality management framework in the construction industry in Qatar. Furthermore, this studyis a combination ofthe collected knowledge in different research traditions, and of observed studies of theQatar Construction industry. The aim is to give a complete picture of the materials, technology, regulatory process and innovation and to provide a theoretical model, whichcan be used for existing and new management framework that may be implemented in theindustry that has been referred as “client” in this study.

The study mythodology is based ona case study to one of the largest construction companies in Qatar toidentify the current status and barriers faced by construction companies in the implementation of Total Quality Management TQM philosophy.

The findings of this study suggest that TQM can be successfully implemented among Qatar's construction companies. The study suggested a framework for the Client

recommending the actions the Client should take toestablish and implement a TQM framework, which will increase productivity, stream linethe processes and improves the quality of the services and the products offered by theclient.

In Hoonakker et al. (2010)study, the authors discuss the problems of defining quality in the construction industry, examine possible benefits of implementing quality, and look at barriers to quality implementation in construction. The authors use data collected during interviews with contractors and data from questionnaire surveys. Results show that contractors do understand the potential benefits of quality implementation, but that there are also many barriers to implementation. The authors describe recent developments that might help to overcome the barriers.

A study by Khudair (2010) aims is to evaluate the quality management situation in the achievement of the product according to ISO 9001-2008 in the asphalt concrete manufacturing plants in the Middle Euphrates region in order to ensure high performance in terms of quality and economic operation.

The case study was used for the purposes of this research and through the field experience in the asphalt plant of Ashur Company (the case study), the details of the operation of all processes, in particular the quality and production, were also identified through the field co-operation in the quality control department. And to identify the quality of deviations in the manufactured asphalt concrete product and to identify the imbalances in the process of this laboratory, as well as conducting interviews with officials in the relevant authorities and with experts and specialists in this area. The checklists were used to determine the reality of the performance of the laboratory activities compared to the components of the ISO 9001: 2008 system to identify the

existing strengths and weaknesses and to indicate the extent of the gap between them and analyze their causes.

The research found that the adoption of the self-financing system of the Ministry of Housing and Construction negatively affected the quality of the product, so the quantity of the product is more important than its quality, with no one to supervise and follow up the implementation of the quality activities within the laboratory (Khudair, 2010, P. 632).

2.6.1Comparison of this Research to other related Researches

This study differs from previous studies in its modernity; it is the freshest study.

It resembles previous studies in its topics and fields: the titles that talked about construction, TQM and other related topics; but it resembles itself in talking about barriers that face implementing TQM in high-rise buildings Justin West Bank cities.

This study resembles the study of Syaj (2015) whose study explains the application of quality in the construction sector in Palestine, the study of Kakkad and Ahuja (2014) and Karaman (2011) who concentrates on quality assurance of construction companies. This study is more spatially specific; it is confined to West Bank, and sector by focusing on residential buildings.

The most similar studies are the study of Ali and Reza (2017) because they talk about the application of total quality in high-rise buildings.

The study of Ch et al. (2015), which speaks of quality improvement in the construction sector in general, but it talks about the obstacles to the application of quality, and the study of Hoonakker et al. (2010) which talks about the obstacles to the application of TQM.

This is a unique study and several bodies may take use of it, i.e. consumers, contractors, researchers and any interested one.

Chapter Three

Methodology

3.1 Overview

These chapter discuses with the methodology used to carry out the study, i.e. how the data was collected and interpreted. Chapter four will present the analysis of the data that were gathered by the questionnaire.

The study carried is an exploratory one. This study intended to collect information regarding barriers that face implementing TQM in high-rise buildings in West Bank cities.

The variables of the study are dependent and independent ones; whereas the independent variable is the barriers that face implementing TQM in high-rise buildings in West Bank cities, the dependent variable is implementing TQM in high-rise buildings in West Bank cities. Other issues related to questionnaire such as distribution of the questionnaire validity of questionnaire reliability of the study are addressed as well.

3.2 Study Procedure

The study procedure consisted of a literature review, developing a questionnaire and analyzing the collected data.

Literature review exposes the efforts of generations of scholars, their writings and research in the topics handled in the study.

The questionnaire is the tool that is used to gather the primary data obtained of the respondents.

The data collected from three sides: the contracting companies, designing and supervising engineers. Two of the participants were independent engineers.

The survey presented in this study is known as exploratory research. Exploratory method of research refers to the type of research that aimed at obtaining information on current state of phenomena (Rahi, 2017, p. 2).

3.3 Data Collection

The study has to choose one of the three methods of research: quantitative, qualitative and mixed of both methods. This study tries to achieve its objectives by following quantitative research methods; the following definitions were mentioned by Techo (2016, p. 2):

Quantitative research methods are those methods in which numbers are used to explain findings Kowalczyk (2016). The research procedures are through “experiments” and “quasi- experiments, with collected data being statistical Creswell (2003, p. 13; Maxwell & Delaney (2004). Using numbers implies that the study has to have a good knowledge of both descriptive and inferential statistical parameters, such as calculations and interpretations of standard deviations, ANOVA, correlations, etc (Techo, 2016, p. 2).

3.4 Questionnaire Design

The questionnaire was designed in the light of a review of literature and ideas discussed there, it includes a total of (91) questions divided into six sections.

The data for this study was collected through the use of questionnaires:

The Questionnaire's six sections were in accordance to its purpose as follows:

 Section one was developed to elicit information about the respondents.

 Sections two and three were developed to address objective one (1), which is the evaluation of the current position of TQM in high- rise buildings.

 Sections four and six were developed to address objective two (2), which was to shed light on problems that face implementing TQM.

and,

 Section five was developed to address objectives three (3), which was to identify the advantages of implementing TQM.

To allow more latitude and depth, questions types were: multiple-choice questions, questions developed and measured within a five point Likert scale of 1-5 (see table 3.1),and one open ended question.

The questionnaire sections divided as follows:

Section one: aims to gather information about respondents as follows: type of organization, respondent's position, certificate, years of experience, their major and the type of project in the company. This section consists of (6) multiple-choice questions.

Section two: is to evaluate the current level of the implementation of quality management in high-rise buildings in Palestine. This section consists of (16) multiple-choice questions.

Section three: checks out the extent to which TQM is implemented in high-rise buildings in Palestine. This section consists of (23) questions developed and measured within a five point Likert scale of 1-5.

Section four: identifies the barriers of applying TQM in the construction of high buildings in West Bank cities. This section consists of (30) questions developed and measured within a five point Likert scale of 1-5.

Section five: concerns about the benefits of applying the TQM to high-rise buildings. This section consists of (16) questions developed and measured within a five point Likert scale of 1-5.

Section Six: addresses the barriers affecting the implementation of TQM in high-rise buildings. This section consists of one open ended question.

The questionnaire was in Arabic and English languages as listed in appendices, so as to distribute it according to respondents' native languages and priorities

In September 2018, data were collected using a questionnaire. The questionnaire was distributed to some contractors and engineers. After the questionnaire was returned, an analysis and comparison of data on variables of interest were carried out based on respondent's responses.

The questionnaire aimed to achieve the purpose of the study which is represented in evaluating the current position of TQM in high- rise buildings, shedding light on barriers that face implementing TQM and identifying the advantages of implementing of TQM.

Table 3.1 Likert Scale

Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Scale	1-1.79	1.8-2.59	2.6-3.39	3.4-4.19	4.2-5

Adapted from "the role of incentives in increasing the efficiency of staffing performance from the point of view of the administrative staff at Al-Quds University" by N. M. Al-Halabi, 2009. Retrieved February 10, 2019, from: https://dspace.alquds.edu/handle/20.500.12213/3445

3.5 Data Collection

3.5.1 Sampling Technique

The Population of the Study:

In order to achieve the objectives of the study, managers and engineers of construction companies in West Bank cities were selected to be the population. The parties include consulting or supervising engineering offices, designing engineering offices and the contracting companies.

The population of the study consists of three sides according to their organization, as shown in the Table 3.2:

Table3.2Distribution of the Respondent's According to Their Organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	supervising side	18	36.0	37.5	37.5
	contracting company	17	34.0	35.4	72.9
	independent engineer	2	4.0	4.2	77.1
	designing side	11	22.0	22.9	100.0
	Total	48	96.0	100.0	
Missing	System	2	4.0		
	Total	50	100.0		

1. The Contracting Companies

The population is represented by the contracting companies for the following fields: buildings, infrastructure and buildings and infrastructure. There are (78)contracting companies in Ramallah and Al-Bireh citiesin 2018(PEA؛PCU, 2018).

2. Designing Engineers

The second party is represented by the designing engineering offices. There are (76) designing engineers' offices in Ramallah and Al-Bireh cities (Ibid).

