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Critical Factors Affecting the Quality Performance of Construction Projects in Palestine: Case Study of Governmental Infrastructure Projects in West Bank Local Councils

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Thesis approval form

Identifying the Critical Factors Affecting on the Quality Performance at Construction Projects in Palestine: Case Study of Governmental Infrastructure Projects in West Bank Local Councils

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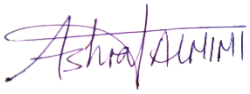
Dr. Ashraf Al-Mimi	Internal External	
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Deceleration

I am the undersigned Mahmoud Shaker Mahmoud Al-Wanneh, holder ID Card No. (851760975), The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

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Dedication

I would like to dedicate this study to:

God praying to him to bless my parents and give them a long life for all of their support and everything they have done for me.

To my closest brothers and sisters, may Allah bless you all for your wonderful presence in my life

To my dear wife, who never fails to fill my life with hope and good vibes.

To my parents, God bless them and extend their life, for all supports and all that they have given me.

To all of you I dedicate this work

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Abstract

This study aims to identify the critical factors affecting the quality performance of construction projects in Palestine and governmental infrastructure projects in West Bank local councils as a case study. The study employed a quantitative research methodology, and a structured questionnaire has been developed to collect the primary data. The study sample consists of 323 respondents from the large population of engineers from several parts, such as ministries, local councils, engineering offices, and contractors. The study's findings show that four of the chosen factors are significantly related and had a positive effect on the quality of performance, and two of the factors are not significant and didn't have any effect. Moreover, the findings indicate that the owner's factor had the most effect on the quality performance, then the supervision factor, followed by the planning and design factor, and the construction factor had the least effect as per multilinear regression model analysis; while material and external factors didn't have any effect or relation with quality performance as per multilinear regression model analysis. According to the study, ministries should pay the differences in currency transfer, material costs between the bidding and construction phases, and financial payments according to contract conditions. Furthermore, they should create an effective and efficient technical evaluation during the bidding phase, place emphasis on having a permanent supervision team on site construction, and use existing skilled labor as needed. The major limitations of the study are the lack of cooperation from government agencies and the unavailability of sufficient documented research or studies in Palestine about the quality of governmental infrastructure projects.

CHAPTER ONE

INTRODUCTION

1.1 Background

The nature of the construction industry is complex because it includes a number of parties such as contractors, clients, supervisors, regulators, stakeholders, and others. This industry significantly contributes to the socio-economic development cycle of any country. It has a large direct and indirect effect on all the economic activities (Yada & Yadeta, 2016). Achieving an acceptable level of quality in the construction phase has been a difficult issue for a long time. Large expenditures of money, time, and resources (material and human) are wasted due to the absence of inefficient quality management standards or procedures (Rashed, 2014). Quality is considered as one of the vital constraints in implementing any construction project, not less than time and cost. The project management team has to prepare an efficient and effective quality management plan in order to complete the project objectives and scope by utilizing the best resources with minimum time and cost (Project Management Institute (PMI), 2000).

Several critical issues have been raised and are affecting quality control, cost accounting, safety and health, supply chain, stores, improvement, production management, and so forth. All of these issues are as a result of poor quality in the organization's earnings and product prices (Rezaian, 2011).

In Palestine's construction industry, the problems resulting from poor quality in the execution phase are many, and their effects are great on the beneficiaries of the projects, who represent a large segment of the Palestinian society. The bad effects are the

weakness of the existing road network, poor coordination between all road services, which causes high maintenance costs as a result of failures during implementation and certain to appear later or immediately, poor supervision of implementation, lack of knowledge and experience of the competencies implemented at times, quality of materials, lack of contractors' financial resources, political factors and weather conditions, etc. This topic was chosen because of its real importance, affecting the daily lives of citizens living within local councils in the West Bank area. Quality management in infrastructure projects or construction projects as a whole in Palestine lacks planning, measurement, evaluation, and assurance. Unfortunately, in most construction projects, the issue of quality and the cost of quality are not taken into account and are as concerning as other project elements such as cost and time (Engineering Association - Jerusalem Center (EAJC)).

1.2 Problem Statement

The construction sector plays a vital function in the Palestinian economy. It is extremely important, whether in terms of its contribution to GDP and employment, or its connection to and direct impact on many other economic activities (MAS, 2008). During 2022, the construction sector contributed to 28.5% of the Palestinian GDP (PCBS, 2022).

The Palestinian construction sector includes several projects like roads, storm water, drinking water, sewage, telecommunication, and electricity facing multiple problems relating to quality such as rework, poor quality, very high maintenance cost, and defects and their effects on a large scale of work not only one activity; the activities in construction projects are very related and depend on each other. Also, one of the major problems is delays in submitting the projects to clients. This will cause penalties for the

contractors. Firstly, cost overrun and excessive rework will lead to inefficiency and ineffective work (PCU, 2008).

There are many quality problems. Some of them are related to public projects within the local councils' boundaries wasting public funds, not optimizing the resources and financing to complete the works with the required and necessary quality level in order to avoid re-works and increase annual maintenance costs due to the effect of fluctuating citizens' benefit from other projects instead of losing development and progress in reform defects, restoration and lack of planning for the sequence of infrastructure services sector. On the other hand, the contractors who complete the work at poor quality will lose their reputation, may be instantly or in the long term, which causes decreasing profitability and losing market share (PCU, 2008). To avoid various types of waste that affect resources, money, and time, proper quality management procedures must be implemented (Arditi and Gunaydin, 1997). Quality is often ignored in construction projects, especially in third world countries like Palestine. Most project managers don’t pay much attention to quality as much as time and cost constraints. They don’t recognize the high effect of poor quality.

Citizens in the West Bank are suffering from poor quality infrastructure service due to a lack of an efficient storm water system; poor quality in road construction; the roads are paved with poor-quality materials some of the time, which leads to failure in a very short period of time; a lack of coordination with other services on the road based on the predecessors and successors activities; and multiple special factors we will have in this research. All of that will reflect on the people and development of the country as a whole. With the absence of proper planning for quality systems, correct, fair

distribution, and optimal use of resources, this will lead to waste in Palestine's resources, budgets, and delays, which are already scarce; at the end, inefficient and ineffective quality performance (Enshassi et.al, 2009).

1.3 Significance of Study

A construction project is unique; we can't find two projects having a similarity in every activity in detail, in spite of the fact that they may have the same scope, not as manufacturing products, which have identical processes and iterations. Also, construction processes are complex because they include a huge number of parties such as consultants, clients, contractors, stakeholders, regulators, shareholders, and others.

For many reasons and factors, construction and infrastructure projects in Palestine and the West Bank as a case study suffer from several problems and issues in quality performance. This research is very important to determine, identify, and quantify the factors that affect quality performance and which of them have the most effect on quality more than others. Then to design a model of all construction independent factors with dependent quality factors in order to formulate recommendations to enhance quality performance at governmental infrastructure projects in West Bank local councils, as they often don't give high attention to quality or don't realize the importance of good quality performance at each phase of implementing the projects. So, maintaining a good quality performance level on these projects has almost been ignored.

Because of all quality performance problems in infrastructure services inside West Bank local councils as shown before, and the previous studies in Palestine about the construction sector don't deal with this aspect of quality performance at governmental

infrastructure projects in West Bank local councils. This research is important to be considered. In this study, the critical factors that affecting the quality of infrastructure projects at West Bank local councils will be addressed and documented. These factors will be considered as a measurement tool to validate the quality level and comparing it with the desired one in all infrastructure projects.

The results will highlight the poor-quality performance factors in governmental infrastructure services inside West Bank local councils. Stakeholders and decision makers also benefit from this research as it represents a chance for quality improvement in this sector by eliminating the waste that occurs in several processes during construction activities, avoiding rework, increasing efficiency through training and other practices, removing excess cost, and removing delays in execution.

1.4 Questions of Study

The study was conducted to answer the following questions:

1. What are the possible critical factors that have an impact on quality performance at governmental infrastructure projects in West Bank local councils?
2. What effect do *owners, planning and design, supervision, material, external, and construction factors* have on the quality of performance in West Bank local councils' governmental infrastructure projects?
3. What is an appropriate conceptual model for this study?

1.5 Objectives of Study

The study was conducted to achieve the following objectives:

1. To identify and assess the critical factors influencing the quality of performance at governmental infrastructure projects in West Bank local councils.
2. To determine the impact of (design and planning, supervision, owners, construction, material, and external factors on the quality performance at governmental infrastructure projects in West Bank local councils.
3. To establish an appropriate conceptual model for this research

1.6 Hypotheses Development

The purpose of this study, as stated previously, is to identify and assess the impact level of the several identified factors on the quality performance at governmental infrastructure projects within West Bank local councils as a dependent variable. The following hypotheses are developed:

H1: There is no positive significant impact from owners' factors on quality performance at governmental infrastructure projects in West Bank local councils.

H2: There is no positive significant impact from material factors on quality performance at governmental infrastructure projects in West Bank local councils.

H3: There is no positive significant impact from planning and design on quality performance at governmental infrastructure projects in West Bank local councils.

H4: There is no positive significant impact from external factors on quality performance at governmental infrastructure projects in West Bank local councils.

H5: There is no positive significant impact from construction factors on quality performance at governmental infrastructure projects in West Bank local councils.

H6: There is no positive significant impact from supervision factors on quality performance at governmental infrastructure projects in West Bank local councils.

H7.1: There is no significant statistical difference in perceiving quality performance at governmental infrastructure projects in West Bank local councils based on respondent's gender.

H7.2: There is no significant statistical difference in perceiving quality performance at governmental infrastructure projects in West Bank local councils based on respondent's qualification.

H7.3: There is no significant statistical difference in perceiving quality performance at governmental infrastructure projects in West Bank local councils based on respondent's age.

H7.4: There is no significant statistical difference in perceiving quality performance at governmental infrastructure projects in West Bank local councils based on respondent's experience.

H7.5: There is no significant statistical difference in perceiving quality performance at governmental infrastructure projects in West Bank local councils based on respondent's work.

H7.6: There is no significant statistical difference in perceiving quality performance at governmental infrastructure projects in West Bank local councils based on respondent's position.

H7.7: There is no significant statistical difference in perceiving quality performance at governmental infrastructure projects in West Bank local councils based on the number of projects that have been accomplished by the respondents' organizations.

H7.8: There is no significant statistical difference in perceiving quality performance at governmental infrastructure projects in West Bank local councils based on the number of working engineers in the respondents' organizations.

1.7 Thesis Structure

This thesis is organized as follows. Chapter One presents a general background of the study and explains its problem statement, significance, objectives, hypothesis, questions, and limitations. The second chapter provides a general literature review and previous studies to define the main factors influencing quality performance at construction projects and in the research case study at governmental infrastructure projects within West Bank local councils. Chapter Three discusses the methodology that adopted in this research Chapter Four clarifies the description, analysis, and

discussion of research results. Finally, Chapter Five presents the conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Preamble

Construction and engineering are a distinctive combination in a process of particular design and need those yields engineering jobs. Despite the significant responsibilities that those who work in this field must accept, a construction career provides the opportunity to acquire works for the benefit of the community (Osaily, 2010).

Construction shares a common characteristic with service and manufacturing industries, as it produces a physical product like other industries. But in some ways, construction is similar to the service industry because both don't require a large amount of capital when compared with other industries like transportation, steel, mining, and petroleum (Rashed, 2014). Construction is the use of resources, skilled labor, specialized equipment, and money on a specific location in accordance with plans, papers, and specifications to further the client's objectives (Jha, 2011). "Construction, in simple words, is the process of constructing something by a human for one purpose or another" (Yada & Yadeta, 2016). It may be a bridge, a dam, a road, an airport, a private residence, a sewage network, a commercial building, etc., so it's a process that comprises building or infrastructure.

"A project is a temporary endeavor undertaken to create a unique product, service or result" (PMBOK@GUIDE, 2008). All the projects have some common characteristics such as uncertainty, complexity, uniqueness, and progressive elaboration, which means that every project needs to iterate planning due to unclear or some risks that may be

occurring during the construction phase. All the construction projects also have the same constraints that need to be planned and monitored well during all phases of the project, which represents time, cost, and quality.

Quality is one of the main issues that has an effect on the overall project's execution. because of the high impact on other project parts like scheduling, budgeting, materials, equipment, etc. with the two faces of quality performance: good quality and poor quality.

As a case study of construction projects, this study focuses on the critical factors that affect the quality performance of infrastructure projects in West Bank local councils funded by the Palestinian government.

2.2 Quality Concept

Several definitions of quality have been used before; one of them is "fitness for use" (Juran et al. 1974, Chrisman 1983, Veregin 1999). Others, such as Crosby (1979), defined quality as "compliance with requirements," and Montgomery (2012) stated that "quality is inversely proportional to variations''.

Mane and Patil (2015), defined quality in the construction field as the project participants expectations being met, or being satisfied. Furthermore, However, "the quality of a project was commonly defined as meeting technical specifications" (Khosravi and Afshari, 2011). The quality represents issues of requirements, technical performance, and the accomplishment of functional goals are all related, and it is the completion of these goals that will be most prone to differences in perception by a variety of project stakeholders (Serradora and Turnerb, 2014).This subject is worth referring to some of the quality gurus to investigate their definitions of quality. Crosby

said that quality is conformance to requirements (Chandrupatla, 2009), which is needed here to clearly establish the requirements and specifications and compare them with the project product. Another definition from Juran, who described quality as fitness for use (Chandrupatla, 2009). He emphasizes the value of the intended customers who will utilize the product.

One of the major constraints for any project is quality, and it represents a basic performance category with cost, time, people, environment, safety, communication, and client satisfaction (Cheung, S & Cheung, 2004). Quality can also be described as satisfying the aesthetic, legal, and functional requirements of a project. So regardless of whether the requirements are hard or easy to achieve, the quality stated is based on satisfying them and validating if the project is completed by implementing the desired requirements. So, this means that good quality equals less variability (Arditi and Gunaydin, 2007).

2.3 Quality Management Era

Both internal and external factors are included in quality systems. An internal quality system includes procedures designed to give management of an organization assurance that the desired level of quality is being met. A "quality management system" is what is used for this. An improvement in workmanship and efficiency, a reduction in wastage, and a gain in profit can all be attributed to a successful implementation of a quality management system. An external quality system, meanwhile, entails actions intended to give the customer confidence that the supplier's quality system will deliver a good or service that meets the customer's standards for quality. This is a "quality assurance system" (Mane and Patil, 2015).

Implementation, design, and development are three essential steps in the creation of goods and services, and quality management is a technique for assuring their effectiveness and efficiency. This actual stage of quality has been reached as a result of the effective use of management tactics that seek client happiness. Lydia (2010) defined the quality management system (QMS) as all the actions taken by the entire management function to establish the quality policy, objectives, and responsibilities and put them into practice through the use of quality assurance, planning, control, and improvement processes. While quality management system (QMS) consists of resource management, management responsibility, product realization, and measurement analysis and improvement (Goetsch and Davis, 2016).

The quality approach evolved from inspection, then quality control (QC) to quality management (QM) by quality assurance (QA) and till quality policies such as TQM. Quality control (QC) is described as the certain installation of QA activities and programs. As a result, when using an effective and efficient QC approach, the possibility of omissions and deviations, changes, fewer conflicts, and fewer disputes means that we are validating the current works against the plan to see if they are conforming or not in this phase. QC avoids unpredictable problems. While QA is a protection shield and early warning from quality problems, it also includes establishing policies for projects, standards, guidelines, systems, training, and procedures crucial to producing quality. The project manager and project management team evolve a convenient program for each project (Bhattacharjee, 2018).

TQM is defined as an all-encompassing management concept that permeates every part of a business and elevates quality to the status of a strategic concern (Chin-Keng, 2011).

TQM implementation will increase quality overall and enhance business performance in the service sector (Haque et al., 2014).

TQM consists of eleven vital key elements among others, long-term commitment, strategically based, obsession with quality, unity of purpose, customer focus, education and training, scientific approach, employee involvement and empowerment, teamwork, continual process improvement, and freedom through control (Goetsch and Davis, 2016).

After TQM, several quality approaches and have been appeared such as: Kaizen, Benchmarking, Statistical Process Control (SPC), Quality Standards, Six Sigma, Lean, and Zero defects' concepts. And several quality management tools have been developed such as: Pareto chart, Stratification, Control Chart, Check Sheet, Scatter Diagram, Histogram, and Cause and effect diagram (Addis, 2019).

2.4 Cost of Quality

Poor quality in construction projects is a common phenomenon in the world (Ali and Wen, 2011). Further, while satisfying the intended quality level in construction projects has not been attained, it is an important problem (Kazaz and Birgonul, 2005). Great expenditures will be incurred in terms of money, resources, and time as a result of insufficient proper quality systems at the organizations and the effect of poor-quality performance. When the construction industry's performance was compared with other industries, highly critical comments appeared (Ashokkumar, 2014).