3. Supervising (or Consulting Engineers)

The third party is represented by the consulting engineering offices, there were (62) consulting offices in Ramallah and Al-Bireh cities in 2018 (Ibid), as shown in Table 3.2. The study selected a representative sample of the three sides, and to analyze their answers.

Table 3.3 Distribution of Study Population by Their Characteristics

Item	Number	Percent
Contractors	78	0.361
Designing engineers	76	0.352
Supervising engineers	62	0.287
Total	216	%100

The Sample Size Determination

Since the study have to select a sample out of the population of the study,the Krejcie & Morgan, 1970 method was adopted for determining sample size as follows:

$$n=\frac{x^2NP(1-P)}{d^2(N-1)+x^2P(1-P)}$$

s = required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the confidence level (3.841), α=0.05.

N = the population size.

P = the population proportion assumed to be (0.50) since this would provide the maximum sample size.

d = the degree of accuracy expressed as a proportion (.05).

The mentioned above formula was applied to the three categories, and the calculations are as follow:

The sample size of the contractors:

$$\frac{3.841\times78\times(0.50)\times(1-.050)}{(0.05)^2\times(78-1)+3.841\times(0.50)\times(1-.050)}=64$$

The sample size of designing engineers:

$$\frac{3.841\times76\times(0.50)\times(1-.050)}{(0.50)^2\times(76-1)+3.841\times(0.50)\times(1-.050)}=63$$

The sample size of supervising engineers:

$$\frac{3.841\times62\times(0.50)\times(1-0.50)}{(0.50)^2\times(62-1)+3.841\times(0.50)\times(1-.050)}=53$$

It took three weeks to distributing and collecting questionnaires. Despite repeated calls and emails to some respondents to fill the questionnaire, they did not do that. The study was limited by a specific time and the 53 questionnaires which were filled and returned back were considered to be sufficient.

According to Fryrear (2015) internal surveys will generally receive a 30-40% response rate (or more) on average, compared to an average 10-15% response rate for external surveys; response rate in our research-which is an external survey- is $\frac{53}{180}$=29.4%; since the respondents are external audiences, the percentage is acceptable in this case.

Sample Selection of the Study

The samples were selected randomly from the three populations. The samples arestratified ones, and used to identify the number of offices needed for each population. These respondents are selected due to their jobs and experience in the fields of construction processes.

Distribution of the Questionnaire and Collecting Data

The questionnaires were distributed either directly by hand, or by fax or email.

Out of the questionnaires distributed, (53) were returned. However, (3) questionnaires were found to be invalid for analysis because of improper filling with the same Likert scale. There spondents who agreed to cooperate in filling the questionnaire are detailed in Table 3.3.

Table 3.4 Number of questionnaire respondents

Respondent type	Sample size	No. of respondents
Contracting companies	78	17
Designing engineers	76	11
Supervising engineers	62	18
Missing		2
Total	216	48

3.5.2Analyzing of Data

To analyze data in this study, Statistical Package for Social Sciences (SPSS.20) was used. Frequencies, percentages, means, standard deviations, One-Way ANOVA, Cronbach alpha were used to provide a comprehensive description of the acceptable degree of the study sample on the different questionnaire statements.

1. Frequencies and percentages, for the data collected from the questionnaires regarding section one that gives information about the respondents.

2. Means as one of central tendency measures, and standard deviation asone of dispersion measures to identify the extent of dispersion of respondents' answers in the various questionnaire statements.

3. One-Way ANOVA Test.

4. Cronbach alpha to each section of the questionnaire, as well as to the questionnaire as a whole.

3.5.3 Validity of Questionnaires

In order to measure validity, the study used a pilot study before distributing the questionnaire to modify, add, or delete any irrelevant questions. The student gets advantage of the arbitrators' experts and skills in the field of scientific research.

The questionnaire was revised several times for improvements and connecting its sections to the study objectives. Two copies of the questionnaires were sent and distributed to experts for amendments and correction. The selected arbitrators are academicians and specialist in business administration, statistics and quality.

Arbitrators in the study (pilot study) were Dr. Issa Smirat- PhD in Strategic & Marketing Management, and Dr. Ashraf Almimi PhD in Quality and Reliability Engineering.

3.5.4 Reliability of the Study

The reliability was measured by Cronbach alpha test to measure its internal consistency. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test (Tavakol & Dennick, 2011).Reliability is consistency of measurement over time or stability of measurement over a variety of conditions, the most commonly used technique to estimate reliability is with a measure of association, the correlation coefficient, often termed reliability coefficient (Drost, 2015).

After checking out the reliability for each section, it was as shown in table 3.5:

Table 3.5Cronbach alpha and correlation values for each questionnaire section

The section of the questionnaire	Cronbach's Alpha
3-The extent to which TQM is implemented in high-rise buildings	.948
4-Barriers of applying total quality in the construction of high buildings	.907
5-Benefits of applying the TQM to high-rise buildings	.941
Total	.932

As seen in the above table, the reliability percentages in all section is above 70%, which means the questionnaire is reliable to a high degree.

Chapter Four

Results and Discussion

4.1 Overview

The data gathered by the questionnaire are analyzed in this chapter, the study had analyzed data and got answers to the study questions as well as checked the hypotheses of the study.

This chapter presents data as answers to the study questions, it offers the demographic data about respondents' characteristics, as well as their perceptions, attitudes and understanding of addressed issues. The findings have been presented in charts and tables for more clarification and understanding.

4.2 Questionnaire Sample Characteristics Analysis

4.2.1 Type of the Organization

Table 4.1 Respondents' Organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	supervising side	18	36.0	37.5	37.5
	contracting company	17	34.0	35.4	72.9
	independent engineer	2	4.0	4.2	77.1
	designing side	11	22.0	22.9	100.0
	Total	48	96.0	100.0	
Missing	System	2	4.0		
Total		50	100.0		

The percentages of supervising and contracting sides are convergent, there are also two engineers who are independent and cannot be calculated within any of the other three sides.

4.2.2 Position

Table 4.2 Respondents' Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	company manager	11	22.0	25.0	25.0
	project manager	8	16.0	18.2	43.2
	supervising engineer	13	26.0	29.5	72.7
	quality engineer	7	14.0	15.9	88.6
	site engineer	5	10.0	11.4	100.0
	Total	44	88.0	100.0	
Missing	System	6	12.0		
Total		50	100.0		

4.2.3 Certificate

Table 4.3 Respondents' Certificate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	diploma	3	6.0	6.0	6.0
	bachelor	41	82.0	82.0	88.0
	higher studies	6	12.0	12.0	100.0
	Total	50	100.0	100.0	

The majority of respondents are qualified in regard of their certificates, (82%) of them have bachelor degree.

4.2.4 Experience

Table 4.4 Respondents' Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 5 years	12	24.0	24.0	24.0
	50-10 years	18	36.0	36.0	60.0
	more than 11 years	20	40.0	40.0	100.0
	Total	50	100.0	100.0	

The highest percentage of respondents (20%) has an experience more than 11 years, this thing gave the sample more credibility.

4.2.5 Project

Table 4.5 Respondents' Project

		Frequency	Percent	Valid Percent	Cumulative Percent
valid	buildings	30	60.0	60.0	60.0
	infrastructure	2	4.0	4.0	64.0
	buildings and infrastructure	18	36.0	36.0	100.0
	Total	50	100.0	100.0	

When 96% of the sample specialized mainly in buildings orbuildings and infrastructure together, this means that the sample know well in regard of high-rise buildings and the problems related to that sector.

4.2.6 Major

Table 4.6Respondents'Major

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	architectural engineering	9	18.0	18.0	18.0
	civil engineering	31	62.0	62.0	80.0
	mechanical engineering	1	2.0	2.0	82.0
	electrical engineering	6	12.0	12.0	94.0
	another major	3	6.0	6.0	100.0
	Total	50	100.0	100.0	

The diversity of the sample her is an advantage to it; the disparity in the sample sometimes reflects the ideas of all sides.

4.3 Answering the Study Questions

4.3.1 The current level of implementing of TQM in high-rise buildings in WB

4.3.1.1The Company Has a Quality Manual

Table 4.7 Availability of a Quality Manual

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	25	50.0	50.0	50.0
	No	14	28.0	28.0	78.0
	existing partially	11	22.0	22.0	100.0
	Total	50	100.0	100.0	

The availability of quality manual enhance achieving TQM, this is one reason to the vague understanding of TQM in respondents answers.

4.3.1.2 The Company Has an ISO Certificate

Table 4.8 Availability of ISO Certificate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	18	36.0	36.7	36.7
	no	31	62.0	63.3	100.0
	Total	49	98.0	100.0	
Missing	System	1	2.0		
Total		50	100.0		

The majority of respondents have no ISO Certificate, about two-third of respondents do not have the Certificate.

4.3.1.3 There Are Laws and Regulations to Implement Quality in the Construction Sector

Table 4.9 Laws and Regulations to Implement Quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	21	42.0	42.0	42.0
	No	8	16.0	16.0	58.0
	existing partially	21	42.0	42.0	100.0
	Total	50	100.0	100.0	

Less than half of the respondents consider that there are laws and regulations to implement quality, the others either considers that there are no laws and regulations or did not hear of it.

4.3.1.4Checkingout the Design Drawings Conformance to Standards

Table 4.10 Checking out the Conformance to Standards

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	do not check	22	44.0	44.0	44.0
	after designing	1	2.0	2.0	46.0
	before starting the project	15	30.0	30.0	76.0
	during construction	12	24.0	24.0	100.0
	Total	50	100.0	100.0	

The mentioned above data means that no clear policy in regard of checking out the design drawings conformance to standards.

4.3.1.5Trainingthe Employees About Quality

Table 4.11 Training the Employees About Quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no training	28	56.0	56.0	56.0
	yes, on site	11	22.0	22.0	78.0
	yes, in external courses	10	20.0	20.0	98.0
	4.00	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

4.3.1.6 The Criteria to Select the Contractor

Table 4.12 The criteria for Contractor Selection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	minimum price	15	30.0	30.0	30.0
	technical advantage	3	6.0	6.0	36.0
	based on price, technical advantage and quality	32	64.0	64.0	100.0
	Total	50	100.0	100.0	

Depending on the percent (64%), the selection process of the contractor is based mainly on price, technical advantage and quality as a whole. The minimum price criteria consists (30%) of the sample.

4.3.1.7 The Supervisor-Controlling Role During Implementing Project

Table 4.13 The Supervisor Controlling Role

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	35	70.0	70.0	70.0
	No	2	4.0	4.0	74.0
	sometimes	13	26.0	26.0	100.0
	Total	50	100.0	100.0	

It is clear that the supervisor-controlling role is active.

4.3.1.8The Supervisor Exists at The Working Site Permanently

Table 4.14 The Supervisor Exists at The Working Site

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	40.0	41.7	41.7
	No	10	20.0	20.8	62.5
	sometimes	18	36.0	37.5	100.0
	Total	48	96.0	100.0	
Missing	System	2	4.0		
Total		50	100.0		

The supervisor existence at the working site is (41.7%); nevertheless, they consider his role is active in the previous question.

4.3.1.9The Contractor's Engineer Role in Achieving Quality on Site

Table 4.15 The Contractor's Engineer Active Role

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	25	50.0	50.0	50.0
	No	9	18.0	18.0	68.0
	sometimes	16	32.0	32.0	100.0
	Total	50	100.0	100.0	

4.3.1.10 There are Specialized Engineers on the Site

Table 4.16 Specialized Engineers on the Site

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	38.0	38.0	38.0
	No	13	26.0	26.0	64.0
	sometimes	18	36.0	36.0	100.0
	Total	50	100.0	100.0	

4.3.1.11 Contractor's Engineer Exist on the Site Permanently

Table 4.17 Contractor's Engineer Existence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	33	66.0	66.0	66.0
	No	3	6.0	6.0	72.0
	sometimes	14	28.0	28.0	100.0
	Total	50	100.0	100.0	

4.3.1.12Materials Selection Dependson Quality Standards

Table 4.18 Materials Selection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	36	72.0	72.0	72.0
	No	4	8.0	8.0	80.0
	sometimes	10	20.0	20.0	100.0
	Total	50	100.0	100.0	

4.3.1.13UsingAlternative Materials Instead of the Described In the Project

Table 4.19 Using Alternative Materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	20.0	20.0	20.0
	No	6	12.0	12.0	32.0
	sometimes	34	68.0	68.0	100.0
	Total	50	100.0	100.0	

4.3.1.14Storing in Safety Places

Table 4.20 Storing in Safety Places

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	58.0	58.0	58.0
	No	8	16.0	16.0	74.0
	sometimes	13	26.0	26.0	100.0
	Total	50	100.0	100.0	

The mentioned above items about the materials indicate that a good percent (72%) of respondents believe that selection process depends on quality standards mainly, they may use alternative materials. In regard of storing materials, it is stored in safety places (58%). The percent's above are not sharp which means the respondents are doubtful in this regard.

4.3.1.15DealingWith Non-Conforming Materials

Table 4.21 Dealing with Non-Conforming Materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	eliminating it	32	64.0	64.0	64.0
	destroying it	3	6.0	6.0	70.0
	using it in other projects	15	30.0	30.0	100.0
	Total	50	100.0	100.0	

The data presented above mean that there is no coherent quality policy in high-rise buildings in West Bank cities; data presented positive and negative conditions in high-rise buildings sector.

4.3.2 To What Extent TQM Is Applied in the Construction in WB?

TQM is applied in the construction of high-rise buildings in West Bank, 23 items were set in the questionnaire and checked out. The items include issues like: equipping the high- rise buildings with the following: a fire extinguishing system, a fire alarm system, a smoke detection system, a lift system, emergency entrances and exits, earthquake precautions…etc.

In Likert scale the score of this section is 3.39, it is a neutral score which means that the respondents neither agree nor disagree on the implementation of TQM in high-rise buildings in West Bank cities.

The cause of that low score could be attributed to the vague understanding of TQM that will be uncovered in the coming test of hypotheses.

4.3.3 The Barriers that face Implementing TQM in High-Rise Buildings in WB

Table 4.22 The Barriers That Face Implementing TQM Classified Ascending

Rank no.	Barrier	Mean	Standard deviation
1	awarding tender on the basis of lower prices	4.3878	0.63954
2	insufficient attention to achieve quality by workers in projects	4.1837	0.63487
3	absence of monitoring and control institutions on the application of international standards in design	4.1429	1
4	Lack of skilled workers	4.1250	0.8411
5	lack of expertise in QMS	4.1224	0.90445
6	lack of public safety rules during implementation	4.1224	0.85714
7	priority attention to cost and time	4.1020	0.58612
8	lack of training in improvement and quality	4.1020	0.77041
9	lack of planning and supervision	4.0612	0.87579
10	absence of follow-up and monitoring institutions of the implementation of international standards	4.0208	1.04147
11	set delivery dates is unreasonable	3.9796	0.8289
12	absence of rewards and appreciation of employees	3.9592	0.99915
13	negative attitude of workers toward change	3.9583	0.84949
14	absence of clear strategy for QM in the company	3.8980	0.84767
15	constant change in employment	3.8750	0.98121
16	using of traditional and environmentally unfriendly technologies	3.8571	0.88976
17	lack of top-management commitment of quality issues	3.8163	0.72668
18	firm's emphasis on short-term objectives and gains	3.8163	0.90539

19	lack of effectiveness of teams or skill building teams	3.8125	0.70428
20	lack of feedback from previous projects and take advantage of them	3.7755	0.89595
21	use low quality inputs	3.7551	0.9689
22	work pressure and diversity of responsibilities and abundance	3.7551	0.9021
23	lack of communication among project's parties	3.7551	0.9021
24	the engineering designs lack innovation and development	3.7347	0.99531
25	a lack of codes and specifications	3.6735	1.08758
26	not use computer software to manage projects effectively	3.6327	1.0742
27	lack of equipment	3.5510	0.93678
28	most bids are free of execution criteria and leave the order to the contractor	3.5510	1.04206
29	lack of employees' commitment to quality and resisting it	3.4082	0.95565
30	continuous changes in the management of the company	3.3673	1.01435
Average		3.88	0.89

The barriers are classified in descending as shown below:

In Likert scale the score is 3.88, it is a high score which means that the respondents agree that the mentioned above items are barriers that face implementing TQM in high-rise buildings in West Bank cities.

Although there are many of five point Likert scale items in the questionnaire which may be a comprehensive one to some degree, there is one open ended question about the problems that hinder the application of TQM in Palestine in the field of high-rise

buildings, aims to enable respondents get free of the restrictions of such questions, to get any responses respondent wants to express it freely and to get an overview to Palestine as a whole.

The respondents ranking answers were as follows:

Table 4.23 Ranking of Barriers Related to Cultural Reasons

Rank no.	Barrier	Frequency
1	Lack of appreciation of quality issues	**12**
2	Culture of the country	**1**
3	Lack of decision and will to change	**1**
4	the need for private and public sector cooperation	**1**
5	Difficulty to change concepts and attitudes	**1**
6	Lack of quality standards curricula in universities	**1**

Marginalizing TQM becomes part of the culture when it stopped to be used for a long time. In Palestine where national rule had absent for a long time, a state of chaos prevailed.