One aspect of quality management that should be considered is the cost of quality, which is divided by the price of conformance (POC) and the price of non-conformance (PONC). POC involves the prices paid for doing activities right the first time, such as

quality appraisal and inspection. The prices are paid due to the poor quality caused by service and product failures like returns and rework (Al-Tmeemy, Abdul-Rahman, and Harun, 2012).

The most important model for quality costs is the Prevention, Appraisal, and Failure model (PAF), which was first issued by Feigenbaum (1961) (Beecroft, 2010). Prevention costs occurred in order to keep nonconforming units in good condition, as well as to prevent defects in the first step by ensuring that customer satisfaction and organizational quality standards are met. Quality administration personnel, process control, field testing, market research, and preventive maintenance are some examples.

Appraisal costs appeared from the costs of necessary activities to verify, check, and identify the actual level of quality accomplished compared with the designed levels of organizational quality standards and customer satisfaction. Appraisal costs are incurred to determine the units that don't comply with standards before shipping them to the customers. Examples like internal product audit, inspection activities, inspection for material, supplier evaluation, quality administration salaries, inventory counts continuously, and preparing audit reports.

Failure costs are the costs incurred because the service or the product didn't meet the standards, specifications, or requirements, and the service had to be repeated or the product fixed. These costs can be separated into internal and external failures. Internal failures incurred from all units, products, or defects that are nonconforming to the requirements that occurred before they are shipped to the customers. Rework, re-design, scrap, extra inventory, overtime due to nonconformity, corrective action reports, and salvage are some examples. While external failures are incurred when the customer

deals directly with the weak service or finds the failure. Recalls, warranty charges, replacement product costs, customer complaint administration, customer follow-up, shipping costs, warranty data analysis, claims and disputes, loss of market share, and bad reputation are some examples. (Kesavan, Gobidan & Dissanayake 2015).

2.5 Construction Industry & Construction Management

Most theoreticians and practitioners consider the construction industry (CI) as one of the main contributors to the economic situation (Elbeltagi and Eng, 2009). Adnan et al. (2012) and Shweiki (2013) said "CI plays an important role in the economic contribution of the country's development."

Manzi & Bignozzi (2020) defined "(CI) as an industrial branch of production and trade that is concerned with the construction, repair, renovation, and maintenance of infrastructures.

The CI plays a vital role in national welfare, which cares about the improvement of the public sector, private lodging, rehabilitation of infrastructure and industrial plants. Furthermore, CI gathers several members and fields that are mixing together to form a framework for economic division (Hendrickson, 2008; Saqfelhait, 2012). The CI should be completed within the established time and cost baselines and at a highly desired level of quality in order to achieve the targeted deliverables. All parties that have participated to the project should have better relationships thanks to the construction companies. They should also enhance their administrative and governing systems in the fields of economics, the environment, and society (Gadde and Dubois, 2010).

High awareness of the construction processes should be taking place in CI, which is forming an overall construction industry management (CIM). CIM should focus on the

whole project life cycle, from planning, scheduling, monitoring and evaluating, controlling, and closing of construction activities and tasks that fulfill the business needs (Taha,2014).

Construction management (CM) is part of the CI. Jackson (2010) defined "Construction management (CM) entails the planning, scheduling, evaluating, and controlling of construction tasks or activities to accomplish specific objectives by effectively allocating and utilizing appropriate labor, material, and time resources in a manner that minimizes costs and maximizes customer/owner satisfaction." Others, like Kim et. al (2011), defined that CM is in charge of managing the full building process as well as supporting tasks such as site selection, conventional facility architecture, and engineering. All of these issues will be managed and coordinated with other resources like time and cost by the project management team (PMT). PMT should optimize the project resources to accomplish the project with the required level of quality.

And so, the task of the construction manager is to take a set of written plans and specifications and a piece of undeveloped land, and then organize all the resources, labor, and tools required to guarantee the project's set price, schedule, and quality without any mishaps or errors, regardless of weather conditions, changes in interest rates, acts of God, or any other unforeseen circumstances. (Jackson, 2010).

2.6 Construction Industry in Palestine

In Palestine, CI The construction industry represents one of the most vital industrial sectors. It has a significant contribution to the economy's growth, mainly in terms of unemployment, and a highly effect on the gross domestic product (GDP). The main purpose of this sector is to improve the quality of life of Palestinian citizens. As a result,

there is an urgent need to create a comprehensive approach to all construction-related issues in order to maintain professional performance in terms of time, cost, and quality in public, governmental, and private investments (Taha, 2016).

CI is one of the main forces that motivate the Palestinian economy, as it has undergone a prominent expansion since 1994. After that date, the construction contracting profession has recovered. While the construction sector became the leader sector among other sectors, it has occupied the foremost position among the rest of the sectors, mainly creating new careers and acquiring new investments. According to Osaily (2010), the construction sector accounts for 33% of Palestinian GDP, affecting various social, economic, vocational, and educational sectors. CI also employs directly about 10.8% of laborers and indirectly about 30% of those who are working in fields relating to construction, such as factories (Palestinian Contractors Union (PCU), 2003). For decades, Palestine's strategic geographic location has made it a greedy and appealing country, creating an unsuitable environment for CI in Palestine, whether for governmental or private projects (Taha, 2016). Due to the critical importance of quality in construction projects and the cost of poor quality, which will be discussed later in this research, we will take governmental or public infrastructure projects such as water pipelines, sewer pipelines, paving roads, et al. that are implemented inside the local councils of the West Bank area as a sample study against the factors that affect quality in those projects.

Moreover, Saqfelhait (2012) said that the market for governmental construction projects is highly remunerated, competitive, and risqué. While in this sample, the government will be the owner, managing and controlling the field in accordance with

the law. Taha (2016) searched for the major challenges facing governmental construction projects in Palestine during their life cycle, which are quality, health and safety, and time.

2.7 Quality Management in Construction Projects

Quality is measured and evaluated based on the nature of the sector, whether it is service, manufacturing, or construction. All of the evaluating processes are dependent on the customer; his voice has to be heard. The customer's needs should be translated into measurable attitudes in a service or product. As per the type of sector, the customers will define the best way to measure the quality whether the end-user realizes the quality of appearance, function, finish, performance, and fit. while rating the quality of service based on the degree of satisfaction that the customer will receive. (Pambreni et.al, 2019)

Project quality management contains the processes needed to emphasize that the project will be accomplished with the intended goals. It includes stages from quality planning and assurance to control. Project quality management also represents an aspect of project management (PMBOK@GUIDE, 2019). A quality system can be defined as "resources, organizational structures, procedures, and processes for executing quality management" (Mane and Patil, 2015).

When comparing CI to others like the service and manufacturing sectors, clear criticisms have been directed towards the construction sector that it has a low-quality level. The construction firms have been increasingly using total quality management (TQM) as an initiative approach to solve quality problems that have appeared in all the project phases in order to meet the requirements of the client (Wong and Fung, 1999).

In CI, QC or QC/QA are found only as a term of contractual requirements. The quality in CI requires special care as the production is different from plant production. General quality is very costly in the construction sector, particularly when the outcomes are not in place, so the cost of reworks or correction defects will be extremely high if no attention is paid to QA (Barrett, 2000).

Consequently, in addition to TQM, there are other methods of quality management have been employed such as: Lean Construction, Supply Chain Management, Continuous Quality Improvement, Just in Time, and Total Quality Control. Several techniques and tools, such as the seven tools of quality (checklist, cause and effect diagrams, histograms, Pareto analysis, control charts, flowcharts, and scatter diagrams); Six Sigma programs; failure mode and effects analysis; value-added analysis; and quality function deployment and other approaches have been used to facilitate problem-solving and facilitate these approaches (Al-Tmeemy et.al, 2012)

Quality is often ignored in construction projects. Most project managers don't pay as much attention to quality as time and cost, and in spite of that, it is a distinguishing factor currently (Hussain et al., 2018). In the West Bank construction sector, there is no sufficient quality model applied, which should clarify the standards and procedures that the project team has to follow in order to complete the projects with the intended level of quality and to achieve the project goals in terms of time, quality, and cost (Rashed, 2014).

This research focuses on governmental infrastructure projects in West Bank local councils as a case study to determine the critical factors that affect the quality performance of the projects implemented in them, which serve a large segment of the

citizens who benefit from them and depend on three basic keys in engineering projects as a whole: contractors, consultants, and clients. Also extended to other stakeholders who are affected or affected by the project.

2.8 Importance of Quality for Construction Project Success

Quality is one of the critical success factors in construction projects, while the success is related to proper and adequate quality management at all of the project phases, from planning to maintenance through design, procurement, construction, and acceptance. Construction and design are the most common project phases that have an effect on the quality of outcomes (Ashokkumar, 2014).

Quality in construction projects can be explained as an achievement of project participants' expectations, and it is mainly affected by regulatory agencies, constructors, owners, and designer requirements. Hence, any deviation from requirements will cause faulty construction activities and errors; if they occur frequently, contractors and owners will incur a high cost. Indeed, 6–15% of the construction cost is wasted because of rework of defective components that were detected late during construction and another 5% during maintenance (Akinci and Boukamp, 2004).

The cost of quality is described as the total of resources that the organization spends to ensure that the quality plan has been achieved to the standard since design, through construction phase, till operation and maintenance phase. These costs are paid either for maintaining quality or incurred because of a lack of quality in the quality system (Al-Tmeemy, et. al., 2012).

Even though several companies realize the importance of the existing quality control system, they are missing that system. Therefore, they will not be able to appreciate their

possible loss because of poor quality. This is the gap between the practical application and theory regarding quality management (Schiffauerova and Thomson, 2006).

The quality approach in developed countries is to produce quality instead of controlling it. This approach is as beneficial for the manufacturer as it is for the customer; the total loss because of quality cost will be minimized. The overall result will be an increase in profits and market share and a decrease in the unit cost of better quality (Davis et al., 1989).

Enhancing the quality of construction projects is a vital issue for completing the overall project successfully. Therefore, the quality management plan should be started from the planning phase to all project phases, and the project management should deal effectively with all of the project parties (designer, owner, and constructor) to ensure that the project will succeed with high quality (Chin-Keng, 2011). However, quality standards have been implemented to guarantee that the construction projects are meeting the desired quality level. As most countries are evolving these quality standards to ensure construction quality, there is a necessity to evaluate the quality performance for overall construction project success. Hence, this research also aims to identify the factors that have an effect on the quality performance of construction projects.

2.9 Previous Empirical Studies

In previous studies, the authors recognized that the success of the projects that satisfy their objectives is related to the quality of the overall projects. Indeed, factors impacting the quality of infrastructure and construction projects have been specified in several past studies. Arditi and Gunaydin (1998) studied the factors that affected quality in construction projects through the life cycle of them in the USA, and they illustrated that

management had the most impact on quality through its commitment to improve quality and its leadership in promoting quality, then quality training for the team and effective cooperation among several parties involved in the project.

Likewise, Chan & Tam (2000) surveyed and examined the factors affecting the construction projects in Hong Kong; they determined that the most powerful factor for the owner's quality satisfaction is the commitment of the project management team towards quality standards, followed by confirming the quality by the clients.

Oke et al. (2017) highlighted experimental research in Swaziland to determine which factors are critical to quality performance in construction projects; the findings revealed that the major factors were incompetent and unskilled contractors; poor supervision on site to ensure compliance with approved quality standards, policies, and requirements; poor planning, and a lack of training in the construction team.

Oyedele et.al, (2015) highlighted the top five most important variables affecting on quality performance according to empirical study from Nigeria, were the poor quality of materials delivered to the site, low levels of expertise and labor experience, bad inspection and testing, poor site installation procedures, and a lack of quality assurance. While Yeoh and Lee, (1996) found that the lack of management commitment, the ambiguous interpretation of standard criteria, and the absence of training policies are the main issues affecting the construction quality management system.

Nyangwara and Datche, (2015) investigated about factors that affecting the performance of construction projects in Kenya; and they founded that: the availability of personals with high experience and qualification, availability of resources as planned through project duration, escalation of material prices, average delay because of

closures and materials shortage; quality of equipment and raw materials in project, leadership skills for project manager, and several external and material factors are the most factors.

Warsame, A. (2013) identified the factors related to obtaining the desired quality in Swedish infrastructure projects, which are illustrated in procurement strategy, clients' (experience, skills and expertise) and shortage in experienced workforce.

After studying the factors affecting quality in infrastructure projects in Malaysia at the preconstruction phase, Nen et al. (2020) revealed that insufficient time for collecting drawings, awarding contracts to lower and not enough qualified bidders, non-compliance with technical requirements, and delay in preparing other plans relating

A study was conducted by Jha and Iyer (2006) on factors that have an impact on construction projects in India. A factor analysis was employed and they found that the project manager's adequacy, monitoring by the project team, interaction between all participants, clients' competence, any type of conflicts between participants, climate condition, the level of knowledge and competition during tendering were the major quality factors. Another evidence from India revealed that leadership factor had the most effect on quality performance at construction projects, then process factor (Shanmugapriya and Subramanian, 2015).

Callistus et.al, (2014) search about the factors affecting quality performance of construction firms in Ghana; and they founded that: poor monitoring and feedback, fraudulent practices and kickbacks, lack of coordination between designers and contractors, and in addition there are several factors relating to contractor is affecting

such as: lack of previous experience, lack of training on quality for staff, and lack of management leadership.

Conformance to design procedures and processes; the ability of manpower to achieve project mission; constructability; conformance to standards; schedule requirements; owners' requirements; and cost requirements are the elements that affect quality performance at construction projects in Taiwan (Tan and Lu, 1995).

Raphael & Phillip (2016) did research in Tanzania on factors affecting quality in governmental construction projects and revealed the contractors' experience, equipment availability, financing processes in the projects, project technology, project manager attributes, and procurement system as the fundamental factors affecting the quality of the projects. Another study from Bureau, Ethiopia, concluded that stratifying to specifications, personal experience, quality of equipment and materials used in the construction phase, and education of construction have been revealed as the most important factors that affect quality performance in urban development and Oromia Industry at Bureau, Ethiopia (Yada & Yadeta, 2016).

Abas et al. (2015) found that design changes, lack of budget, shortage of equipment, shortage of materials, and errors in cost estimations for the projects are the main factors that impact on quality in construction projects in Pakistan.

A study done by Hussain et al. (2018) about quality factors at infrastructure projects in Pakistan showed that material, design, stakeholders', external, and construction factors had the most effect on quality factors. Warsame, A. (2013) identified the factors related to obtaining the desired quality in Swedish infrastructure projects, which are illustrated

in procurement strategy, clients' (experience, skills and expertise) and shortage in experienced workforce.

Zu (2009) investigated the relationship between management practices and the quality of infrastructure projects in the United States of America and discovered that top management assistance, workforce management, supplier relationships, customer relationships, quality information, process management, and product design lead to improved quality performance. Mallawaarachchi & Senaratne (2015) described the elements that may enhance the quality performance or quality level of construction projects; these elements are management commitment, training & awareness, quality drawings and specifications, quality standards, constructability of design, and constructability of design. Hence, the project parties' requirements will be met and the cost of poor quality will be reduced.

The critical factors that affect quality in construction projects are leadership, lack of management commitment regarding quality, and lack of an appropriate quality management system (Sebsibe, 2019).

According to Shejul et al. (2019), top management support, interaction between project participants, equipment, code and standard compliance, and financial issues have the greatest impact on quality performance at construction projects.

Another Nigerian study found that the critical factors for achieving an adequate quality level at construction projects are management support and commitment; effective evaluating and monitoring; joint conflict resolution methods; and compatibility with objectives (Ola-awo et al., 2019).

While some factors, like unsuitability inadequate budgetary allocation, lack of offenders' sanctions, greedy contractors, and lack of regulatory framework are the barriers against adequate quality performance (Arowolo et al., 2019).

In the Middle East, one of the research projects was done in Egypt by Abdel-Razeq (1998) regarding the factors affecting quality in construction projects and found that contract, material, site staff, equipment, execution, labor, and design. Another study in the Arab World was done by Zidan (2013) in Syria about the major factors impacting on quality and revealed that insufficient design time, the way of choosing the designer, which is based on the lowest price, the change in client's requirements, and lack of documentation are the essential factors.

Quality is regarded as one of the most critical factors influencing the implementation and performance of construction projects in Palestine (Rashed and Othman, 2015). In the Palestinian construction sector, Rustom and Amer (2006) surveyed a questionnaire in the Gaza Strip about the factors affecting quality performance and found that the constructor's financial power, subcontractors, control system, political environment, availability of materials, site staff experience and integrity or coordination for design documents.

Also, Tayeh et al. (2018) discussed the factors influencing the success of construction projects in the Gaza Strip and found that experience of the construction, qualified staff, fund availability, and payment strategy have the greatest effect on attaining a suitable level of quality performance.

Rashed, (2014) studied the factors relating to implementing an adequate quality management level at construction projects in the West Bank area, and found that lack

of knowledge and skills in quality management, lack of training and education, lack of management and employee commitment, and attitude and behavior towards quality. One study described the challenges facing the implementation of the public construction industry in Palestine; found that the blindly imitating, working in C area, neighbors' objections and other environmental factors; hiring labor and workforce; lack of coordination; staff negligence for safety and health; and lack of laws and legislation are the biggest challenges (Taha, 2016).Syaj, (2015) identified the barriers that face the implementation of quality management in the construction sector in Palestine and concluded that awarding the contract to the lowest bidder price has the most effect on quality. The other challenges are lack of training and owner awareness about the significance of quality, implementing a properly safety program and design errors in preparing drawings and specifications.

Enshassi et.al (2009) founded the factors that affecting the performance of construction projects in the Gaza Strip, which were availability of personals with high experience and qualification, escalation of material prices, leadership skills for project manager, availability of resources as planned through project duration, and quality of equipment’s and raw materials in project.

In spite of a bit of research done in Palestine regards the factors affecting quality in construction projects, specialized studies about infrastructure projects and governmental are still lacking in Palestine. Infrastructure projects have some unique attributes from construction projects, such as: a large number of stakeholders are affected or affected by the project; they need a high level of coordination with all the services at the same site (storm water, electricity, telecommunications, sewage,

drinking water, roads, etc.); owners for the site areas; variability in the funds because it's almost a governmental sector in Palestine; and several issues that are vital and not common with other construction sectors like buildings.

2.10 Comments on Previous Empirical Studies

After reviewing most of the relevant studies that investigated the critical factors that have an effect on quality performance in construction projects, there is a need to comment on these studies.

To begin, we should note that all previous studies used a quantitative hypotheses-testing approach in their design, with data collected from samples via a structured questionnaire. They used two techniques of statistical analysis to analyze the data. The first was descriptive methods like standard deviations and means. The second was inferential methods like regression analysis. In this study, both regression analysis and descriptive statistical methods will be used.

The results of the previous empirical studies confirmed that there are several factors which they ranked based on the questionnaire results and found that they have a positive impact on the quality performance of construction projects. but with a bit of a ranking among different factors. The current study is very similar to previous studies in terms of factors that affect quality in construction projects. Table 1 below summarizes the most frequent factors from the previous studies.

Table 1 Factors from Previous studies

Author's	**Factors That Effect on Quality Performance**
Tan and Lu (1995)	conformance to design procedures and process, the ability of manpower to achieve project mission, constructability, conformance to standards, schedule requirements, owners' requirements, and cost requirements
Yeoh and Lee, (1996)	lack of management commitment, the ambiguous interpretation of standard criteria, and the absence of training policies
Arditi and Gunaydin (1998)	management, quality training, effective cooperation
Abdel-Razeq, (1998)	contract, material, site staff, equipment, execution, labor and design
Chan & Tam (2000)	commitment of the project management team, confirming the quality by the clients,
Rustom and Amer (2006)	constructor's financial power, subcontractors, control system, political environment, availability of materials, site staff experience and integrity or coordination's for design documents.
Jha and Iyer (2006)	project manager's adequacy, monitoring by project team, interaction between all participants, Clients Competence, any type of conflicts between participants, climate condition, the level of knowledge and competition during tendering were the major quality factors
Zu, (2009)	top management assistance, workforce management, supplier relationship, customer relationship, quality information, process management and product design
Enshassi et.al (2009)	availability of personals with high experience and qualification, escalation of material prices, leadership skills for project manager, availability of resources as planned through project duration, and quality of equipment's and raw materials in project.
Warsame, A. (2013)	procurement strategy, clients (experience, skills and expertise) and shortage in experienced workforce.
Zidan, (2013)	insufficient design time, the way of choosing the designer which is based on the lowest price, the changing in client's requirement and lack of documentation are the essential factors.

Rashed, (2014)	lack of knowledge and skills in quality management, lack of training and education, lack of management and employee commitment and the attitude and behavior towards quality.
Callistus et al., (2014)	poor monitoring and feedback, fraudulent practices and kickbacks, lack of coordination between designers and contractors, and in addition there are several factors relating to contractor is affecting such as: lack of previous experience, lack of training on quality for staff, and lack of management leadership.
Syaj, (2015)	awarding the contract to the lowest bidder price has the most effect in occurring quality, the other challenges are lack of training and owner awareness about the significant of quality, implement properly safety program and design errors in preparing drawings and specifications.
Abas et al., (2015)	design changes, lack of budget, shortage of equipment's, shortage of materials and errors in cost estimations
Mallawaarachchi & Senaratne, (2015)	Management commitment, Training & awareness, Quality drawings and specifications, Quality standards, Constructability of design, and Constructability of design
Oyedele et.al, (2015)	poor quality of materials delivered to the site, low levels of expertise and labor experience, bad inspection and testing, poor site installation procedures, and a lack of quality assurance
Shanmugapriya and Subramanian (2015).	Leadership and process factors
Nyangwarab and Datche, (2015)	the availability of personals with high experience and qualification, availability of resources, escalation of material prices, average delay because of closures and materials shortage; quality of equipment and raw materials in project, leadership skills for project manager, and several external and material factors
Yada & Yadeta, (2016)	Stratifying to specifications, personal experience, quality of equipment's and materials used in the construction phase
Raphael & Phillip (2016)	contractors experience, equipment's availability, financing processes in the projects, projects technology, project manager attributes and procurement system as the fundamental factors affecting the quality of the projects
Taha, (2016).	blindly imitate, working in C area, neighbor's objection and others environmental factor, hiring labors and workforce, lack of coordination, staff negligence for safety and health and lack of laws and legislations
Oke et al., (2017)	incompetent and unskilled contractors, poor supervision at site, policy and requirements, poor planning and lack in training construction team

Tayeh et al., (2018)	experience of the construction, qualified staff, fund availability and payments strategy
Hussain et al., (2018)	material, design, stakeholder's, external and construction factors
Sebsibe, (2019).	leadership, lack of management commitment regarding quality and lack of appropriate quality management system
Shejul et al., (2019)	top management support, interaction between Project Participants, equipment, conformance to codes and standards and financial issues
Ola-awo et al., (2019)	support and commitment of management, effective evaluating and monitoring, joint conflict resolution methods and compatibility with objectives
Arowolo et al., (2019)	unsuitable Inadequate budgetary allocation budgetary allocation, lack of offender's sanctions, greedy contractors and lack of regulatory framework
Nen et al., (2020)	insufficient of collecting drawings, award contract to lower and not enough qualified bidder, not compliance with technical requirement and delay in preparing other plans relating;

This study is characterized as the only one that studied infrastructure projects funded by the government and not all the construction projects in general, located within the West Bank local councils, the nature of the sample targeted only engineers from the three main parties in any project: the owner, contractor, and supervision staff, and from this research a structural equation model was developed for evaluating the main factors. After reviewing the above and drawing on my own experience in this field, the researcher conducted a focus group with a local expert. Six main factors have been developed out of 49 items; we summarized all the possible factors into these main factors: construction, materials, owners, design, planning, supervision, and external factors; these factors will be considered as independent variables, and quality performance is a dependent variable. Below a definition for each variable and Figure1 below describe the research conceptual model.

Owners Factors: a group of factors were summarized and related to ministries and local councils including grants, procurements, payments strategy, policies, coordination's, and others (Warsame, A. 2013).

Planning and Design Factors: a group of factors were summarized and related to the impact of the planning and design phases on the quality performance, including the plans prepared and their effects, design activities, bidding documents, civil society sharing, and others (Zidan, 2013).

Supervision Factors: a number of factors were summarized and related to the supervision staff's responsibilities and roles in quality control at these types of projects, such as their permanent presence at the site project, the necessary experience and skills, inspection and monitoring daily activities, and others (Oke at.al, 2017).

Construction Factors: factors that related to the construction phase and the contractor's staff roles and effect on the quality performance, including the contractor's team experience and training required to do the work at the required level of quality, equipment that was needed at projects, subcontractors, financial statements for the contractor, and others (Rustom and Amer, 2006).

Material Factors: factors that related to Material impact on quality performance, including materials availability, the quality of material supplied to site, material prices and others (Yada and Yadeta, 2016).

External Factors: factors related to the surrounding environment but not to the main parts of the project, such as political issues, neighbor objections, working in the C Area, climate uncertainty, and others (Taha, 2016).

Quality performance at construction projects: conformance to project requirements, plans, policies, and specifications; and it could be achieved by continual validating of projects input such as project management commitment toward quality, plans, design, competence and qualified team, quality of raw materials and equipment, and others (Enshassi et.al, 2009).

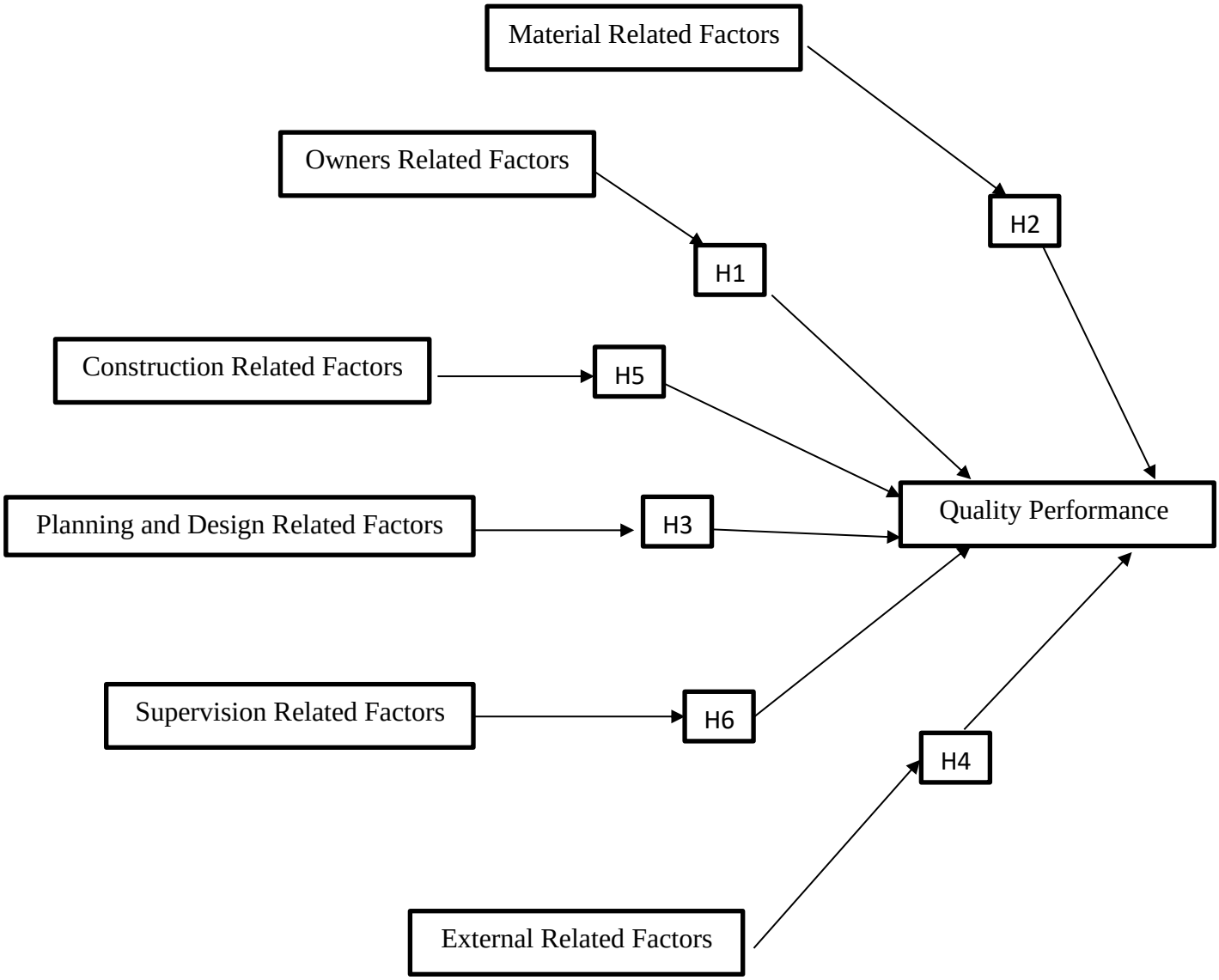

Figure1 Conceptual Framework of the Study

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter provides an outline of the researcher's methodological approach to examining quality performance in governmental infrastructure projects in West Bank local councils. This is accomplished by researching the current quality performance of those projects and developing a guide model to improve their performance according to several critical factors relating to it. This is aided by a literature review, which will assist the researcher in determining the best method of analysis. The survey is distributed and evaluated in order to construct the model based on the survey results, with the conclusion and suggestions created according to the analysis results.

Firstly, the researcher looked over the literature on the building industry. Focus groups were conducted, followed by the developing the questionnaire, then distribution of the questionnaire, after that collecting data and analysis of the results, finally formulation of the model, results, and conclusion.

3.2 Research Methodology Diagram

To describe the methodology used in the research as part of this investigation, which begins with the theme selection, ends with the conclusion and recommendation, and includes questionnaire design, data collection, and model development. This study contains eight phases, which are depicted in Figure 3 below, which provides a flowchart of the technique and drive the achievement of the research goal.

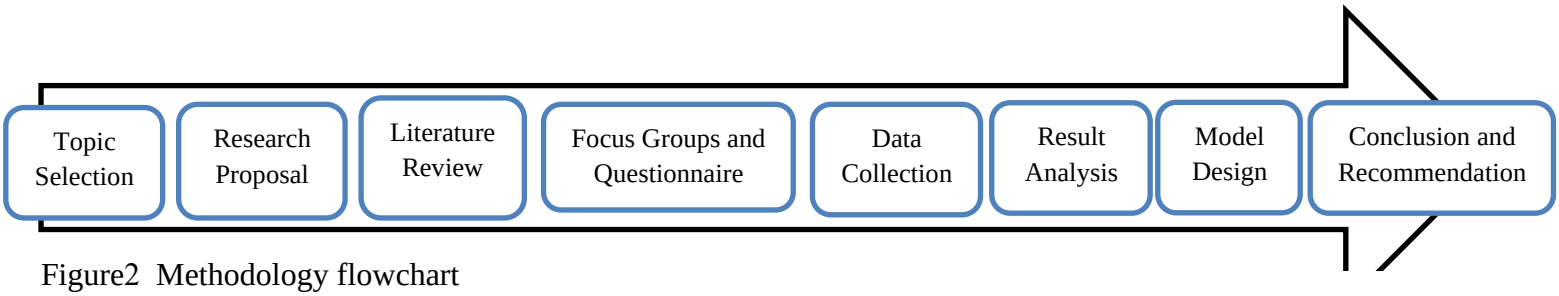

Figure2 Methodology flowchart

The initial element of this research was choosing a topic. The study objectives and research plan were created in the second step, followed by the identification and definition of research problems. The third phase entails a review of the literature to uncover past studies on the construction industry and the factors that affected quality performance in this sector. Then, the fourth phase is conducting preliminary investigations to learn more about the Palestinian situation when it comes to judging quality performance in construction and governmental construction projects via focus groups with several engaged experts from governmental offices, contractors, owners, and consultants in order to build the questionnaire.

The fifth phase involves collecting data from respondents after distributing 350 questionnaires. The next step is statistical data analysis of the research, is completed with the help of the Statistical Package for the Social Sciences (SPSS) program. After that; creating a model is an important step in improving and enriching the quality of performance on governmental infrastructural projects at West Bank local councils. Finally, the research findings and recommendations were presented.

3.3 Research Approach

Saqfelhait (2012) described the research strategy as "the way in which the research objectives can be questioned." So, choosing a research method is a critical decision; the

researcher must examine the approaches to determine which will best meet the study's objectives and the researcher's demands, comparing the existing data with the information required. The quantitative and qualitative approaches, as well as the combined method approach, are the two main approaches to research (Creswell, 2009). Both methodologies have advantages and limitations, but in some studies, one is more effective or appropriate than the other.

The qualitative approach intends to investigate phenomena by using open-ended questions, focus groups, the interview method, and textual results. On the other hand, the quantitative approach seeks to investigate the hypothesis by employing numerical values, survey methods and questionnaires, and closed-ended questions (Creswell, 2009).