Legal and Administrative Barriers That Face Implementing TQM in WB

Table 4.24 Ranking of Legal and Administrative Reasons

Rank no.	Barrier	Frequency
1	Lack of clarity or absence of laws	**11**
2	Lack of references to quality standards	**2**
3	The absence of somebody to follow up the contracts	**2**
4	Non-compliance with international standards	**1**
5	The complacency in taking action against those who violate the specifications	**1**
6	Absence of the role of Engineers' Syndicate	**1**

The lack of clarity or absence of laws barriers resemble non-standardisation barrier mentioned by Hoonakker et al. (2010).

Ranking of Executive Reasons that face implementing TQM in WB

Table 4.25 Ranking of Executive Reasons

Rank no.	Barrier	Frequency
1	Lack of adequate supervision	**11**
2	Lack of seriousness in implementing decisions	**3**
3	Set delivery dates is unreasonable	**3**
4	Lack of coordination between the relevant authorities	**3**
5	Lack of public safety rules	**2**
6	Use of unfriendly to environment techniques	**1**
7	Use traditional methods	**1**

The supervision process may not cover all processes of construction, that conclusion was reached by Sommerville (1994) who wrote that the projects are often very large, labour intensive and seldomsituated in the same location.

Ranking of Logistic Barrier That Face Implementing TQM in WB

Table 4.26 Ranking of Logistic Reasons

Rank no.	Barrier	Frequency
1	Lack of experience of engineers and others in quality system	**12**
2	Lack of training	**4**
3	Lack of quality equipment and materials on the market	**3**
4	Lack of technicians, skilled workers and trained personnel	**3**
5	Failure to execute bids in all their details	**2**
6	Continuous changes in the management of the company	**1**
7	Lack of planning and supervision	**1**

The study in this section mentioned the logistic barriers who concluded with lack of experience of engineers and others in qualityis the key barrier, other barriers seem to cause that key barrier.

Ranking of Financial Barrier That Face Implementing TQM in WB

Table 4.27 Ranking of Financial Reasons

Rank no.	Barrier	Frequency
1	Pay attention to profit and reduce cost	**13**
2	High cost of equipment to apply quality standards	**6**
3	Lack of financial resources	**1**

Gaining profit is the key incentive to business companies, sometimes this may lower quality in favor of profit.

Hoonakker et al. (2010) said that important barrier to quality implementation and management is the bidding process in which competitiveness may entail endeavor to reduce involvement in safety and/or quality management which can be very costly to a contractor, if they encounter accidents during the project.

4.3.4 What Are The Advantages of Implementing of TQM in West BankCities?

The answers were as follows:

Enhance the company's competitive ability, improve the efficiency and effectiveness of the work system, get customer satisfaction, increase confidence between the owner and the construction company, speed in achieving the goals of the company, do the business correctly the first time, achieving a high level of quality when executing project activities, improve the achievement and internal communication within the company, encouraging R & D within the company, increase confidence and communication

between different administrative levels, reduce problems during work or execution, increase productivity, improve employee performance, increase profitability, improve the performance of institutions based on the construction system, Development of laws in the field of construction and construction.

In Likert scale the score is (4.3), it is a very high score which means that the respondents strongly agree on the advantages of implementing of TQM in high-rise buildings in West Bank cities.

4.4 Hypotheses of the Study

Hypothesis 1:

H0: There is no significant difference among respondents in perception of the extent to which TQM is applied in the construction of high-rise buildings in West Bank cities.

First of all, respondent's perception of TQM which was as follows:

Table 4.28 Respondents Perception of TQM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	tasks with minimum errors	10	20.0	20.8	20.8
	continuous improvements	21	42.0	43.8	64.6
	better competitiveness	4	8.0	8.3	72.9
	customer satisfaction	2	4.0	4.2	77.1
	another thing	11	22.0	22.9	100.0
	Total	48	96.0	100.0	
Missing	System	2	4.0		
Total		50	100.0		

The largest percent (42%) of the respondents perceive of TQM as continuous improvements, which is similar to Syaj(2015), Clough, et al.(2000) and Kakkad & Ahuja (2014) definitions.

In regard of the question about the respondents' perception of the TQM in the construction of high-rise buildings in West Bank cities differently, the results were as follows:

Table 4.29Differentiation of Respondents Perception of TQM

		Sum of Squares	df	Mean Square	F	P-value
Organization	Between Groups	12.307	4	3.077	2.733	.042
	Within Groups	46.150	41	1.126		
	Total	58.457	45			
Position	Between Groups	.873	4	.218	.112	.977
	Within Groups	73.778	38	1.942		
	Total	74.651	42			
Certificate	Between Groups	.928	4	.232	1.266	.298
	Within Groups	7.884	43	.183		
	Total	8.813	47			
Experience	Between Groups	.892	4	.223	.338	.851
	Within Groups	28.358	43	.659		
	Total	29.250	47			
Project	Between Groups	5.997	4	1.499	1.700	.168
	Within Groups	37.920	43	.882		
	Total	43.917	47			
Major	Between Groups	4.740	4	1.185	.966	.436
	Within Groups	52.739	43	1.226		
	Total	57.479	47			

As shown above, the (p-value) is bigger than (0.05) in respondents' perception of the TQM in the construction of high-rise buildings in West Bank cities regarding of their position (0.977), certificate (0.298), experience (0.851), project (0.168) and major (0.436). Respondents' perception of TQM differ according to their organization; they perceive it as (another thing) as the (p-value) is (0.042) which is smaller than (0.05) which requires making Scheffe analysis to determine to which category the difference is attributed.

When the study checked out what the respondents define (another thing), the answers were as follows: doing the best quality based on assigned specifications, best quality and less cost, implementing according to sketches, contracts and specifications; tasks without errors in accordance to specifications; and mentioned above.

Hypothesis 2:

H0: There is no significant difference among respondents in perception of the barriers that face implementing TQM in high-rise buildings in West Bank cities.

Table 4.30 Respondents Perception of the Barriers of TQM Implementation

		Sum of Squares	Df	Mean Square	F	Sig.
organization	Between Groups	35.303	26	1.358	.939	.568
	Within Groups	24.583	17	1.446		
	Total	59.886	43			
position	Between Groups	44.358	26	1.706	.989	.530
	Within Groups	22.417	13	1.724		
	Total	66.775	39			
certificate	Between Groups	7.554	27	.280	4.029	.002

	Within Groups	1.250	18	.069		
	Total	8.804	45			
experience	Between Groups	21.442	27	.794	1.995	.066
	Within Groups	7.167	18	.398		
	Total	28.609	45			
project	Between Groups	28.493	27	1.055	1.425	.220
	Within Groups	13.333	18	.741		
	Total	41.826	45			
major	Between Groups	28.370	27	1.051	.772	.735
	Within Groups	24.500	18	1.361		
	Total	52.870	45			

The (p-value) is bigger than (0.05) in respondents' perception of the barriers that face implementing TQM in high-rise buildings in West Bank cities regarding of their organization, position, experience, project or their major, the study adopts the null hypothesis (H0) in this regard. Respondents' perception of the barriers differs according to their certificate as the (p-value) is (0.002) which is smaller than (0.05)which requires making Scheffe analys is to determine to which category the difference is attributed; it was to bachelor certificate compared with diploma and higher studies.

Hypothesis 3:

H0: There is no significant difference among respondents in perception of the advantages of implementing of TQM in High-rise buildings in West Bank cities.

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Table 4.31 Respondents perception of the advantages of TQM implementation

		Sum of Squares	Df	Mean Square	F	P-value
organization	Between Groups	20.752	21	.988	.580	.893
	Within Groups	39.159	23	1.703		
	Total	59.911	44			
Position	Between Groups	28.446	21	1.355	.627	.850
	Within Groups	41.067	19	2.161		
	Total	69.512	40			
Certificate	Between Groups	3.922	21	.187	.956	.538
	Within Groups	4.886	25	.195		
	Total	8.809	46			
Experience	Between Groups	12.047	21	.574	.906	.587
	Within Groups	15.826	25	.633		
	Total	27.872	46			
Project	Between Groups	18.761	21	.893	.911	.582
	Within Groups	24.515	25	.981		
	Total	43.277	46			
Major	Between Groups	17.592	21	.838	.569	.904
	Within Groups	36.833	25	1.473		
	Total	54.426	46			

As shown above, the (p-value) in all cases is bigger than (0.05) which means that the respondents perceive the advantages of implementing TQM in high-rise buildings in West Bank cities similarly regardless of their organization(0.893), position(0.850), certificate(0.538), experience(0.587), project(0.582)and their major(0.904). The null hypothesis is adopted here.

Chapter Five

Conclusions and Recommendations

5.1 Overview

After presenting the previous chapters which covered issues of the introduction, literature review, methodology data presentation and discussion, the study is going to finalize his study by presenting the conclusions and recommendations.

The conclusions are presented here, since it is the aim of the study, and recommendations were presented to take advantage of them.

5.2 Conclusions

The literature review in chapter two mainly covered construction sector in Palestine and principles of TQM, it covered theoretical, factual and historical base to such issues.

The findings of this study revealed respondent perception of quality, whether there is a policy of quality, the extent to which TQM is implemented in high-rise buildings in West Bank cities, barriers of applying TQM in the construction of high buildings in West Bank cities and the benefits of applying the TQM to high-rise buildings.

Although there is no consensus on the definition of TQM, it can be understood as doing efforts to make progress and development in the construction process, so as to make outputs as a best as possible.

Based on the findings, several points have been concluded:

1. The Barriers That Hinder Implementing TQM

The barriers that hinder implementing TQM in high-rise buildings in West Bank cities can be classified into cultural, legal and administrative, executive, logistic and financial reasons.

The study differ than the other studies that it is the freshest, and confined to high-rise buildings definitely.

2. Perception of Quality

According to table 4.22, respondents' perception of quality is continuous improvements, then (another thing), then tasks with minimum errors, then better competitiveness, then customer satisfaction.

When the study checked out what the respondents define (another thing), the answers were as follows: doing the best quality based on assigned specifications; best quality and less cost, implementing according to sketches as well as contracts and specifications, and all mentioned above.

3. The Current Level of the Implementation of TQM in High-Rise Buildings in WB

Data reveals that respondents were not sure about the extent to which TQM is applied in the construction of high-rise buildings in West Bank cities, this disparity could be attributed to their different perception of TQM, or the different extent it is applied which varied from one area to another.

The data presented above express there is no coherent quality policy in high-rise buildings in West Bank cities; there are pros and consign the degree of implementing TQM in West Bank:

The pros in implementing TQM in West Bank:

The company has a quality manual (50%), The criteria to select the contractor based on his qualifications (64%), the supervisor makes controlling process during implementing project (70%), the contractor's engineer do his role in achieving quality on the site (50%)… etc.

The cons in implementing TQM in West Bank:

The company has no ISO Certificate (62%), there are laws and regulations to implement quality in the construction sector (42%), checking out the design drawings conformance to standards (44%), no training the employees about quality (56%), the supervisor existence at the working site (40%) and there are specialized engineers on the site (38%).

4. The Barriers That Face Implementing TQM in High-Rise Buildings in WB

The barriers that face simplementing TQM are (30) items detailed in chapter four, some of them are:

Awarding tender on the basis of lower prices, insufficient attention to achieve quality by workers in projects, absence of monitoring and control institutions on the application of international standards in design …etc.

The high degree of agreement on the mentioned above items as barriers that face implementing TQM means that respondents realize the barriers well, these barriers face them in their everyday duties in construction.

The barriers face implementing TQM in high-rise buildings in Palestine as mentioned in the open-ended question were (29) item. The barriers of applying total quality in the construction of high buildings in Palestine are a lot, it can be classified into cultural, legal and administrative, executive, logistic, financial and other reasons; they are classified in ascending way follow:

Pay attention to profit and reduce cost. Lack of appreciation of quality issues, lack of experience of engineers and others in quality system. Lack of clarity or absence of laws, lack of adequate supervision. High cost of equipment to apply quality standards.

Lack of training. Lack of seriousness in implementing decisions, set delivery dates is unreasonable, lack of coordination between the relevant authorities, lack of quality equipment and materials on the market, lack of technicians skilled workers and trained personnel. Lack of references to quality standards, the absence of somebody to follow up the contracts, lack of public safety rules, failure to execute bids in all their details.

culture of the country, lack of decision and will to change, the need for private and public sector cooperation, difficulty to change concepts and attitudes, lack of quality standards curricula in universities, non-compliance with international standards, the complacency in taking action against those who violate the specifications, absence of the role of engineers syndicate, use of unfriendly to environment techniques, use traditional methods, continuous changes in the management of the company, lack of planning and supervision, lack of financial resources.

It is noticeable that the respondents answer in the open-ended question and in Likert five-point scale considered the company's attempt to reduce cost and increase profits the most important reason to hinder implementing of TQM.

5. The advantages or benefits of implementing of TQM in West Bank cities

The respondents agreed on the following:

Enhance the company's competitive ability, improve the work system, get customer satisfaction, increase confidence between the owner and the construction company, achieving the goals of the company, do the business correctly the first time, achieving a high level of quality, improve the achievement within the company, encouraging R & D within the company, reduce problems during work or execution, increase productivity, improve employee performance, increase profitability, improve the performance of institutions based on the construction system, development of laws in the field of construction and construction.

Although TQM may be not applied sufficiently in West Bank cities, the respondents agree to a high score on its importance, at least theoretically.

In Likert scale the score is (4.3), it is a very high score, and the highest score among the questionnaire sections, which means that the respondents strongly agree on the advantages of implementing of TQM in high-rise buildings in West Bank cities.

6. Perception of TQM in the Construction of High-Rise Buildings in WB

Respondents' perception of TQM is similar in accordance to their position, certificate, experience, project and major where the(p-value) is bigger than (0.05).Respondents' perception of TQM differ according to their organization who perceive it as (another thing) where the (p-value) is (0.042) which is smaller than (0.05),that means making Scheffe analysis is required.

When the student checked out what the respondents define (another thing), the answers were as follows: doing the best quality based on assigned specifications, best quality

and less cost, implementing according to sketches, contracts and specifications; tasks without errors in accordance to specifications; and mentioned above.

7. Respondents' Perception of the Barriers That Face Implementing TQM.

Respondents' perception of TQM is similar in accordance to their organization, position, experience, and project and major where the (p-value) is bigger than (0.05). Respondents' perception of TQM differ according to their certificate in favor of bachelor certificate compared with diploma and higher studies, as the (p-value) is (0.002) which is smaller than (0.05) which requires making Scheffe analysis..

8. Respondents' Perception of the Advantages of Implementing TQM

The respondents perceive similarly the advantages of implementing TQM in high-rise buildings in West Bank cities regardless of their organization, position, certificate, experience, project or their major; it can be shown in the (p-value) in all cases which is bigger than (0.05).

5.3 Recommendations

Depending on the findings, the recommendations are as follows:

1-The construction sector must be organized and ruled by law and regulation; the chaos and disorder in construction sector should go to an end.

2-There is a vital need to a clear and unified definition to TQM in Palestine; the unified definition should direct the practices and policies of quality.

3-Quality should be appreciated value, no matter how it costs; there must be a heavy price to avoiding quality standards rather than to confront to standards. Quality should be part of the culture and behavior not only in construction sector, but also in all sectors of our life.

4-There should be a cooperation between public and private sectors to develop a QMS, to meet the requirements of the international quality standards; the QMS should be applicable in construction sector in Palestine.

5. The aesthetic and environmental aspects in the design of residential buildings should take into account. In Palestine, buildings are characterized by designs and architecture that differ from each other. Attention must be paid to the existence of green spaces around the buildings.

6. The government should issue planning guidance in regard of high-rise buildings schemes to avoid the current poorly planned buildings.

7. There should be a free access to information relevant to the services needed by customers who buy and use apartments.

8. It is recommended for the construction firms to develop its own overall

QMS to ensure that most quality elements be achieved.

9.It is recommended to avoid the lowest price base as a sole criterion to select bidders who carry out constructional project, sometimes lowest price implicit bad quality.

10. The principle of "reward and punishment" should be activated; it is unreasonable to make some people lose their money or life for an error committed in the construction sector.

11. Customer complaints should be taken into account during the various stages of the apartment finishing.

12. It is highly recommended to raise the level of awareness in quality field to all sides of construction process.

13. Feedback policy should be followed depending on customers complaints and corrections.

14. There should be a quality manual to be apprehended and applied in the construction sector.

15. Construction firms should do its best to get ISO Certificate as an article to improve its reputation and practices.

The study could open up horizons for other studies in the future, thus establishing a culture of scientific research in the Palestinian society.

Recommendations can benefit the private, public and non-profit sectors, research centers, universities and trade unions whose members work in construction-related professions, and anyone interested.