A quantitative technique is used to forecast and measure the end course of action using statistics and numerical values, whereas a qualitative method is used to understand perceptions and thoughts, as well as how individuals think about opinions and issues and build a decision-making foundation. For this study, the researcher used a quantitative method by numerical analysis of data collected by a questionnaire to determine the relationship between quality performance as a dependent variable and independent variables that may affect the quality performance, test the hypothesis, and build the relationship model.

3.4 The Sample Size

The questionnaire was developed, and questionnaires were disseminated to the participants in order to gauge and get a clear picture of the critical factors that affect the quality performance at West Bank governmental infrastructure projects, as well as to

understand and pinpoint those factors in order to enable a successful projection to improve construction management efficiency and responsiveness.

In this research, there are three main populations targeted. There are three types of engineers: owners' population, constructors' population, and consultants' population. where the study sample size was determined based on the targeted degree of accuracy, the size of the study population. Table 2 shows how to choose the sample size by using Steven Thompson equation for computing the sample size (n) and based on a data from ministry of local government and ministry of housing and public works about the infrastructure projects they were implemented in local councils from 2010 as a population example.

Table 2 Governmental Infrastructure Projects in West Bank Local Councils

Number of Projects implemented inside local councils (MOLG, 2022)	Average Number of Engineers for each Project from all parts	Total Number of Engineers
4450	8	35600

(PCU, 2022)

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

n = 35600 * 0.25 / (35600 – 1 *(0.05^2 / 1.96^2)) + (0.5*0.5)

= 8900 / 25.32 + 0.25 = 348.06

The sample size equal 349 using above Steven Thompson equation, we distributed a comprehensive sample of 350 engineers from all the three parts; the sample was randomly selected, where the opportunity was equal for everyone in the population to get a chance to be in the sample.

3.4.1 Project Owners

This population includes all the owners' engineers from local councils and related funded government ministries' staff who are managing the projects directly. In these public projects, the local council engineer and the ministry representative are considered as one part as they assign the direct supervision and design to consultant engineering offices, and they manage the project as a higher supervisor or manager as a clients or top management teams, even though there are some differences in rules and responsibilities.

The Palestinian governmental structure contains twenty-two ministries. The most that have a relationship with West Bank local councils and provide the proper funds are the Ministry of Local Government and the Ministry of Housing and Public Works (Alfarra & Allouh, 2007). These ministries' engineering staff are managing the infrastructure projects in full coordination with the local councils' engineers.

3.4.2 Constructors Engineers Representative

The second population is described by engineers of constructing companies in Palestine who were approved by the owners' representatives (owner engineer and consultant engineer), and have a valid engineering association membership. There are over 330 constructors in the West Bank, divided into two categories: the type of construction work they are authorized to do and five classes: first class A, first class B, second, third, fourth, and fifth class. While all the classification depends on staff, capital, history of

the achieved projects, and experience (PCU,2017).

It was discovered that the first three classes of the classified contractors (first class A, first class B, and second class) completed roughly 95 percent of the overall implemented projects in the West Bank (Rashed, 2014). Whereas they represent only 60 % of all contracting companies in Palestine, 160 of these contracting companies belong to the first three degrees (PCU,2017). Figure 4 below shows the percentage of these companies, and Figure 5 describes the percentage of the executed projects based on its classification degree.

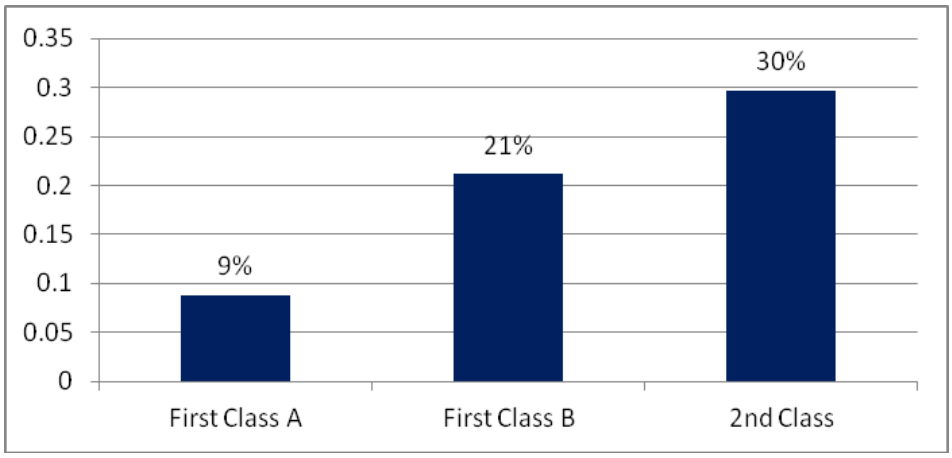

Figure 3 The Percentage of the Classified Targeted Contracting Firms in Palestine

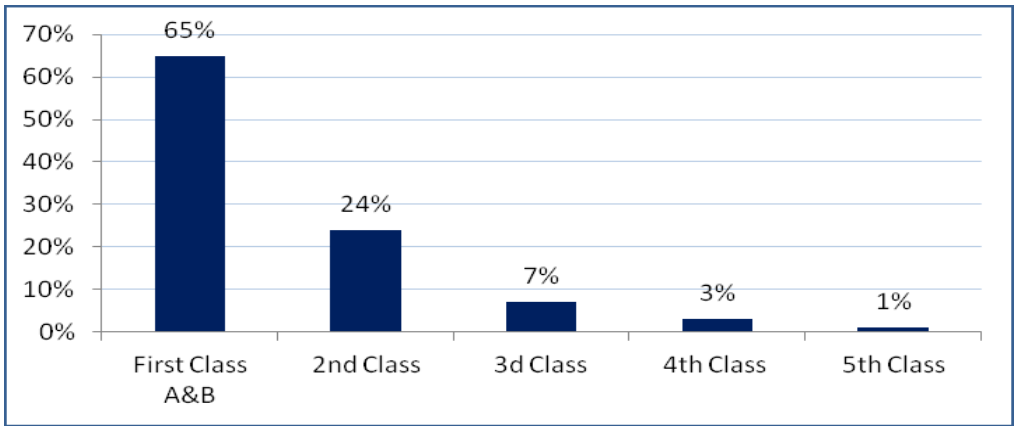

Figure 4 Executed projects Percentage according to the classification degree

3.4.3 Consultant Representative Engineers

The third population for this research is from engineering consultant firms, which is represented by the supervision engineers who form the link between the owner of the project and the contractor. Their basic role is to maintain the interest of the project owner by implementing the project as per the planned schedule, budget, proper level of quality, and optimal use of project resources. necessary time and cost and the required quality with the optimal use of resources.

These supervision engineers should have valid engineering degrees and be selected by the owners' representatives, whilst there are (230) various specialties engineering offices distributed in all Palestine regions. About 150 of these offices have a consultant classified, which are targeted in this study (Paleng, 2022).

3.5 Designing the Questionnaires & Instrumentation

The questionnaire is the most important field study tool to focus on, and it is used on a large scale by researchers to gather information about the existing circumstances and plans.

The questionnaire was written in English and then translated into Arabic to make it easier for respondents to understand, especially since some of them are unfamiliar with the English language, and it is published in English in Appendix A to serve as the research language.

The questionnaire was designed to address the most important issues, starting with a cover letter that explains the purpose of the study, the value of the data, and the confidentiality of the information provided. The questionnaire was divided into three sections in order to achieve the research goal.

3.5.1 Part One

This section intends to gather information on the demographic features of respondents. It consists of the following seven components:

1. Gender: (2 categories).
2. Educational level: (4 categories).
3. Number of engineers in the organization: (4 categories).
4. Number of projects that have been implemented or managed: (4 categories).
5. Years of experience: (5 categories).
6. Current work: (3 categories).
7. Job title: (6 categories).

3.5.2 Part Two

This section tries to gather information on engineers perceived levels of quality performance at governmental infrastructure projects at West Bank local councils; by answering six questions.

3.5.3 Part Three

This part aims to collect data on engineers perceived levels of factors that affect quality performance. This part contains 49 items belonging to the following six dimensions:

1. Planning and Design
2. Construction
3. Material

4. Owner
5. Supervision
6. External

Finally, in the second, and third sections of the questionnaire, a five-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5) is employed. All of the items in this section are positively phrased. As a result, nothing must be reversed. Higher scores (going from "Strongly Disagree" to "Strongly Agree") indicate improved quality performance among every variable or factor. Table 3 shows how the quantities of these variables are evaluated qualitatively.

Table 3 Qualitative Evaluation of Operational Variables

Mean Interval	**Qualitative Evaluation**
1 –2.33	**Low**
2.34 –3.66	**Moderate**
3.67 –5	**High**

3.6 Validity of the Questionnaire

According to Sekaran and Bougie (2016), validity is the degree to which a research instrument truly measures the variable it was designed to measure. To put it another way, validity assures that the research tool is measuring the correct idea. Seven professional judges examined the study instrument in terms of substance, wording, structure, and sequencing of questions to ensure that it was content valid. The appropriate changes are made based on their comments as deleted, added, and paraphrased. The list of professional judges who reviewed the study instrument can be

found in Appendix 3. Additionally, the study employed a Pearson Correlation matrix to assess the questionnaire's internal consistency, as shown in Appendix 4 (Tables A4.1–A4.7), where the sig between all questions and their primary variables was less than.05.

3.7 Reliability of the Questionnaire

Reliability is the extent to which a research tool is objective and consistent throughout time and across various components of the tool (Sekaran and Bougie, 2016). The internal consistency of the scale is frequently evaluated using the Cronbach's alpha coefficient. Cronbach's alpha coefficients of less than 0.60, between 0.70 and 0.80, and greater than 0.80 are regarded as bad, acceptable, and good, respectively. In a word, the Cronbach's alpha coefficient measures how well the scale's internal consistency and, consequently, the research instrument are maintained (Sekaran and Bougie, 2016). All variables' and associated items' alpha coefficients are greater than 0.60, indicating that the items' internal consistency is high. which indicates that the measurement model has been shown to be sufficient, as indicated in Table 4.

Table 4 Cronbach’s Alpha Coefficients for Dimensions

Dimension	**Number of Items**	**Cronbach’s Alpha**
Quality Performance	6	0.935
Planning and Design	9	0.935
Supervision	8	0.945
Construction	8	0.886
Material	7	0.814
Owners	10	0.944

External	7	0.859
Overall	**55**	**0.967**

3.8 Data Analysis

To provide answers to study questions. (SPSS-25) was used to examine the information gathered. Means, standard deviations, t-tests, frequencies, and multilinear regression analysis for independent samples and One-Way ANOVA, as well as a person correlation matrix. All these results and analysis are shown in the next chapter.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

In order to accomplish the primary goal of the study, this chapter evaluates the data that was gathered to answer the questions of this study. Means, standard deviations, One-Way Analysis of Variance (ANOVA), and frequencies. Finally, this chapter concludes with a test of the study's hypotheses. The Fifth-Likert scale was used to collect data from the sample size of 323 participants. With SPSS, data analysis was done.

4.2 Respondents Profile

The respondent's information including gender, qualification, age, years of experience, positions, current work, number of projects implemented, and the number of engineers employed, are shown in Table 5.

Table 5 Demographic Variables of Study

Variables	**Frequency (Total N = 323)**	**Percent (%)**
Gender		
Male	194	60.1
Female	129	39.9
Qualification		
Diploma	2	.6
Bachelor	247	76.5
Master	71	22.0
Ph.D.	3	.9

Age		
From 20-29	58	18.0
From 30-39	140	43.3
From 40-49	90	27.9
From 50-59	28	8.7
More than 60	7	2.2
Years of Experience		
Less than 5	38	11.8
5-9	68	21.1
10-14	100	31.0
15-19	61	18.9
More than 20	56	17.3
Current Work		
Engineering Office	65	20.1
Contracting Company	150	46.4
Local Council / (village council/Municipality)	58	18.0
Ministry	50	15.5
Position		
General Manager	36	11.1
Department Manager	40	12.4
Project Manager	123	38.1
Project Engineer	95	29.4

Other	29	9.0
The number of Accomplished Projects		
Less than 10	21	6.5
10-19	32	9.9
20-29	33	10.2
30-39	41	12.7
More than 40	196	60.7
The Number of Working Engineers		
Less than 5	80	24.8
5-9	81	25.1
10-14	63	19.5
15-19	37	11.5
More than 20	62	19.2

From the above table, the ratio between (323) respondents of males and females is (60.1: 39.9). This ratio looks reasonable based on the percentage of female working engineers in Palestine, which is 36% (Paleng, 2022). The results also revealed the participants' level of qualification. With 76.5 percent of the participants having bachelor's degrees, postgraduate graduates (with master's degrees) made up 22 percent of the participants. 0.6 percent of the participants did not have a degree but did have a diploma, and only 0.9 percent of the participants had a PhD degree. When compared to the annual report of the General Personnel Council for 2016–2017, which shows that 11 percent of all civil service employees hold a postgraduate degree, in my opinion, these percentages seem

appropriate. 70 percent of the overall civil service workforce is made up of workers with bachelor's degrees.

Moreover, (30–39) was the largest age group of respondents, with 43.3% of participants; the respondents who are between the ages of 40–49, who make up 27.9% of participants, are the second-largest group; while those who are from 20–29 make up 18% of respondents. While the group of engineers aged 50 to 59 years of age represented 8.7% of respondents, and the engineers who are more than 60 years of age made up 2.2 % of respondents. According to these percentages, the sample of respondents is primarily made up of engineers who are between the ages of 20 and 49, or 89.1% of the total participant population. In my opinion, this indicates and supports the fact that the Palestinian state is a young one.

The categories with the most participants in terms of years of experience were those with 10-14 years (31%), followed by those with (5-9) years (18.9%), (15-19) years (18.9%), more than 20 years (17.3%), and less than 5 years (11.8%).On average, 88.3 percent of participants had five years of work experience or more. From my perspective, it makes sense that the majority of participants have a medium to high level of experience, especially given that the bulk of them are between the ages of 25 and 49 years old.

The results also show the participants' current jobs; the percentage of participating engineers were: 46.4 percent working at contracting companies; 20.1 percent at engineering offices; at local councils was 18 percent; and the remaining 15.5 percent was at ministries.

Furthermore, the results also display the job titles or positions of the participants, with 38.1 percent of participating engineers working as project managers, 29.4 percent as project engineers, 12.4 percent as department managers, 11.1 percent as general managers, and the remaining 9 percent as others.

Otherwise, the total number of projects that have been managed or implemented by the organizations that the engineers work for is another indication of the experience that they can receive from those firms. As of 60.7 percent of respondents whose organizations had implemented more than 40 projects, 12.7 percent had implemented 30-39 projects, 10.2 percent had implemented 20-29 projects, 9.9 percent had implemented 10-19 projects, and 6.5 percent had implemented less than 10 projects. This indicates that the institutions have extensive experience.

Finally, another measure related to the organizations that the respondents work for, which indicates by the number of colleagues or total engineers they are working for, an idea about the size of the organizations. 25.1 percent of respondents work in organizations with 5-9 working engineers, 24.8 percent in organizations with less than 5 working engineers, 19.5 percent in organizations with 10-14 working engineers, 19.2 percent in organizations with 15-19 working engineers, and 11.5 percent in organizations with more than 20 engineers. From the above data, I concluded that the Palestinian organizations' staff are not large in general.

4.3 Research Questions

This section aims to answer research questions based on the mean and standard deviation, which depict the degree of the selected factors (planning and design, supervision, construction, material, owner, and external) and their impact on quality

performance at governmental infrastructure projects in West Bank local councils. The Likert scale takes into account the mean judgments as described before in this study to respond to the study's questions. Before we go over on evaluating the factors that affect quality performance, we evaluated quality performance as a dependent variable by its mean, standard deviation, and degree as shown in Table 6 below.

Table 6 Descriptive Analysis of Quality Performance Variable

Items	Mean	Std. Deviation	Degree
Local governments carry out high-quality government infrastructure projects.	2.45	0.98	Moderate
Quality-related problems seldom happen after implementing governmental infrastructure projects inside local councils	2.35	0.95	Moderate
There is complete satisfaction from citizens about the quality of governmental infrastructure projects at local councils	2.19	1.00	Low
As an engineer working on governmental infrastructure projects, I sensed a clear interest from all parties in a quality issue	2.5	1.05	Moderate

Governmental infrastructure projects are implemented by local councils based on carefully written quality plans	2.2	0.92	Low
Governmental infrastructure projects are implemented within local councils according to international quality standards	2.22	0.88	Low
Overall	**2.32**	**0.96**	**Low**

The above table indicates that the quality performance dimension consists of 6 items. We noticed that the overall quality performance mean is low as it is 2.32. All the items mean they are very close to each other while they are classified from low to moderate. Where the highest item mean of quality performance is (Local governments carry out high-quality government infrastructure projects) with (M = 2.45, SD = 0.98); this item mean is not too high from low degree whereas most of respondent's engineers from owners and supervision sides who have the big responsibility about the project's outcomes.

While the lowest item of quality performance is (there is complete satisfaction from citizens about the quality of governmental infrastructure projects at local councils) with (M = 2.19, SD = 1.00); this represented an indication of the bad performance of perceived quality by citizens as per all respondents' feedback; as citizens are suffering from several quality problems during and after the execution of projects, such as:

delaying in implementing, rework, bad outcomes, and mis-coordination between services and projects.

In order to answer the study questions about assessing the impact of independent factors (planning and design, supervision, construction, material, owner, and external) on quality performance, by summarizing the descriptive statistics for each of these factors.

4.3.1 Planning and Design Factor

Table 7 below describes the descriptive statistics for this factor

Table 7 Descriptive Analysis of Planning and Design Factor

Items	Mean	Std. Deviation	Degree
When designing for governmental infrastructure projects, coordination is achieved between all existing and proposed future infrastructure services	2.39	0.95	Moderate
The design office clearly describes the proposed work and the bid items	2.57	1.04	Moderate
Governmental infrastructure projects at local councils are planned based on priorities and needs	2.52	0.97	Moderate
Blinding design for similar projects does not happen at all there	2.21	0.92	Low
Usually, there is no conflict between the bidding documents for a single project	2.43	0.85	Moderate

Referring the design tender to the engineering office with the lowest price does not affect the quality of the work	2.02	.92	Low
Civil society organizations are usually involved in planning for governmental infrastructure projects	2.29	1.05	Low
Identifying a specific budget for the designed office does not affect the quality of work in the project	2.10	.94	Low
Usually, there is a complete coordination between the local council, the designed office, and the donor of the project in defining the work requirements	2.41	1.10	Moderate
Overall	**2.33**	**0.95**	**Low**

The above table indicates that the planning and design dimension consists of 9 items. When going over each item, it is clear that Item 2, which is (the design office clearly describes the proposed work and the bid items), had the highest mean score, which is 2.57 with a moderate degree and a little bit higher than low degree, and the lowest effect on quality performance. It described a clear miscoordination between all contract documents that can be easily found; whereas (referring the design tender to the engineering office with the lowest price does not affect the quality of the work) had the lowest mean score and the highest effect, which is 2.02, as it depends on the type of

engineering office that is preparing the bid documents; the engineering design office has the lowest design tender price will produce bad or unprofessional outcomes. But the other items had mean scores that were between these two bounds. Overall, planning and design factors had a low degree of level, with a mean score of 2.33 and a standard deviation of 0.95.

4.3.2 Supervision Factor:

Table 8 below describes the descriptive statistics for this factor.

Table 8 Descriptive Analysis of Supervision Factor

Items	Mean	Std. Deviation	Degree
The lack of permanent supervision on a daily basis at governmental infrastructure projects does not affect the quality of work implementation	1.92	.92	Low
The supervision staff often has the technical expertise to follow up the work with the required quality	2.47	1.18	Moderate
There is a high commitment from the supervision staff to the application of quality	2.57	.90	Moderate
The supervision staff has the necessary contractual experience that is required to manage the work with the contractor	2.59	1.02	Moderate

The supervision staff always follows up the work according to the schedules and plans prepared in advance	2.52	0.87	Moderate
The supervision staff always receives the work activities according to the specifications and bid documents	2.56	0.82	Moderate
The supervision team coordinates between all parties, including the contractor, local council, and ministry, as required	2.61	0.95	Moderate
All supervision teams follow up on laboratory tests of the supplied materials and their conformity with quality standards	2.73	0.98	Moderate
Overall	**2.50**	**0.95**	**Moderate**

The above table indicates that the supervision factor consists of 8 items. When going over each item, it is clear that Item 8, which is (all supervision teams follow up on laboratory tests of the supplied materials and their conformity with quality standards), had the highest mean score and the lowest effect, which is 2.73, They could be represented as a second or next phase as a result of laboratory tests and monitoring on material suppliers, as they did not have a large and clear effect on other items, other communicated parts, and overall performance. Whereas Item 1, (the lack of permanent

supervision on a daily basis at governmental infrastructure projects does not affect the quality of work implementation), had the lowest mean score and the highest effect, which is 1.92; as the high effect of absence the supervision staff on quality of all activities and other project parts. But the other items have mean scores that fall between these two bounds. Overall, the supervision factor has a moderate degree level, with a mean score of 2.50 and a standard deviation of 0.95. All the items had a moderate degree level except item number 1. It had a low degree of level as it describes the effect of supervision absence on quality performance.

4.3.3 Construction Factor

Table 9 below describes the descriptive statistics for this factor.

Table 9 Descriptive Analysis of Construction Factor

Items	Mean	Std. Deviation	Degree
The contractor team always has the necessary experience to carry out the project work with the required level of quality	2.60	.97	Moderate
The contractor's staff is interested in carrying out the work with the required quality, as they are interested in getting the work done within the planned time and cost	2.60	.91	Moderate
Contractors' performance is not affected by their bid prices	2.28	.86	Low

The quality of the work is not affected by the lack of skilled manpower from the contractor's staff	2.17	.78	Low
The quality of the work is not affected by the contractor due to the absence of the necessary equipment in a timely manner	2.28	.84	Low
Subcontractors are committed to implementing quality as the main contractor’s commitment	2.49	1.04	Moderate
The quality of the work is not affected by the general financial status of the contractor	2.32	.91	Low
The quality of work is not affected by the number of projects implemented by the contractor at the same time	2.66	1.03	Moderate
Overall	**2.43**	**0.92**	**Moderate**

Table 9 shows that there were 2.43 total mean-related elements, which indicates a moderate level of estimation. The quality of work (the quality of work is not affected by the number of projects implemented by the contractor at the same time) received the best grade for mean and the lowest effect on quality performance. It scored (2.66) as it described the relationship between the number of projects the contractor had at the same

time and the quality performance of each project; logically every project differs from another, has unique resources, plans, stakeholders, and others. As a result, the performance of each project was unaffected by the performance of others. Additionally, the item with the lowest mean score and the highest effect was " The quality of the work is not affected by the lack of skilled manpower from the contractor's staff," which received a score of 2.17. This explains that the absence of skilled labor had a high effect on the quality of performance; they are the main resources for doing any activity as per the required level of quality.

4.3.4 Material Factor:

Table 10 below describes the descriptive statistics for this factor.

Table 10 Descriptive Statistics for Material Factor

Items	Mean	Std. Deviation	Degree
The unavailability of the necessary materials for the work at the required time does not affect the quality of the work	2.22	.764	Low
All the materials supplied for construction projects conform to the required level of quality	2.58	.959	Moderate
Fluctuations in the prices of materials during implementation do not affect the quality of work	2.15	1.05	Low

The contractor's relationship with suppliers usually does not affect the quality of the materials used to carry out the work	2.59	.99	Moderate
The contractor or supplier focuses only on the quality of materials, regardless of their price	2.29	.84	Low
The engineering laboratories transparently check the compliance of the supplied materials with the required specifications	2.53	1	Moderate
The monopoly of suppliers for some materials does not affect their quality	2.51	.94	Moderate
Overall	**2.41**	**0.94**	**Moderate**

The results of Table 10 indicate that the material dimension consists of 4 items. When looking at each of these items, it is clear that (the contractor's relationship with suppliers usually does not affect the quality of the materials used to carry out the work) had the highest mean score and the lowest effect on the quality performance, which it scored 2.59, as it described the relationship between contractors and suppliers and their interrelationship in the quality of supplying materials, logically this relationship does not have a large impact because materials will be monitored later. Whereas (fluctuation in the prices of materials during implementation does not affect the quality of work), which it scored 2.15; it described the effect of material prices changing during the

project execution, because changes in materials pricing affect the profit of contractors, and this issue may force the contractors to reduce the material quality. The other items had mean scores between these two bounds. Overall, the material factor had a moderate degree level, with a mean score of 2.41 and a standard deviation of 0.94

4.3.5 Owner Factor

Table 11 below describes the descriptive statistics for this factor.

Table 11 Descriptive Analysis of Owner Factor

Items	Mean	Std. Deviation	Degree
There is continuous coordination between ministries and local councils with decisions related to the implementation of the work in the project	2.42	1	Moderate
There is a unified quality system issued by the relevant ministries	2.36	.9	Moderate
The ministries provide a sufficient grant for local councils to enable them to design an integrated project that takes into account all aspects of quality	2.03	1.02	Low
Relevant ministries disburse the financial payments to contractors in a timely manner	1.78	.85	Low

Referring bid to the lowest price contractor does not affect the quality of work implementation	2.07	1.01	Low
Local governments overcome the contractor's obstacles, allowing him to complete the project with the required quality.	2.39	.95	Moderate
The local councils' give the supervision staff full powers to carry out their work according to the rules	2.39	.82	Moderate
The local council and the funded ministry are constantly striving to improve procedures that reduce waste	2.49	.96	Moderate
The Ministry's non-disbursement of currency exchange and material differences does not reduce the value of quality in implementation in general	2.02	1.07	Low
Donors' instructions do not affect the implementation of the work with the required level of quality	2.40	0.91	Moderate
Overall	**2.24**	**.95**	**Low**

Table 11 shows that there was a 2.24 mean of owner item means, which indicates a low level of estimation and one of two low-level overall factors; this means that the owner factor had the highest effect on the quality performance. The item "the local council and the funded ministry are constantly striving to improve procedures that reduce waste" received the highest mean score and the lowest effect, which is 2.49. It described the seeking range that owner institutions introduced to decrease waste. The item with the lowest mean score and highest effect was " relevant ministries disburse the financial payments to contractors in a timely manner," which received a score of 1.78. This item can be noticed from all sides as an effect of the delay in disbursement of the contractors' deserved payments, this issue effects contractures' cash flow and causes contractual claims between contractures and owners that may lead to quality and performance problems

4.3.6 External Factor

Table 12 below describe the descriptive statistics for this factor.

Table 12 Descriptive Analysis of External Factor

Items	Mean	Std. Deviation	Degree
The intervention of citizens in the work of infrastructure projects does not limit the application of quality	2.32	.87	Low
The contractor can work with the required level of quality on projects located within areas c	2.51	.92	Moderate

Adverse weather conditions do not affect the contractor's commitment to quality application	2.50	.98	Moderate
Occupation practices during implementation do not hinder contractors from performing the work as required	2.44	.88	Moderate
Repeated closures due to epidemics and emergencies do not affect the quality of work implementation	2.53	.89	Moderate
Changing the exchange rate between the local and foreign currency during implementation does not affect the quality of work	2.09	.94	Low
The quality of work execution is not affected by the Israeli restrictions on importing materials	2.46	.90	Moderate
Overall	**2.41**	**0.915**	**Moderate**

Table 12 shows that there was a 2.41 mean of external item means, which indicates a moderate level of estimation. The item " repeated closures due to epidemics and emergencies do not affect the quality of work implementation" received the highest mean score and the lowest effect, which is 2.53. It described that the effect of unforeseen risks on the quality of performance which have a moderate degree; as the delay in implementing activities due to emergences cases should not effect on quality

performance. The item with the lowest mean score and highest effect was " changing the exchange rate between the local and foreign currency during implementation does not affect the quality of work," which received a score of 2.09. This item can be noticed from all sides as an effect of changing the exchange rate between the bidding phase and the construction phase. These differences, if they are not paid to the contractor, will greatly affect the quality of work execution because the prices of materials will be greatly affected.

4.3.7 Summary of Quality Performance Factors

Table 13 below describe the descriptive statistics for quality performance factors.

Table 13 The Descriptive Statistics for Quality Performance Factors

Factors	Mean	Std. Deviation	Degree
Planning and Design	2.33	0.95	Low
Supervision	2.50	0.95	Moderate
Construction	2.43	0.92	Moderate
Material	2.41	0.94	Moderate
Owner	2.24	0.95	Low
External	2.41	0.91	Moderate
Overall	**2.39**	**0.94**	**Moderate**
Quality Performance	**2.32**	**0.96**	**Low**

The results of Table 12 indicate that respondents have moderate levels of perception regarding four factors (supervision, construction, materials, and external), all of these four factors are only a little bit higher than low degree as the overall quality performance has a low degree. On the other hand, respondents have low levels of

perceptions with respect to tow factors (planning and design, and owners). The planning and design phase are responsible for issuing the procedures and standards that have to be followed by all parties, especially with regard to quality. While the owners' factor had the most effect on the quality of the performance; because without the owners' representative commitments; all the necessary plans would not be able to apply. Generally, we didn't have a large difference between all the independent factor means and the dependent quality performance factor, as the overall factor mean is 2.39 which is moderate and a little bit larger than low degree; and the overall quality performance mean is 2.32 which is low degree, and the tow means are very close to each other.

4.4 Testing Hypothesis

4.4.1 Testing for Normality of Data

Before testing the hypotheses already established in Chapter One, it is necessary to test the normality of data by using well-known test of Kolmogorov-Smirnov. According to this test, data are normally distributed if the p-value of the test is more than 0.05 whereas data do not follow normal distribution if the p-value is less than 0.05. The output of the normality test is shown in Table 14.

Table 14 Kolmogorov-Smirnov Test of Normality

Kolmogorov-Smirnov Test of Normality				
Variable	**Statistic**	**df**	**Sig.**	**Conclusion**
Planning and Design	0.122	323	0.166	Normal
Supervision	0.156	323	0.201	Normal
Construction	0.199	323	0.102	Normal
Material	0.890	323	0.362	Normal
Owners	0.138	323	0.089	Normal
External	0.145	323	0.240	Normal

The results of the above table indicate that the planning and design, supervision, material, construction, owners, and external all have P-values above 0.05, so the data is normally distributed. This is why the parametric T-Test, ANOVA and Regression are used as shown in the next pages.

To test the hypothesis (H1 – H6), Regression analysis is used to see if the relationship is positive significant or not between all the independent variables (planning and design, supervision, construction, material, owner, and external) and the dependent variable, which is quality performance. Firstly, by using the ANOVA test. Table 15 below shows this ANOVA for the estimated regression model.

Table 15 ANOVA for Estimated Regression Model

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	235.964	6	39.327	200.155	.000[b]
	Residual	62.089	316	.196		
	Total	298.053	322			
a. Dependent Variable: Quality						
b. Predictors: (Constant), External, Construction, Pla_Design, Material, Owner, Supervision						

The calculated regression model's ANOVA reveals that the F-statistic of 39.327 is significant for the model. The overall regression model is therefore determined to be significant and there is a relationship.

4.4.2 Individual Regression Coefficients

Table 16 shows the results of regressing dependent variables on quality performance at governmental infrastructure projects in West Bank local councils.

Table 16 Individual Regression Coefficients

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.112	.127		-.885	.377		

	Pla_Design	.274	.062	.258	4.413	.000	.240	1.16
	Supervision	.325	.052	.334	6.231	.000	.229	2.37
	Material	.043	.058	.029	.740	.460	.598	1.673
	Owners	.380	.056	.362	6.768	.000	.428	2.338
	External	-.079	.046	-.055	-1.717	.087	.231	2.332
	Construction	.105	.046	.076	2.276	.024	.643	1.555
a. Dependent Variable: Quality								

Based on the above table we concluded these results for the hypotheses H1-H6:

H1: As the significant value for the relation between owners' factor and quality performance equals .000 and it's below the p-value which is 0.05, we conclude that there is a relation or impact from owner factor on quality performance. The relationship in general is significant and positive (owners' coefficient is 0.380). So, we cannot support H1. (There is a significant positive impact from owners on quality performance). There is a relationship between quality performance and the owners' factor due to the impact of owners' decisions, commitment, leadership, assistants, policies, etc. If the owners give high awareness to quality, all the project parts will work because of their power.

H2: As the significant value for the relationship between material factor and quality performance equals .460 and it's above the p-value which is 0.05, we conclude that there is no relationship or impact from material factor on quality performance. So, we support H2 (There is no significant impact from material on quality performance). Material factor didn't have effect on quality performance; it could be considered a

secondary or dependent issue because it can be controlled easily, not like other issues related to owners or planning and design.

H3: As the significant value for the relation between planning and design factor and quality performance equals 0.000 and it's below the p-value which is 0.05, we concluded that there is a relation or impact from planning and design factor on quality performance. The relationship in general is significant and positive (planning and design coefficient is 0.274). So, so H3 is not supported (there is a significant positive impact from planning and design on quality performance). The highly effect from planning and design phase; its effect will be high, because it represents the guidance, direction, and outline for the project; through its polices and standards

H4: As the significant value for the relation between external factors and quality performance equals 0.087 and it's above the p-value which is 0.05, we concluded that there is no relation or impact from external factors on quality performance; the relationship is not significant, so we can support H4. (There is no significant positive impact from external on quality performance). There is no effect of external factors on quality is because it could be easily monitored, prevented, and controlled.