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Appendices

Appendix A: Questionnaire in English language

الجامعة العربية الأمريكية
ARAB AMERICAN UNIVERSITY

A questionnaire

The barriers facing the implementation of TQM in high- rise buildings in the cities of Ramallah and Al-Bireh

Ladies / Gentlemen: Hello and thank you for agreeing to take part in this questionnaire determining the obstacles facing the implementation of TQM in high- rise buildings in the cities of Ramallah and Al-Bireh. This questionnaire should only take 8-10 minutes to complete. Be assured that all answers you provide will be kept in the strictest confidentiality.

The TQM system is useful to all producers and consumers. A system works in different countries in the world. For high -rise buildings.

The study prepared the questionnaire as part of the study plan to obtain a master's degree in total quality management from the Arab American University (AAU). The questionnaire is directed to three parties: the contracting companies, the designing and supervising engineers.

Please mark (×) the column you see fit the contents of the corresponding paragraph.

Thank you very much for your cooperation

By:

Abdul Rahim Jadallah

The supervisor

Dr.: FuadBarghouthi

Section One:

General information about the respondents

1. Type of organization:

☐ Supervising side (engineering office) ☐ Contracting company

☐ Independent engineer ☐ Designing side

2. Respondent position:

☐ Company manager ☐ Project manager

☐ Supervising engineer ☐ Quality engineer

☐ Site engineer

3. Respondent's certificate:

☐ Less than diploma ☐ Diploma

☐ Bachelor ☐ Higher studies

4. Respondent years of experience:

☐ Less than 5 years ☐ 5-10 years ☐ more than 11 years

5. Type of project in the company:

☐ Buildings ☐ infrastructure ☐ Buildings &infrastructure

6. Respondent major:

☐ Architectural engineering ☐ civil engineering

☐ Mechanical engineering ☐ another major

Section Two:

The evaluation of the current level of the implementation of quality management in high-rise buildings in Palestine

Please select one answer

1. What is your perception of quality?

☐ Implementing tasks with minimum errors

☐ Continuous improvements ☐ Better competitiveness

☐ Customer satisfaction ☐ another thing …

2. Does your company have a quality manual?

☐ Yes ☐ No ☐ existing partially

3. Has your company had the ISO Certificate?

☐ Yes (Palestinian ISO…) ☐ No

4. Is there suitable laws and regulations to implement quality in the construction sector?

☐ Yes ☐ No ☐ existing partially

5. When your company check the design drawings conformance to standards?

☐ Do not check it out ☐ after designing

☐ Before starting the project ☐ during construction

☐ At the end of the project

6. Does your company train the employees for quality?

☐ No training is given ☐ es, on the site

☐ In external courses by training establishment

7. What are the criteria to select the contractor?

☐ Based on the minimum price ☐ based on technical advantage

☐ Based on quality ☐ based on price, technical advantage and quality

8.Does the supervisor make a comprehensive controlling process during implementing project activities to ensure accuracy and Good implementation?

☐ Yes ☐ No ☐ sometimes

9. Does the supervisor exist on the site permanently?

☐ Yes ☐ No ☐ sometimes

10.Does the contractor's engineer do his role in achieving quality at the site?

☐ Yes ☐ No ☐ sometimes

11. Are there specialized engineers on the site (fire systems, fire extinguishers, cameras ...)?

☐ Yes ☐ No ☐ sometimes

12.Does the contractor's engineer exist on the site permanently?

☐ Yes ☐ No ☐ sometimes

13.Are materials selected according to quality standards?

☐ Yes ☐ No ☐ sometimes

14. Are alternative materials used instead of the described in the project?

☐ Yes ☐ No ☐ sometimes

15. Are materials stored in places suitable for its safety?

☐ Yes ☐ No ☐ sometimes

16. How to deal with non-conforming materials?

☐ By eliminating it ☐ destroying it ☐ using it in other projects

Section Three:

The extent to which TQM is implemented in high-rise buildings in Palestine

No.	Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	The high- rise buildings are equipped with a fire extinguishing system					
2	The high- rise buildings are equipped with a fire alarm system					
3	The high- rise buildings are equipped with a smoke detection system					
4	The high- buildings are equipped with a lift system					
5	high- rise buildings are equipped with emergency entrances and exits					
6	high- rise buildings are equipped with earthquake precautions					
7	high- rise buildings are licensed based on urban planning					
8	high- rise buildings are licensed based on comprehensive engineering designs (electricity, civil, architectural, mechanical) prior to implementation					
9	high- rise buildings have reservoirs and pumps to provide clean water					
10	The high- rise buildings have a suitable location for solid waste collection under the high buildings					

No.	Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	to accommodate the number of housing units					
11	high-rise buildings have a backup generator					
12	high- rise buildings have an appropriate number of lifts according to the load stipulated in the law					
13	high-rise buildings have emergency staircase					
14	high- rise buildings have parking for firefighters, civil defense, ambulance and others					
15	A control room is available in the high-rise buildings					
16	A sufficient number of parking spaces are available in high- rise buildings					
17	Waterproofing materials are used to prevent water leakage in bathrooms and kitchens					
18	high- rise buildings have lightning conductors					
19	high-rise buildings have emergency lighting units					
20	A cooling and air conditioning system is available in high- rise buildings					
21	A high-rise shelter is available					

No.	Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	according to specifications					
22	There is an entrance to the high-rise buildings for the disabled					
23	There is a light signal above the high- rise buildings					

Section Four:

Barriers of applying total quality in the construction of high buildings in Palestine

Barriers related to employees						
No.	**Item**	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
1	Lack of skilled workers					
2	Insufficient attention to achieve quality by workers in projects					
3	Lack of employees' commitment to quality and resisting it					
4	Absence of rewards and appreciation of employees					
5	Negative attitude of workers toward change					
6	Lack of effectiveness of teams or skill buildings teams					
Barriers related to management						
7	Constant change in employment					
8	Awarding tender on the basis of lower prices					
9	Use low quality inputs					

10	Continuous changes in the management of the company					
11	Lack of planning and supervision					
12	Lack of equipment					
13	Set delivery dates is unreasonable					
14	Absence of clear strategy for QM in the company					
15	Work pressure, diversity of responsibilities and abundance					
16	Priority attention to cost and time					
17	Not use computer software to manage projects effectively					
18	Lack of feedback from previous projects and take advantage of them					
19	A lack of codes and specifications					
20	Lack of expertise in QMS					
21	Lack of training in improvement and quality					
22	Firm's emphasis on short-term objectives and gains					
23	Lack of communication among project's parties					
24	Lack of top-management commitment of quality issues					
25	Most bids are free of execution criteria and leave the order to the contractor					
26	Using of traditional and environmentally unfriendly technologies					

27	Lack of public safety rules during implementation					
28	The engineering designs lack innovation and development					
29	Absence of monitoring and control institutions on the application of international standards in design					
30	Absence of follow-up and monitoring institutions of the implementation of international standards					

Section Five:

Benefits of applying the TQM to high-rise buildings

No.	**Item**	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
1	Enhance the company's competitive ability					
2	Improve the efficiency and effectiveness of the work system					
3	Get customer satisfaction					
4	Increase confidence between the owner and the construction company					
5	Speed in achieving the goals of the company					
6	Do the business correctly the first time					
7	Achieving a high level of quality					

No.	Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	when executing project activities					
8	Improve the achievement and internal communication within the company					
9	Encouraging R & D within the company					
10	Increase confidence and communication between different administrative levels					
11	Reduce problems during work or execution					
12	Increase productivity					
13	Improve employee performance					
14	Increase profitability					
15	Improve the performance of institutions based on the construction system					
16	Development of laws in the field of construction and construction					

Section Six: Barriers affecting the implementation of TQM in high-rise buildings

What are the barriers that hinder the application of total quality in Palestine in the field of high-rise buildings?

.....

.....

.....

Thank you very much for your cooperation

Appendix B:(questionnaire in Arabic language)

الجامعة العربية الأمريكية
ARAB AMERICAN UNIVERSITY

استبيان حول

المعيقات التي تواجه تنفيذ إدارة الجودة الشاملة في المباني المرتفعة في الضفة الغربية

السيدات/السادة الكرام: تحيةطيبةوبعد

يقوم الباحث بإعداددراسة بعنوان«**المعيقات التي تواجه تنفيذ إدارة الجودة الشاملة في المباني المرتفعة في الضفة الغربية**»، ذلك أن نظام الجودة الشاملة مفيد للجميع من منتجين ومستهلكين، وهو نظام يعمل به في مختلف دول العالم التي تسعى لخدمة مصالح طرفي عملية البناء والاستهلاك للمباني المرتفعة.

قام الباحث بإعداد الاستبيان كجزء من خطة الدراسة للحصول على درجة الماجستير في إدارة الجودة الشاملة من الجامعة العربية الأمريكية، والاستبيان موجه إلى ثلاث جهات: الجهة التي تقوم بتصميم مخططات البناء، الجهة المنفذة لبناء وإعداد المباني المرتفعة من مديري مشاريع وشركات مقاولات، والجهة الإشرافية ممثلة بالمكاتب الهندسية.