H5: As the significant value for the relation between construction factor and quality performance equals 0.024 and it's below the p-value which is 0.05, we concluded that there is a relation or impact from construction factor on quality performance; so, we can't support H5 as there is a positive impact from the construction factor on quality performance (as the external coefficient equal 0.105). There is a correlation between construction factor and quality performance because it is a fundamental part of implementing any project; it is an execution part which its output is very important by

the contractor team as their experience, skills, and training. All issues related to construction parts had immediate reflect on quality outcome such as equipment and skilled labors availability, subcontractors concern to quality, financial statement of the contractors, and others.

H6: As the significant value for the relation between supervision factor and quality performance equals 0.000 and it's below the p-value which is 0.05, we concluded that there is a relation or impact from the supervision factor on quality performance; the relationship in general is significant and positive (supervision coefficient is 0.325), so we can't support H6 (there is a significant positive impact from supervision on quality performance); the supervision staff play a vital role in monitoring and controlling quality performance at site construction and ensuring that the quality policies and standards are executed as per plan.

While testing the above hypothesis, supervision, planning and design, construction, and owners' factors have a positive significant relation with the quality performance factor. and material and construction factors have no significant relationship with the quality performance factor.

4.4.3 Multi-Collinearity Test:

To verify the existence of multiple linear relationship, a multicollinearity test was carried out. From above Table 32 described before, the result revealed the variance inflation factor (VIF) for all factors was less than 2.5; which indicating the non-existence of multi collinearity problem as per (Johnston et.al 2018).

4.4.4 Coefficient of Determination (R^2)

The degree to which the predicted regression model fits the data is often determined by the coefficient of determination (R^2). R^2 estimates the proportion of the dependent variable's fluctuation that can be accounted for by the independent variables in the regression model. The independent factors completely explain the dependent variable when the extreme R^2 value is 1. (i.e., the regression model fits the data perfectly). An excessive R^2 value of 0, on the other hand, shows that the independent variables in the regression model do not at all explain the dependent variable. The coefficient of determination for the estimated regression model is shown in Table 17.

Table 17 Coefficient of Determination for Regression Model

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.890[a]	.792	.788	.44327
a. Predictors: (Constant), Construction, Pla_Design, External, Material, Owner, Supervision				
b. Dependent Variable: Quality				

Table 17 shows that the adjusted R^2 for the estimated regression model is 0.788. This means that variation in the six variables included in the regression model (planning and design, construction, external, material, owner, and supervision) explains 78.8% of the variation in quality performance at governmental infrastructure projects in West Bank local councils. In social sciences studies, such a percentage indicates very good explanatory power of the regression model.

4.4.5 The Research Model

The following regression equation summarizes the relationship between the independent factors (planning and design, supervision, construction, material, owner, and external) and the dependent factor, which is quality performance in West Bank local councils:

Quality Performance = -0.112 + 0.274 planning and design + 0.325 supervision

+ 0.380 owners+ 0.380 owners + 0.105 construction

Based on the above equation we conclude that:

a) Coefficient of owner's factor is 0.380, which means if owners factor increases while a planning and design, supervision, and construction remain constant, the quality performance increases.

b) Coefficient of supervision factor is 0.325, which means if supervision factor increases while a planning and design, owners, and construction remain constant, the quality performance increases.

c) Coefficient of planning and design factor is 0.274, which means if planning and design factor increases while a owners, supervision, and construction remain constant, the quality performance increases.

d) Coefficient of construction factor is 0.105, which means if construction factor increases while a planning and design, owners, and supervision remain constant, the quality performance increases.

4.4.6 T-Test & ANOVA Test

To test the hypothesis (H7.1 – H7.8), T-Test and ANOVA have been used.

H7.1: T-test for Independent Samples regarding gender is shown in table 18 below.

Table 18 T-test for Independent Samples of Quality Performance Due to Gender

Total	Gender	N	Mean	S. D	t	Sig.*
	Male	149	2.58	0.99	5.21	0.000
	Female	129	2.03	0.80		

Table 18 shows statistically significant gender differences in quality performance at governmental infrastructure projects in West Bank councils at ($\alpha = 0.05$). The significance was (0.000), which is less than (0.05), and since the t count value is greater than t table value (5.21 > 1.6493). So, H7.1 is not supported (there is a significant statistical difference in quality performance perception due to the respondent's gender), where the percentage of male respondents is higher than females and the West Bank community is an eastern one, in which the male engineer is able to communicate with the community and measure their satisfaction with quality first, and leadership positions in the profession are higher than the most experienced males who are able to assess quality performance with a broader view. In general, the powers and responsibilities of male engineers are also higher, which helps them more as well as assess the situation in a broader and more comprehensive manner.

H7.2: Table 19 below describes the frequencies, means, and standards deviations of a respondent's qualification, and Table 20 describes the results of a one-way ANOVA of the quality performance due to qualification.

Table 19 Frequencies, Means and Standards Deviations of Respondent's Qualification

Qualification	**N**	**Mean**	**Std. Deviation**
Diploma	2	3.41	1
Bachelor	247	2.32	.97
Master	71	2.46	.89
Ph.D.	3	2.88	1.01
Total	323	2.36	.96

Table 20 One-Way ANOVA Test for the Quality Performance Due to Qualification

ANOVA					
Quality					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.112	3	1.371	1.488	.218
Within Groups	293.941	319	.921		
Total	298.053	322			

Table 20 shows that there are no statistically significant differences in the total degree of quality performance at governmental infrastructure projects in West Bank councils due to qualification at ($\alpha = 0.05$). The significance was (0.218), which is more than (0.05). So, H7.2 is supported. (There is no significant statistical difference in quality performance perception due to the respondent's qualification.

H7.3: Table 21 below describes the frequencies, means, and standard deviations of a respondent's age; and Table 22 describes the results of a one-way ANOVA of the quality performance due to age.

Table 21 Frequencies, Means and Standards Deviations of Respondent's Age

Age	**N**	**Mean**	**Std. Deviation**
From 20-29	58	2.46	.93
From 30-39	140	2.44	.94
From 40-49	90	2.19	.95
From 50-59	28	2.42	1.06
More than 60	7	1.97	1.04
Total	323	2.36	.96

Table 22 One-Way ANOVA Test for the Quality Performance Due to Age

ANOVA					
Quality					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.172	4	1.293	1.404	.232
Within Groups	292.881	318	.921		
Total	298.053	322			

Table 22 shows that there are no statistically significant differences in the total degree of quality performance at governmental infrastructure projects in West Bank councils due to age ($\alpha = 0.05$). The significance was (0.232), which is more than (0.05). So, H7.3

is supported (There is no significant statistical difference in quality performance perception due to the respondent's age).

H7.4: Table 23 below describes the frequencies, means, and standard deviations of a respondent's experience; and Table 24 describes the results of a one-way ANOVA of the quality performance due to experience.

Table 23 Frequencies, Means and Standards Deviations of Respondent's Exper**ience**

Experience	**N**	**Mean**	**Std. Deviation**
Less than 5	38	2.41	1.02
5-9	68	2.46	.81
10-14	100	2.38	.95
15-19	61	2.06	1.01
More than 20	56	2.51	.99
Total	323	2.36	.96

Table 24 One-Way ANOVA Test for the Quality Performance Due to Experience

ANOVA					
Quality					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.482	4	1.870	2.047	.088
Within Groups	290.572	318	.914		
Total	298.053	322			

Table 24 shows that there are no statistically significant differences in the total degree of quality performance at governmental infrastructure projects in West Bank councils due to experience ($\alpha = 0.05$). The significance was (0.088), which is more than (0.05). So, H7.4 is supported (There is no significant statistical difference in quality performance perception due to the respondent's experience)

H7.5: Table 25 below describes the frequencies, means, and standard deviations of a respondent's work; and Table 26 describes the results of a one-way ANOVA of the quality performance due to work.

Table 25 Frequencies, Means and Standards Deviations of Respondent's Work

Current Work	**N**	**Mean**	**Std. Deviation**
Engineering Office	65	2.47	.811
Contracting Company	150	1.75	.68
Local Council	58	3.30	.77
Ministry	50	2.98	.68
Total	323	2.36	.96

Table 26 One-Way ANOVA Test for the Quality Performance Due to Work

ANOVA					
Quality					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	127.422	3	42.474	79.407	.000
Within Groups	170.631	319	.535		

Total	298.053	322			

Table 26 shows there is a statistical significance difference due to work at (α =0.05) on the total degree of quality performance at governmental infrastructure projects in West Bank councils. The significance was (0.000), which is less than (0.05). So, H7.5 is not supported (There is a significant statistical difference in quality performance perception due to the respondent's work). It is natural that the opinions of responding engineers differ about quality performance, as their workplace greatly affected their answers. As each part of them wants to hold the other responsible, some of them are senior management responsible for all policies and general plans, and some of them implement and supervise.

H7.6: Table 27 below describes the frequencies, means, and standard deviations of a respondent's position; and Table 28 describes the results of a one-way ANOVA of the quality performance due to position.

Table 27 Frequencies, Means and Standards Deviations of Respondent's Position

Position	**N**	**Mean**	**Std. Deviation**
General Manager	36	2.35	.93
Department Manager	40	3.16	.82
Project Manager	123	2.13	.84
Project Engineer	95	2.14	.97
Other	29	2.99	.76
Total	323	2.36	.96

Table 28 One-Way ANOVA Test for the Quality Performance Due to Position

ANOVA					
Quality					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48.396	4	12.099	15.411	.000
Within Groups	249.658	318	.785		
Total	298.053	322			

Table 28 shows that there is a statistically significant difference in the total degree of quality performance at governmental infrastructure projects in West Bank councils due to position (α =0.05). The significance was (0.000), which is less than (0.05). So, H7.6 is not supported (There is a significant statistical difference in quality performance perception due to the respondent's position). The respondents' perceptions about the quality of project performance vary based on their position, as their position depends on their actual experience; a more experienced engineer has a wider view and more power to judge.

H7.7: Table 29 below describes frequencies, means, and standards deviations for the number of accomplished projects, and Table 30 describes the results of a one-way ANOVA of the quality performance due to the number of accomplished projects.

Table 29 Frequencies, Means and Standards Deviations for Number of Accomplished Projects

Number of Accomplished Projects.	**N**	**Mean**	**Std. Deviation**
Less than 10	21	2.9841	.98447

10-19	32	2.6406	.98019
20-29	33	2.2727	.91744
30-39	41	1.9797	.80553
More than 40	196	2.3529	.95842
Total	323	2.3669	.96210

Table 30 One-Way ANOVA Test for the Quality Performance Due to the Number of Accomplished Projects

ANOVA					
Quality					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.877	4	4.219	4.772	.001
Within Groups	281.177	318	.884		
Total	298.053	322			

Table 30 shows that the number of completed projects has a statistically significant difference on the total degree of quality performance at governmental infrastructure projects in West Bank councils (α =0.05). The significance was (0.000), which is less than (0.05). So, H7.7 is not supported (There is a significant statistical difference in quality performance perception due to the number of accomplished projects). As the number of completed projects is a measure of real experience, and therefore a higher holistic view in all respects.

H7.8: Table 31 below describes frequencies, means, and standards deviations for the number of working engineers, and Table 32 describes the results of one-way ANOVA of the quality performance due to the number of working engineers.

Table 31 Frequencies, Means and Standards Deviations for Number of Working Engineers

Number of Working Engineers	N	Mean	Std. Deviation
Less than 5	80	2.86	1.03
5-9	81	2.30	.89
10-14	63	1.88	.75
15-19	37	1.83	.63
More than 20	62	2.61	.90
Total	323	2.36	.96

Table 32 One-Way ANOVA Test for the Quality Performance Due to the Number of Working Engineers

ANOVA					
Quality					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48.871	4	12.218	15.592	.000
Within Groups	249.182	318	.784		
Total	298.053	322			

Table 32 shows that the number of completed projects has a statistically significant difference on the total degree of quality performance at governmental infrastructure projects in West Bank councils (α =0.05). The significance was (0.000), which is less than (0.05). So, H7.8 is not supported (There is a significant statistical difference in quality performance perception due to the number of working engineers). The number

of engineers working in the institution indicates the size of the institution, its experience, and the number and type of the implemented projects. There is no doubt that the engineer working in an institution that contains more engineers is affected by its broader vision and experience, as well as the experience of his colleagues. Table 33 below summarizes the hypothesis results.

Table 33 Summary of Testing Hypotheses Results

No	**Hypothesis Description**	**Result**
H1	There is no positive significant impact from Owners' factors impact on quality performance.	Not Supported
H2	There is no positive significant impact from Material factors impact on quality performance.	Supported
H3	There is no positive significant impact from Planning and Design factors impact on quality performance.	Not Supported
H4	There is no positive significant impact from External factors impact on quality performance.	Supported
H5	There is no positive significant impact from Construction factors impact on quality performance.	Not Supported
H6	There is no positive significant impact from Supervision factors impact on quality performance.	Not Supported

H7.1	There is no significant statistical difference in quality performance perception due to respondents' gender	Not Supported
H7.2	There is no significant statistical difference in quality performance perception due to respondents' qualification.	Supported
H7.3	There is no significant statistical difference in quality performance perception due to respondents' age	Supported
H7.4	There is no significant statistical difference in quality performance perception due to respondents' experience	Supported
H7.5	There is no significant statistical difference in quality performance perception due to respondents' work	Supported
H7.6	There is no significant statistical difference in quality performance perception due to respondents' position	Not Supported
H7.7	There is no significant statistical difference in quality performance perception due to the number of accomplished projects	Not Supported
H7.8	There is no significant statistical difference in quality performance perception due to the number of working engineers	Not Supported

4.5 Discussion of Results

After testing the above hypothesis, the researcher found that owners' factors have the most positive impact on quality performance, then supervision factors, and finally planning and design factors and construction factors have the least impact on quality performance at governmental infrastructure projects in West Bank local councils. But external and material factors didn't have any impact. While comparing the above results with the international studies that have been done before about similar subjects, such as Warsame, (2013) and Chan and Tam, (2000), they agreed with this research as there is a positive correlation and effect of owners or clients on the quality of performance, and almost all of the previous studies indicated that there is a positive effect of owners' factors on quality performance.

Other studies, such as Raphael and Phillip, (2016), found no correlation or effect from material factors on quality performance at Kenya construction projects, which agreed with this research, despite the fact that material factors are one of the most factors that have an effect on quality performance, according to Yada and Yadeta, (2016).

In comparison with Oke et al. (2007), the findings indicate a positive correlation and effect of planning on the quality of performance. Also, Zu (2009) found that there is a positive effect between design factor and quality performance, which agrees with this result. While Callistus et al. (2014) found that there is no relation between design factors and quality performance.

Regarding the external factors, Nyangwarab and Datche (2015) found that there is a positive correlation and effect of external factors on the quality performance, which is not agreed with this research. While Nen et al. (2020) found that there is no impact from

external factors on quality performance, which is agreed with this study. In comparison with Zidan, (2013) and Sebsibe, (2019), they found that there is no relation or any effect between construction factors and quality performance, but Arowolo et al., (2019) found that there is a positive impact from construction factors on quality performance, which is agreed with this study.

Regarding supervision factors, in comparison with Oke et al., (2017) and Jha and Iyer, (2006), they found that there is a positive correlation and effect of supervision on the quality of performance, which agreed with this study, while Sebsibe, (2019), found that there is no relation between supervision factors and quality performance.

While comparing the above results with the studies that have been conducted in Palestine, in comparison with Hussain et al. (2018), the findings indicate that the factors that have the greatest effect on quality performance are: construction, design, stakeholders, which here are represented by owners, and supervision. However, Hussain et al. (2018) mentioned both material and external factors. When compared to previous research in Palestine, this study agrees with Rashed, (2014), Taha, (2016), Syaj, (2015), and Enshassi et al., (2009) on construction factors such as hiring skilled labor and training and education for construction staff. It also all agrees on owners commitment toward quality, but only with Syaj, (2015), and Taha, (2016), and does not agree with Rashed, (2014), and Enshassi et al., (2009) on the impact of planning and design factors, such as design errors in tender documents and lack of standards and laws. This study disagrees with the mentioned Palestinian studies on the supervision factor, but other studies, such as Oke et al. (2017), mention the supervision factor. Moreover, Taha (2016) found several external factors affecting quality that didn't have

an effect in this study, and Enshassi et al. (2009) found several material factors affecting quality that didn't have an effect in this study.

The researcher thinks, from his personal experience in this field, that this is the best realistic result for governmental infrastructure projects in West Bank local councils. He agrees that the owners' factors are the most influential on the quality performance, which unfortunately suffers from poor performance as respondents answered the questionnaire. Because there is a failure to issue, standardize, and adhere to a unified quality system for all infrastructure projects funded by the Palestinian government, as well as the relevant ministries often provide insufficient grants to municipalities, forcing municipalities or local councils to neglect some quality factors in project activities to reduce the cost of construction at the expense of increasing quantities to meet their growing needs One of the development projects, especially in the field of infrastructure.

The researcher also agrees with the order of factors in terms of importance, where the factors related to supervision are very important and have an impact on quality performance because the supervision team is responsible for monitoring and controlling quality performance in construction sites, and at the level of projects within local councils, it is often appointed to partial supervision and does not have sufficient experience due to the lack of oversight from the ministries. As for the factors of planning and design, they have a significant impact because projects within local councils also suffer from major problems as a result of poor planning and design; from poor coordination between existing and future services; conflict between bid documents; between plans and specifications, which leads to the occurrence of work disputes; and greatly affects the quality and other.

As for the construction factors, they affect the quality performance with less impact and this is realistic because other factors contribute greatly to controlling this factor, but in infrastructure projects within the West Bank municipalities, there is sometimes a shortage of skilled workers on the part of the contractor, and this greatly affects the performance, because re-working due to lack of skills in the contractor's staff and the absence of the necessary equipment in the required time leads to the re-work and reduces its quality.

The researcher also agrees that material factors and external factors do not have a strong impact on quality performance because both factors can be controlled through other factors, which are dependent factors. Where materials factors can be controlled and received by supervisory crews and engineering laboratories as input to construction work. As for the external factors, they do not affect the quality of the performance. They can be eliminated or reduced to a large extent. For example, weather factors delay the work and do not affect its quality if the follow-up is done and the materials are properly stored. Other external factors that may cause the work to be suspended can proceed with the work later according to plans and schedules prepared in advance without affecting performance.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study's findings, advices and recommendations for those who might be interested, and lastly suggestions for future studies.

5.2 Conclusions

5.2.1 Conclusions of the Study Questions

The findings show that respondents' perceptions of almost all selected factors that affect the quality of performance at governmental infrastructure projects in West Bank local councils are moderate. The respondents believe that the highest factor degree is supervision, with a moderate degree. Moreover, the second highest factor degree is construction, with a moderate degree, followed by material and external factors, also with a moderate degree. While some of the effecting factors, such as planning and design and owner, have a low degree, the lowest factor, which is greater than the planning and design factor, is the owner factor. As we explained earlier in chapter four, we didn’t have a large difference between all the independent factor means and the dependent quality performance factor, as the overall factors mean is 2.39 and the overall quality performance mean is 2.32, while the overall factors mean has a moderate degree and the overall quality performance mean has a low degree.

The findings also indicate that the highest planning and design factor is (the designed office clearly describes the proposed works and the bid items) with a moderate degree, while the lowest item in planning and design is (referring the design tender to the

engineering office with the lowest price does not affect the quality of the work) with a low degree. In addition, the highest item of supervision factor is (all supervision teams follow up on laboratory tests of the supplied materials and their conformity with quality standards) with a moderate degree, while the lowest item of supervision dimension is (the lack of permanent supervision on a daily basis at governmental infrastructure projects does not affect the quality of work implementation) with a low degree.

Moreover, the highest item in the construction factor is (The quality of work is not affected by the number of projects implemented by the contractor at the same time) with a moderate degree, while the lowest dimension is (The quality of the work is not affected by the lack of skilled manpower from the contractor's staff) with a low degree. In addition, the highest item of material factor is (the contractor's relationship with suppliers usually does not affect the quality of the materials used to carry out the work) with a moderate degree, while the lowest item degree of material factor is (fluctuation in the prices of materials during implementation does not affect the quality of work) with a low degree.

The highest item in the owner factor is (the local council and the funded ministry are constantly striving to improve procedures that reduce waste) with a moderate degree, while the lowest item is (relevant ministries disburse the financial payments to contractors in a timely manner) with a low degree. Finally, for external factors, (repeated closures due to epidemics and emergencies do not affect the quality of work implementation) is the highest item with a moderate degree, and (changing the exchange rate between the local and foreign currency during implementation does not

affect the quality of work) is the lowest item with a low degree. Table 34 below defines all the highest and lowest items for each dimension.

Table 34 Highest and Lowest Item for Each Dimension

Dimension	**Highest item / Moderate Degree**	**Lowest Item / Low Degree**
Planning and Design	The designed office clearly describes the proposed works and the bid items	Referring the design tender to the engineering office with the lowest price does not affect the quality of the work
Supervision	All supervision teams follow up on laboratory tests of the supplied materials and their conformity with quality standards	The lack of permanent supervision on a daily basis at governmental infrastructure projects does not affect the quality of work implementation
Construction	The quality of work is not affected by the number of projects implemented by the contractor at the same time	The quality of the work is not affected by the lack of skilled manpower from the contractor's staff

Material	The contractor's relationship with suppliers usually does not affect the quality of the materials used to carry out the work	Fluctuation in the prices of materials during implementation does not affect the quality of work
Owners	The local council and the funded ministry are constantly striving to improve procedures that reduce waste	Relevant ministries disburse the financial payments to contractors in a timely manner
External	Repeated closures due to epidemics and emergencies do not affect the quality of work implementation	Changing the exchange rate between the local and foreign currency during implementation does not affect the quality of work

5.2.2 Conclusions of Testing the Study Hypotheses

The hypothesis we tested discovered that factors such as planning and design, owners, construction, and supervision have a positive impact on quality performance in West Bank local councils. While material and external factors had no effect on quality performance in West Bank local councils' governmental infrastructure projects.

According to demographic information's hypothesis with quality performance at governmental infrastructure projects in West Bank local councils, we concluded that

there is a significant statistical difference in quality performance perception due to respondents' gender, respondents' position, number of accomplished projects, and number of working engineers, while there are no statistical differences in quality performance perception due to respondents' qualifications, age, experience, and work.

5.2.3 Conclusions of Regression Model

We concluded that planning and design, supervision, owners, and construction factors are significant and have a positive effect on quality performance at governmental infrastructure projects in West Bank local councils after reviewing the overall individual regression coefficients. The owner factor has the most effect on the quality performance, followed by supervision, then planning and design, and the last factor is construction, which has the lowest effect on the quality performance. In addition, material and external factors are not significant and therefore have no effect on the quality performance.

Furthermore, we concluded that variation in the six variables included in the overall regression model explains 78.8% of the variation in quality performance at governmental infrastructure projects in West Bank local councils.

5.3 Recommendations

Based on the above results of the statistical analysis, we regret to say that the perception level of quality performance at governmental infrastructure projects in West Bank local councils is low, according to all segments of respondents. Therefore, this requires high attention and immediate action from all levels, starting from the decision makers in the relevant ministries because they are the responsible authorities for organizing this type

of construction project and the local councils partnering with the ownership of these projects to all the influencers and those affected by these projects.

The main steps that must be taken are related to the owners, supervision, planning and design phase, and construction factors as they have the most effect on the quality performance while not neglecting material and external factors. Keeping in mind that there are several factors that may have an effect on the quality performance that will be eliminated or removed when the above factors have been improved, as there are a wide range of segments effected by construction projects in general. Here are some of the recommendations listed for each factor.

5.3.1 Owners Recommendations

I. Project owners should coordinate with each other on all issues during the implementation phase of the project.
II. Issuance of a unified quality system.
III. The ministries must pay the differences in currency transfer and material costs between the bidding phase and the construction phase.
IV. The relevant ministries should pay the financial payments to the contractors according to the contract requirements of the contract.
V. Creating a technical evaluation, not only a financial evaluation at the bidding phase.
VI. Local councils must remove obstacles for the contractor in order to perform his work as required.
VII. Local councils should facilitate the supervision of staff work and not interfere in their work tasks.
VIII. Local councils must provide sufficient grants to local councils.

IX. Ensure the permanent presence of the supervision staff at the project.

5.3.2 Supervision Recommendations

I. The supervision staff have to follow up the project on a daily basis to evaluate its progress of the project according to the plans prepared in advance.

II. The supervision staff must evaluate each task output based on the requirements of the project with high accuracy.

III. The supervisory staff should validate the materials conformity to the required specifications and conduct the necessary tests on them.

IV. All supervisors must receive the necessary training to be able to do their job effectively.

V. The supervisory staff must be highly committed to quality issues.

VI. The supervision team should coordinate between all parts.

VII. The supervision staff must have adequate contractual experience and respond to the contractor's inquiries as quickly as required.

5.3.3 Planning and Design Phase Recommendations

I. Owners should study the technical issues of the competing engineering offices to design bids, not just financial matters.

II. The engineering office that designs the project work must clearly describe the proposed work and all bid documents to avoid any later conflict.

III. Owners should involve some relevant civil society institutions in planning infrastructure projects within local councils.

IV. There must be complete coordination between all existing and proposed future infrastructure services.

5.3.4 Construction Recommendations

I. High penalties should be applied to force the construction team to give their best intention to quality.

II. Ensuring that the contractor's staff have the experience and training necessary to implement the project's work with the required level of quality.

III. Ensuring that the contractor has the necessary equipment that enables him to complete the work at the required level of quality.

IV. Emphasis on the commitment of the subcontractors to quality issues as the commitment of the main contractor.

V. Checking the contractor's financial ability to complete the work during the technical evaluation.

VI. Ensuring the contractor's completion of similar previous projects and the degree of quality achieved with them.

5.3.5 Material Recommendations

I. Confirmation that the contractor should order purchases of materials according to the schedule and without delay.

II. Follow up the work of engineering laboratories, periodically ensure the transparency of their work, and the attendance of the supervisory staff for material testing.

III. Eliminating and seeking to prevent the monopoly of materials supplied to projects by a specific supplier.

IV. The owners should compensate the contractors in case of a negative fluctuation in the prices of materials between the bidding phase and the construction phase.

5.3.6 External Recommendations

I. Owners must put an end to citizens' interference in the implementation of infrastructure work.

II. The owners' engineers should take into account the risks related to the general political situation during the design and preparation of plans for the project.

V. The owners should compensate the contractors in case of a negative fluctuation in the exchange rate between foreign and local currency through the bidding phase and the construction phase.

5.4 Future Studies

In this part, the researcher will make some suggestions for potential future research subjects. Future research can look into the effects of other factors (such as Palestinian laws, the political situation, the size of the project, and a lack of resources) on the quality of performance at governmental infrastructure projects in West Bank local councils. Additionally, they might carry out comparable investigations about the quality performance at construction projects based on the project locations according to governorates, and another comparable investigation could be made about the quality performance at construction projects in Palestine between the public sector and the private sector as they differ in funding procedures, payment methods, audit procedures, and the type of stakeholders.

Moreover, further research may be conducted about the application of six sigma or lean management approaches to construction projects in Palestine and the opportunities, benefits, and obstacles related thereto.

5.5 Limitations and Challenges

While the researcher is conducting this research, he will face many limitations and barriers such as low response rate of the selection sample, too much time needed by the respondents to fill out the questionnaire, lack of seriousness in filling out the questionnaire, bias in answering the question from any part, lack of cooperation from government agencies, unavailability of sufficient documented research or studies in Palestine about quality in infrastructure projects, etc.

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Appendix

Appendix 1

كلية الدراسات العليا

برنامج إدارة الجودة

أخي المهندس / أختي المهندسة،

تحية طيبة وبعد،

يهدف هذا الاستبيان الى دراسة العوامل التي تؤثر على اداء الجودة لمشاريع البنية التحتية الحكومية داخل الهيئات المحلية في الضفة الغربية، وهو جزء لا يتجزا من البحث التكميلي لنيل درجة الماجستير في ادارة الجودة من الجامعة العربية الامريكية، املين ان تؤدي هذه النتائج فعلا الى تحسين اداء الجودة بشكل عام.

مع العلم ان المعلومات المعباة بهذا الاستبيان هي فقط من اجل اغراض البحث العلمي وسوف يتم التعامل معها بمبدا السرية التامة.أرجو مساعدتكم في توفير إجابات صادقة، ودقيقة، وموضوعية على الأسئلة الواردة في هذه الاستبيان . تحتاجون الى 10 دقائق من اجل اكمال هذا الاستبيان.

اذا كان لديكم أي استفسار، يمكنكم مراسلتنا على البريد الألكتروني المرفق ادناه.

مع وافر الشكر والإحترام،

الباحث :م. محمود الونه/ وراهمة

m.alwanneh@student.aaup.edu

القسم الاول : المعلومات الشخصية (Personal)

الرجاء التكرم بوضع إشارة (×) أمام الاختيار المناسب

الرمز	السؤال
Per-1	الجنس: ذكر ☐ انثى ☐
Per-2	المؤهل العلمي: ☐ دبلوم ☐ بكالوريس ☐ ماجستير ☐ دكتوراة
Per-3	العمر: ☐ 29-20 ☐ 39-30 ☐ 49-40 ☐ 59-50 ☐ اكثر من 60
Per-4	عدد سنوات الخبرة التي لديك: ☐ اقل من 5 ☐ 9 – 5 ☐ 14-10 ☐ 19 – 15 ☐ اكثر من 20
Per-5	مكان العمل الحالي: ☐ مكتب هندسي ☐ شركة مقاولات ☐ هيئة محلية (بلدية/ مجلس قروي) ☐ وزارة
Per-6	المسمى الوظيفي:

	☐ مدير عام ☐ مدير دائرة ☐ مدير مشروع ☐ مهندس مشروع ☐ غير ذلك
Per-7	عدد المشاريع التي تم انجازها او ادارتها من قبل المؤسسة التي تعمل بها : ☐ اقل من 10 ☐ 10- 19 ☐ 20 – 29 ☐ 30 – 39 ☐ اكثرمن40
Per-8	عدد المهندسين العاملين بمؤسستك : ☐ اقل من 5 ☐ 5-9 ☐ 10- 14 ☐ 15-19 ☐ من 20

القسم الثاني : اداء الجودة (Quality Performance)

الرجاء التكرم بوضع إشارة ((×)) أمام الاختيار المناسب.

الرمز	السؤال	أوافق بشدة	أوافق	محايد	غير موافق	غير موافق بشدة
Qup-1	يتم تنفيذ مشاريع البنية التحتية الحكومية داخل الهيئات المحلية بجودة عالية					
Qup-2	نادرا ما يحدث مشاكل متعلقة بالجودة بعد تنفيذ مشاريع البنية التحتية الحكومية					
Qup-3	هناك رضى تام من المواطنين عن جودة البنية التحتية للمشاريع الحكومية داخل الهيئات المحلية					
Qup-4	كمهندس يعمل بمشاريع البنية التحتية الحكومية المس اهتمام واضح من جميع الاطراف بموضوع الجودة					

Qup-5	يتم تنفيذ مشاريع البنية التحتية الحكومية في الهيئات المحلية بناء على خطط جودة مكتوبة بدقة عالية					
Qup-6	يتم تنفيذ اعمال البنية التحتية الحكومية داخل الهيئات المحلية وفق معايير جودة عالمية					

القسم الثالث : عوامل الجودة ((Factors Quality

المحور الاول : التخطيط والتصميم (Planning & Design)

الرمز	السؤال	أوافق بشدة	أوافق	محايد	غير موافق	غير موافق بشدة
Pld-1	عند التصميم لمشاريع البنية التحتية الحكومية يتم التنسيق بين جميع خدمات البنية التحتية القائمة والمقترحة مستقبلا					
Pld-2	يقوم المكتب المصمم بتوصيف الاعمال المقترحة وبنود العطاء بشكل واضح					
Pld-3	يتم التخطيط للمشاريع داخل الهيئات المحلية بناء على اولويات واحتياجات					
Pld-4	لا يحدث نهائيا تقليد اعمى بالتصميم لمشروع مشابه					
Pld-5	عادة لا يكون هناك تعارض بين وثائق العطاء للمشروع الواحد					
Pld-6	احالة الهيئة المحلية عطاء التصميم على المكتب الهندسي الاقل سعر لا يؤثر على جودة العمل					

Pld-7	عادة ما يتم اشراك مؤسسات المجتمع المدني في التخطيط لمشاريع البنية التحتية					
Pld-8	تحديد موازنة معينة للمكتب المصمم لا يوثرعلى جودة الاعمال في المشروع					
Pld-9	عادة ما يكون تنسيق تام ما بين البلدية والمكتب المصمم والممول للمشروع في تحديد متطلبات العمل.					