يتقدم الباحث بجزيل الشكر، وعظيم الامتنان على حسن تعاونكم في تعبئة الاستبانة لما في ذلك من أهمية كبيرة في قياس متغيرات الدراسة علما بأن المعلومات التي ستقدمونها ستعامل بسرية ولن تستخدم إلا لغايات البحث العلمي.

يرجى وضع إشارة (×)في العمود الذي تراه / ترينه يناسب مضمون الفقرة المقابلة لها.

مع جزيل الشكر لكم لحسن تعاونكم/ن

الطالب

عبد الرحيم جادالله

بإشراف الدكتور:

فؤاد برغوثي

الجزء الأول: معلومات أولية

الرجاء وضع إشارة (x)في المربع المناسب:

1. جهة العمل:

☐ جهة إشراف (مكتب هندسي) ☐ جهة تنفيذ (شركة مقاولات) ☐مهندس مستقل

☐جهة تصميم

2.الموقع الوظيفي:

☐مدير شركة ☐مدير مشروع ☐مهندس إشراف ☐مهندس جودة

☐ مهندس موقع

3.المؤهل العلمي:

☐ أقل من دبلوم ☐ دبلوم ☐بكالوريوس ☐دراسات عليا

4.عدد سنوات الخبرة:

☐ أقل من خمس سنوات ☐ 5-10 سنوات ☐11 سنة فأكثر

5.مجالات عمل الشركة:

☐ أبنية ☐بنية تحتية ☐أبنية وبنية تحتية

6.التخصص:

☐ مهندس معماري ☐مهندس مدني ☐ مهندس ميكانيكي ☐مهندس كهرباء

☐تخصص آخر

الجزء الثاني:

تقييم مستوى الجودة في بناء المباني المرتفعة

الرجاء اختيار إجابة واحدة فقط

1.ما هو تصوركم عن مفهوم الجودة؟

☐ تنفيذ العمل بأخطاء قليلة ☐ التحسين المستمر ☐ تحسين الوضع التنافسي

☐ مستفيدون راضون غير ذلك ☐...

2.هل يوجد لدى شركتكم دليل رسمي للجودة(Quality manual)؟

☐ نعم ☐ لا ☐ موجود بشكل جزئي

3.هل شركتكم حاصلة على شهادات في الجودة؟

☐ نعم (ISO بمواصفة فلسطينية، عالمية ...) ☐ لا

4. هل يوجد قوانين وأنظمة مناسبة لتطبيق الجودة في مجال البناء والتشييد؟

☐ نعم ☐ لا ☐ موجود بشكل جزئي

5. متى يتم التحقق من أن مخططات التصميم مطابقة للمعايير المصممة ومتكاملة؟

☐ يتم بعد كل تصميم ☐ لا يتم التحقق ☐ قبل البدء بالمشروع

☐ أثناء التنفيذ ☐ في نهاية المشروع

6. هل تقومون بتدريب الموظفين على أنظمة أو معايير الجودة؟

☐ نعم يتم في الموقع أثناء العمل ☐لا يوجد تدريب ☐في دورات خارجية من قبل مؤسسة تدريب

7. ما هو الأساس الذي تتم بناء عليه ترسية العطاء على المقاول؟

☐ على أساس اقل سعر ☐ على أساس الكفاءة ☐ على أساس الجودة

☐ على أساس أقل الأسعار والكفاءة والجودة

8.هل يقوم (المشرف/ة) أثناء التنفيذ بالمراقبة الشاملة على كل نشاطات المشروع بما يضمن الدقة وحسن التنفيذ؟

☐ نعم ☐ لا ☐أحيانا

9. هل يتواجد (المشرف/ة) بشكل دائم في الموقع؟

☐ نعم ☐لا ☐أحيانا

10. هل يقوم المهندس المقاول بدوره لتحقيق أهداف الجودة؟

☐ نعم ☐لا ☐ أحيانا

11.يتوفر بموقع العمل مهندسين مختصين بالأنظمة (أنظمة حريق، إطفاء، كاميرات ...)

☐ نعم ☐لا ☐أحيانا

12. هل يتواجد مهندس المقاول بشكل دائم في الموقع؟

☐ نعم ☐ لا ☐ أحيانا

13. هل يتم اختيار المواد وفق معايير الجودة؟

☐ نعم ☐ لا ☐ أحيانا

14. هل يتم استخدام مواد بديلة عما هو موصوف في المشروع؟

☐ نعم ☐ لا ☐ أحيانا

15. هل يتم تخزين مواد المشروع في أماكن تضمن سلامتها؟

☐ نعم ☐ لا ☐ أحيانا

16. كيف يتم التعامل مع المواد غير المطابقة للمواصفات؟

☐ يتم ترحيلها ☐ يتم اتلافها ☐ يتم استخدامها في مشاريع أخرى

الجزء الثالث: مدى تطبيق الجودة الشاملة في بناء المباني المرتفعة في فلسطين:

الرقم	الفقرات / الأوزان	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
1	المباني المرتفعة مزودة بنظام إطفاء للحريق					
2	المباني المرتفعة مزودة بنظام إنذار للحريق					
3	المباني المرتفعة مزودة بنظام اكتشاف الدخان					
4	المباني المرتفعة مزودة بنظام مصاعد					
5	المباني المرتفعة مزودة بمداخل ومخارج طوارئ					
6	المباني المرتفعة مزودة باحتياطات من الزلازل					
7	يتم ترخيص المباني المرتفعة بناء على تخطيط عمراني					
8	يتم ترخيص المباني المرتفعة بناء على التصاميم الهندسية الشاملة (كهرباء، مدني، معماري، ميكانيكي) قبل البدء بالتنفيذ					
9	يتوفر للمباني المرتفعة الخزانات والمضخات اللازمة لتوفير المياه					

الرقم	الفقرات / الأوزان	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
	النظيفة					
10	يتوفر للمباني المرتفعة موقع مناسب لتجميع النفايات الصلبة أسفل المبنى المرتفع تتناسب مع عدد الوحدات السكنية					
11	يتوفر للمباني المرتفعة مولد كهربائي احتياطي					
12	يتوفر للمباني المرتفعة عدد مناسب من المصاعد حسب الحمولة المنصوص عليها في القانون					
13	يتوفر للمباني المرتفعة سلالم طوارئ					
14	يتوفر للمباني المرتفعة مساحات مناسبة لاقتراب سيارات الإطفاء والدفاع المدني والإسعاف وغيرها					
15	يتوفر غرفة تحكم بالأنظمة في المباني المرتفعة					
16	يتوفر عدد كافي لمواقف السيارات في المباني المرتفعة					
17	يتم استخدام مواد عازلة لمنع تسرب المياه في الحمامات والمطابخ					

الرقم	الفقرات / الأوزان	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
18	يتوفر في المباني المرتفعة موانع صواعق					
19	يتوفر في المباني المرتفعة وحدات إنارة طوارئ					
20	يتوفر نظام تبريد وتكييف في المباني المرتفعة					
21	يتوفر ملجأ بالمبنى المرتفع حسب المواصفات					
22	يتوفر مدخل بالمبنى المرتفع خاص لذوي الاحتياجات الخاصة					
23	توجد إشارة ضوئية أعلى المباني المرتفعة					

الجزء الرابع: مشاكل تطبيق الجودة الشاملة في بناء المباني المرتفعة في فلسطين

الرقم	الفقرات / الأوزان	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
مشاكل تتعلق بالعمال						
1	قلة العمال المهرة					
2	قلة اهتمام العاملين في المشروع بتحقيق الجودة					
3	عدم وجود التزام من العاملين في الشركة بأمور الجودة ومقاومتهم لمثل هذه البرامج					
4	غياب المكافآت والتقدير للموظفين والعمال					
5	الموقف السلبي للعمال من التغيير					
6	قلة فعالية فرق العمل أو فرق بناء المهارات					
مشاكل تتعلق بالإدارة						
7	التغيير المستمر في العمالة					
8	منح العطاء على أساس أقل الأسعار					
9	استعمال مدخلات ذات جودة منخفضة					
10	تغيرات مستمرة في إدارة الشركة					
11	نقص في عملية التخطيط والإشراف					
12	نقص الأجهزة والمعدات اللازمة					

13	تعيين مواعيد تسليم غير معقولة					
14	عدم وجود استراتيجية واضحة لإدارة الجودة في الشركة					
15	ضغط العمل وتنوع المسؤوليات وكثرتها					
16	أولوية الاهتمام بالتكلفة والزمن					
17	عدم استخدام الحوسبة وبرامج الكمبيوتر لإدارة المشاريع بشكل فعال					
18	عدم وجود تغذية راجعة من المشاريع السابقة والاستفادة منها					
19	نقص المواصفات وعدم وضوحها					
20	نقص الخبرة في نظام إدارة الجودة					
21	نقص التدريبات المتعلقة في مجال التحسين والجودة					
22	تركيز الشركات على الأهداف والمكاسب قصيرة المدى					
23	غياب التواصل والتنسيق بين أطراف المشروع					
24	عدم وجود التزام من الإدارة العليا بما يتعلق بالجودة					
25	خلو معظم العطاءات من معايير التنفيذ وترك الأمر للمقاول					
26	استخدام تقنيات تقليدية وغير صديقة للبيئة					

27	الافتقار لقواعد السلامة العامة أثناء التنفيذ					
28	ابتعاد التصاميم الهندسية عن الابتكار والتطور					
29	غياب مؤسسات المتابعة والرقابة عن تطبيق المعايير العالمية في التصميم					
30	غياب مؤسسات المتابعة والرقابة على تطبيق المعايير العالمية في التنفيذ					

الجزء الخامس: فوائد تطبيق نظام الجودة الشاملة في بناء المباني المرتفعة

الرقم	الفقرات / الأوزان	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
1	تعزيز قدرة الشركة التنافسية					
2	تحسين كفاءة وفاعلية نظام العمل					
3	الحصول على رضا الزبائن					
4	زيادة الثقة بين المالك والشركة الإنشائية					
5	سرعة في تحقيق أهداف الشركة					
6	تنفيذ الأعمال بالشكل الصحيح من المرة الأولى					
7	تحقيق مستوى عال من الجودة عند تنفيذ فعاليات المشروع					
8	تحسين الإنجاز والتواصل الداخلي					

الرقم	الفقرات / الأوزان	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
	ضمن الشركة					
9	تشجيع عملية البحث والتطوير داخل الشركة					
10	زيادة الثقة والتواصل بين المستويات الإدارية المختلفة					
11	تقليل المشاكل أثناء العمل أو التنفيذ					
12	زيادة الإنتاجية					
13	تحسين أداء العاملين					
14	زيادة الربحية					
15	تحسين أداء المؤسسات القائمة على نظام البناء والتشييد					
16	تطوير القوانين المعمول بها في مجال البناء والتشييد					

الجزء السادس

مشاكل تؤثر على تنفيذ إدارة الجودة الشاملة في المباني المرتفعة

ما هي المشاكل التي تعيق تطبيق الجودة الشاملة في فلسطين في مجال المباني المرتفعة

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مع جزيل الشكر لكم لحسن تعاونكم

Appendix C: The Decision of the Cabinet No. (6) for the year 2011

The cabinet decision items related to TQM:

قرار مجلس الوزراء رقم (6) لسنة 2011م بنظام الأبنية والتنظيم للهيئات المحلية

مادة (25)

يجب توفير مواقف للسيارات في المباني السكنية على النحو الآتي: 1. سكن (أ) أو سكن (ب) أو المباني السكنية العالية أو الفلل أو سكن (أ) مرتفع أو السكن الزراعي أو السكن الريفي موقف سيارة واحدة لكل وحدة سكنية. 2. سكن (ج) أو سكن (د) أو البلدة القديمة موقف سيارة واحدة لكل وحدتين سكنيتين.

مادة (51)

يشترط لغايات ترخيص إنشاء طوابق إضافية فوق الأبنية القائمة قبل نفاذ هذا النظام، أن يقدم طالب الترخيص تقريراً إنشائياً مصدقاً من نقابة المهندسين يثبت أن البناء القائم يتحمل ذلك.

مادة (65)

للجنة المختصة ترخيص إنشاء أبنية عالية في المناطق التنظيمية بإستثناء مناطق الفلل والسكن الريفي والزراعي والبلدة القديمة ومنطقة الأبنية السكنية العالية وسكن (أ) مرتفع، على أن تخضع هذه الأبنية للأحكام الآتية: 1. أن يُقدم طالب الترخيص إلى اللجنة المختصة مخططات تتضمن مشروعاً متكاملاً، وأن يحصل على ترخيص لكامل المشروع بدون تجزئه. 2. أن تقع القطعة على شارع عام لا تقل سعته عن (16م). 3. أن تكون أرض المشروع مفرزة إفرازاً رسمياً، وأن لا تقل مساحتها عن ضعف المساحة المقررة لمنطقة الاستعمال وفق أحكام هذا النظام. 4. أن تكون الأرض قابلة للربط على شبكة المجاري العامة.

مادة (70)

يجب أن لا يزيد عدد طوابق البناء العالي عن عشرين طابقاً.

مادة (78)

يحظر ترخيص أي بناء معد للسكن أو إعادة إنشائه إلا إذا كانت كل غرفة مطلة من أحد جوانبها على شرفة أو ساحة منور.

مادة (84)
يجب أن تجهز الأبنية المكونة من عدة طوابق التي يشغلها أكثر من مائة شخص بما في ذلك المساكن التي تتألف من أكثر من (16) شقة بدرجين منفصلين، على أن يؤدي أحدهما مباشرة إلى شارع أو فسحة كبيرة مكشوفة، وأني كون الحد الأدنى لعرض كل منهما على النحو الآتي:
عرض الشاحط في الدرج الثاني (م)عرض الشاحط في الدرج الأول (م)سعة المكان0.901.251. من (100) شخص إلى (350) شخص1.001.402. لغاية 450 شخصاً1.101.553. لغاية 550 شخصاً1.101.704. لغاية 650 شخصاً1.251.855. لغاية 750 شخصاً

مادة (94)
يجب موائمة وتهيئة المباني العامة والمباني التجارية والمباني السكنية المتعددة الشقق وعمارات المكاتب تتناسب مع ذوي الاحتياجات الخاصة ضمن مداخلها وممراتها حسب المواصفات التي تقررها اللجنة المختصة.

مادة (96)
على جميع الجهات المختصه، كل فيما يخصه، تنفيذ أحكام هذا النظام، ويعمل به من تاريخ صدوره وينشر في الجريدة الرسمية.

صدر في مدينة رام الله بتاريخ 2011/5/17 ميلادية الموافق 13/ جمادى الآخرة/ 1432 هجرية سلام فياض رئيس الوزراء

عن منظومة القضاء والتشريع في فلسطين – المقتفي –، اعداد معهد الحقوق في جامعة بيرزيت.

ملخص

يعتبر موضوع السكن حاجة أساسية من حاجات الإنسان؛ فهو يوفر له ملجأ ماديا ومعنويا. حاجة الإنسان للسكن تتطلب منه أن يولي قضية الجودة اهتماما خاصا، وتزداد أهميةالجودة في المباني المرتفعة بشكل خاص؛ نظرا لخصوصية هذه المباني وما يرافقها من أشياء مشتركة بين سكان العمارة أنفسهم، وبعض الاحتياجات النوعية التي يحتاجه هذا النوع من السكن.

تهدف هذه الدراسة إلى التعرف على العوائق التي تعيق تطبيق إدارة الجودة الشاملة في المباني المرتفعة في الضفة الغربية. يمكن تصنيف العوائق إلى أسباب ثقافية وقانونية وإدارية وتنفيذية ولوجستية ومالية.

استعملت الدراسة المنهج الكمي عبر تحليل بيانات الاستبانة إحصائيا، والكيفي عبر تحليل سؤال مفتوح ورد فيها.

كشفت الدراسة أن المستجيبين لا يوجد لديهم رؤية واضحة حول مدى تطبيق إدارة الجودة الشاملة في بناء المباني المرتفعة في الضفة الغربية، وأن العامل الرئيس الذي يعوق تنفيذ إدارة الجودة الشاملة هو التركيز على تحقيق الربح وخفض التكلفة، إلا أن المستجيبين يوافقون على درجة عالية من أهميتها على اختلاف جهة العمل أو الموقع الوظيفي أو المؤهل العلمي أو سنوات الخبرة أو مجالات عمل الشركة أو التخصص العلمي الخاص بهم.

انتهت الدراسة بتوصيات لتحسين الوضع القائم في قطاع البناء في مدن الضفة الغربية مثل تنظيم قطاع البناء، ونشر قيمة الجودة الشاملة، وسن تشريعات لتعزيز الجودة الشاملة، وعدم اعتماد اقل الأسعار كسبب رئيس لترسية العطاء على المقاولين.

كلمات مفتاحية: نظام الجودة الشاملة، المباني المرتفعة، قطاع البناء في فلسطين.