المحور الثاني: الاشراف (Supervision)

الرمز	السؤال	أوافق بشدة	أوافق	محايد	غير موافق	غير موافق بشدة
Sup-1	عدم وجود الاشراف بشكل دائم في المشاريع لا يؤثر على جودة تنفيذ الاعمال					
Sup-2	غالبا ما يمتلك طاقم الاشراف الخبرة الفنية الكافية لمتابعة الاعمال بالجودة المطلوبة					
Sup-3	يوجد التزام عالي من طاقم الاشراف بتطبيق الجودة					
Sup-4	يتمتع طاقم الاشراف بالخبرة التعاقدية اللازمة لادارة الاعمال مع المقاول					
Sup-5	يقوم طاقم الاشراف بمتابعة الاعمال وفق الجداول والخطط المعدة مسبقا بشكل دائم					
Sup-6	يقوم طاقم الاشراف دائما باستلام الاعمال وفق المواصفات ووثائق العطاء					

Sup-7	يقوم طاقم الاشراف بالتنسيق بين كافة الاطراف من مقاول وبلدية ووزارة بالشكل المطلوب					
Sup-8	تقوم جميع طواقم الاشراف بمتابعة الفحوصات المخبرية للمواد الموردة ومدى مطابقتها لمعايير الجودة					

المحور الثالث:التنفيذ (Construction)

الرمز	السؤال	أوافق بشدة	أوافق	محايد	غير موافق	غير موافق بشدة
Con-1	يتمتع فريق المقاول دائما بالخبرة اللازمة لتنفيذ اعمال المشروع بالجودة المطلوبة					
Con-2	يهتم طاقم المقاول بتنفيذ الاعمال بالجودة المطلوبة مثل اهتمامهم بانجاز الاعمال بالسرعة والتكلفة					
Con-3	لا يتاثر اداء المقاولين باسعارهم المقدمة بالمناقصة					
Con-4	لا تتاثر جودة الاعمال بنقص الايدي العاملة المهرة من طاقم المقاول					
Con-5	لا تتاثر جودة الاعمال من المقاول بسبب غياب المعدات اللازمة بالوقت المناسب					
Con-6	مقاولو الباطن يلتزمو بتطبيق الجودة كالتزام المقاول الرئيسي					
Con-7	لا تتاثر جودة الاعمال بالوضع المالي العام للمقاول					
Con-8	لا تتاثر الجودة في العمل بعدد المشاريع التي ينفذها المقاول في نفس الوقت.					

المحور الرابع :المواد (Materials)

الرمز	السؤال	أوافق بشدة	أوافق	محايد	غير موافق	غير موافق بشدة
Mat-1	عدم توفر المواد اللازمة للاشغال بالوقت المطلوب لا يؤثرعلى جودة الاعمال					
Mat-2	جميع المواد الموردة للمشاريع الانشائية تتمتع بالجودة المطلوبة					
Mat-3	التذبذب في اسعار المواد اثناء التنفيذ لا يؤثر على جودة الاعمال					
Mat-4	علاقة المقاول بالموردين عادة لا تؤثرعلى جودة المواد المستخدمة بتنفيذ الاعمال					
Mat-5	المقاول او المورد يركز فقط على جودة المواد بغض النظر عن سعرها					
Mat-6	تقوم المختبرات الهندسية بفحص مدى مطابقة المواد الموردة للمواصفات المطلوبة بشفافية					
Mat-7	احتكار بعض الموردين لبعض المواد لا يؤثر على جودتها					

المحور الخامس: الجهات المالكة (Owners)

الرمز	السؤال	أوافق بشدة	أوافق	محايد	غير موافق	غير موافق بشدة
Own-1	يوجد تنسيق مستمر بين الوزارات والهيئات المحلية بالقرارات بالمتعلقة بتنفيذ الاعمال بالمشروع					

Own-2	هناك نظام للجودة موحد صادر عن الوزارت ذات العلاقة					
Own-3	تقوم الوزارات بتقديم منح كافية للهيئات المحلية تمكنها من تصميم متكامل للمشروع يراعي كافة جوانب الجودة					
Own-4	تقوم الوزارات ذات العلاقة بصرف المطالبات المالية للمقاولين بالوقت المناسب					
Own-5	عند احالة العطاء على المقاول ذو السعر الاقل فان ذلك لا يؤثرعلى جودة تنفيذ الاعمال					
Own-6	تقوم الهيئات المحلية بتذليل العقبات للمقاول لتمكينه من التنفيذ بالجودة المطلوبة					
Own-7	تقوم الهيئات المحلية باعطاء جهاز الاشراف كامل الصلاحيات لليام بعمله حسب الاصول					
Own-8	تسعى الهيئة المحلية والوزارة الممولة باستمرار الى تحسين الاجراءات التي تقلل من الهدر					
Own-9	عدم قيام الوزارة بصرف فروقات العملة والمواد لا يقلل من قيمة الجودة بالتنفيذ بشكل عام					
Own-10	تعليمات المانحين لا تؤثر على تنفيذ الاعمال بالجودة المطلوبة					

المحور السادس : العوامل الخارجية (External)

الرمز	السؤال	أوافق بشدة	أوافق	محايد	غير موافق	غير موافق بشدة

Ext-1	تدخل المواطنين باعمال مشاريع البنية التحتية لا يحد من تطبيق الجودة					
Ext-2	يستطيع المقاول من العمل بالجودة المطلوبة في المشاريع التي تقع ضمن مناطقc					
Ext-3	الظروف الجوية السيئة لا تؤثر على التزام المقاول بتطبيق الجودة					
Ext-4	ممارسات الاحتلال اثناء التنفيذ لا تعيق المقاولين من اداء الاعمال بالشكل المطلوب					
Ext-5	الاغلاقات المتكررة بسبب الاوبئة و الحالات الطارئة لا تؤثر على جودة تنفيذ الاعمال					
Ext-6	تغير سعر الصرف بين العملة المحلية والاجنبية اثناء التنفيذ لا يؤثر على جودة الاعمال					
Ext-7	لا تتاثر جودة تنفيذ الاعمال بالقيود الاسرائيلية على استيراد المواد					

Appendix 2

Arab American University – Palestine

Faculty of Graduate Studies

Dear Engineers

Good Greeting,

This questionnaire aims to study the factors that effect on the quality performance at governmental infrastructure projects in West Bank local councils, and it is an integral part of the supplementary research to obtain a master's degree in quality management from the Arab American University, hoping that these results will actually improve quality performance in general.

Knowing that the information filled out in this questionnaire is only for the purposes of scientific research and will be treated with the principle of strict confidentiality. I hope for your assistance in providing honest, accurate, and objective answers to the questions contained in this questionnaire. You need 10 minutes to complete this survey. If you have any questions, you can contact us at the email attached below.

With much thanks and respect,

Researcher: M. Mahmoud Al-Wanneh / Barahmeh

m.alwanneh@student.aaup.edu

First section, demographic variables:

Per-1	Gender: ☐ Male Female ☐
Per-2	Scientific Qualification :☐ Diploma ☐ B. A ☐ Master ☐P. HD
Per-3	Age :☐ 20-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐more than 60
Per-4	Years of experience: ☐ less than 5 ☐ 5-9 ☐ 10-14 ☐15-19 ☐ more than 20
Per-5	Current Work: ☐ Engineering Office ☐ Contracting Company ☐ Local Council (Village Council / Municipality) ☐ Ministry
Per-6	Position: ☐ General Manager ☐ Department Manager ☐Project Manager ☐ Project Engineer ☐Other
Per-7	The number of projects that have been accomplished or managed by your organization: ☐less than10 ☐ 10-19 ☐ 20-29 ☐ 30-39 ☐ more than 40
Per-8	The number of working engineers in your organization: ☐ less than 5 ☐ 5-9 ☐ 10-14 ☐15-19 ☐ more than 20

Second section: Quality Performance

Please kindly put an X in front of the proper choice

No.	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Qup-1	Local governments carry out high-quality government infrastructure projects.					
Qup-2	Quality-related problems seldom happen after implementing governmental infrastructure projects inside local councils					
Qup-3	There is complete satisfaction from citizens about the quality of governmental infrastructure projects at local councils					
Qup-4	As an engineer working on governmental infrastructure projects, I sensed a clear interest from all parties in a quality issue					
Qup-5	Governmental infrastructure projects are implemented by					

	local councils based on carefully written quality plans					
Qup-6	Government infrastructure projects are implemented within local councils according to international quality standards					

Third Section: Quality Factors

Please kindly put an X in front of the proper choice

First Dimension: Planning and Design

No.	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Pld-1	When designing for governmental infrastructure projects, coordination is achieved between all existing and proposed future infrastructure services					
Pld-2	The design office clearly describes the proposed work and the bid items					

Pld-3	Governmental infrastructure projects at local councils are planned based on priorities and needs					
Pld-4	Blinding design for similar projects does not happen at all there					
Pld-5	Usually, there is no conflict between the bidding documents for a single project					
Pld-6	Referring the design tender to the engineering office with the lowest price does not affect the quality of the work					
Pld-7	Civil society organizations are usually involved in planning for governmental infrastructure projects					
Pld-8	Identifying a specific budget for the designed office does not affect the quality of work in the project					

Pld-9	Usually, there is complete coordination between the local council, the designed office, and the donor of the project in defining the work requirements					

Second Dimension: Supervision

No.	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Sup-1	The lack of permanent supervision on a daily basis at governmental infrastructure projects does not affect the quality of work implementation					
Sup-2	The supervision staff often has the technical expertise to follow up the work with the required quality					
Sup-3	There is a high commitment from the supervision staff to the application of quality					

Sup-4	The supervision staff has the necessary contractual experience that is required to manage the work with the contractor					
Sup-5	The supervision staff always follows up the work according to the schedules and plans prepared in advance					
Sup-6	The supervision staff always receives the work activities according to the specifications and bid documents					
Sup-7	The supervision team coordinates between all parties, including the contractor, local council, and ministry, as required					
Sup-8	All supervision teams follow up on laboratory tests of the supplied materials and their					

	conformity with quality standards					

Third Dimension: Construction

No.	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Con-1	The contractor team always has the necessary experience to carry out the project work with the required level of quality					
Con-2	The contractor's staff is interested in carrying out the work with the required quality, as they are interested in getting the work done within the planned time and cost					
Con-3	Contractors' performance is not affected by their bid prices					
Con-4	The quality of the work is not affected by the lack of skilled					

	manpower from the contractor's staff					
Con-5	The quality of the work is not affected by the contractor due to the absence of the necessary equipment in a timely manner					
Con-6	Subcontractors are committed to implementing quality as the main contractor’s commitment					
Con-7	The quality of the work is not affected by the general financial status of the contractor					
Con-8	The quality of work is not affected by the number of projects implemented by the contractor at the same time					

Fourth Dimension: Material

No.	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Mat-1	The unavailability of the necessary materials for the work at the required time does not affect the quality of the work					
Mat-2	All the materials supplied for construction projects conform to the required level of quality					
Mat-3	Fluctuations in the prices of materials during implementation do not affect the quality of work					
Mat-4	The contractor's relationship with suppliers usually does not affect the quality of the materials used to carry out the works					
Mat-5	The contractor or supplier focuses only on the quality of materials, regardless of their price					

Mat-6	The engineering laboratories transparently check the compliance of the supplied materials with the required specifications					
Mat-7	The monopoly of suppliers for some materials does not affect their quality					

Fifth Dimension: Owners

No.	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Own-1	There is continuous coordination between ministries and local councils with decisions related to the implementation of the work in the project					
Own-2	There is a unified quality system issued by the relevant ministries					

Own-3	The ministries provide a sufficient grant for local councils to enable them to design an integrated project that takes into account all aspects of quality					
Own-4	Relevant ministries disburse the financial payments to contractors in a timely manner					
Own-5	Referring bid to the lowest price contractor does not affect the quality of work implementation					
Own-6	Local governments overcome the contractor's obstacles, allowing him to complete the project with the required quality.					
Own-7	The local councils' give the supervision staff full powers to carry out their work according to the rules					

Own-8	The local council and the funded ministry are constantly striving to improve procedures that reduce waste					
Own-9	The Ministry's non-disbursement of currency exchange and material differences does not reduce the value of quality in implementation in general					
Own-10	Donors' instructions do not affect the implementation of the work with the required level of quality					

Sixth Dimension: External

No.	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Ext-1	The intervention of citizens in the work of infrastructure projects does not limit the application of quality					

Ext-2	The contractor can work with the required level of quality on projects located within areas c					
Ext-3	Adverse weather conditions do not affect the contractor's commitment to quality application					
Ext-4	Occupation practices during implementation do not hinder contractors from performing the work as required					
Ext-5	Repeated closures due to epidemics and emergencies do not affect the quality of work implementation					
Ext-6	Changing the exchange rate between the local and foreign currency during implementation does not affect the quality of work					
Ext-7	The quality of work execution is not affected by the Israeli					

	restrictions on importing materials					

Appendix 3: List of Questionnaire Evaluators

Number	Name	Mobile	Affiliation
1	Prof. Sameer Abuiesheh	0599241084	An-Najah National University (PH. D in Civil Engineering)
2	Dr. Osama Abu Zir	0599654052	Owner of Abu Zir Engineering Consulting Office (PH. D in Civil Engineering)
3	Eng. Zaher Abu Sa'a	0599757482	Head of Engineering Department at Jenin Municipality (M.Sc. in Civil Engineering)
4	Eng. Diya Al-Sayeh	0599610675	Head of Supervision Department at Ziadeh Consulting Engineering Office (M.Sc. in Engineering Management)
5	Eng Iyad Osaily	0594227812	Head of Supervision Section at Ministry of Local Government (M.Sc. in Engineering Management)
6	Eng Alaa Ighnemat	0594277523	Head of Supervision Section at Ministry of Public Works and Housing (M.Sc. in Transportation Engineering)

7	Eng Majdi Turabi	0598230160	Projects Manager at Construction Company (M.Sc. in Engineering Management)

Appendix 4

Table 35 Pearson Correlation Matrix- Internal Consistency for Quality Performance

Items	**Quality Performance**		
	R	**Sig.**	**No.**
Local governments carry out high-quality government infrastructure projects.	.901**	.000	323
Quality-related problems seldom happen after implementing governmental infrastructure projects inside local councils	.822**	.000	323
There is complete satisfaction from citizens about the quality of governmental infrastructure projects at local councils	.843**	.000	323
As an engineer working on governmental infrastructure projects, I sensed a clear interest from all parties in a quality issue	.892**	.000	323
Governmental infrastructure projects are implemented by local councils based on carefully written quality plans	.882**	.000	323
Government infrastructure projects are implemented within local councils according to international quality standards	.880**	.000	323

Table 36 Pearson Correlation Matrix- Internal Consistency for Planning and Design

Items	**Planning & Design**		
	R	**Sig.**	**No.**

When designing for governmental infrastructure projects, coordination is achieved between all existing and proposed future infrastructure services	.858**	.000	323
The design office clearly describes the proposed work and the bid items	.831**	.000	323
Governmental infrastructure projects at local councils are planned based on priorities and needs	.868**	.000	323
Blinding design for similar projects does not happen at all there	.772**	.000	323
Usually, there is no conflict between the bidding documents for a single project	.851**	.000	323
Referring the design tender to the engineering office with the lowest price does not affect the quality of the work	.727**	.000	323
Civil society organizations are usually involved in planning for governmental infrastructure projects	.810**	.000	323
Identifying a specific budget for the designed office does not affect the quality of work in the project	.714**	.000	323
Usually, there is a complete coordination between the local council, the designed office, and the donor of the project in defining the work requirements	.861**	.000	323

Table 37 Pearson Correlation Matrix- Internal Consistency for Supervision

Items	**Supervision**		
	R	**Sig.**	**No.**
The lack of permanent supervision on a daily basis at governmental infrastructure projects does not affect the quality of work implementation	.508**	.000	323
The supervision staff often has the technical expertise to follow up the work with the required quality	.884**	.000	323
There is a high commitment from the supervision staff to the application of quality	.894**	.000	323
The supervision staff has the necessary contractual experience that is required to manage the work with the contractor	.890**	.000	323
The supervision staff always follows up the work according to the schedules and plans prepared in advance	.892**	.000	323
The supervision staff always receives the work activities according to the specifications and bid documents	.893**	.000	323
The supervision team coordinates between all parties, including the contractor, local council, and ministry, as required	.891**	.000	323
All supervision teams follow up on laboratory tests of the supplied materials and their conformity with quality standards	.896**	.000	323

Table 38 Pearson Correlation Matrix- Internal Consistency for Construction

Items	**Construction**		
	R	**Sig.**	**No.**
The contractor team always has the necessary experience to carry out the project work with the required level of quality	.721**	.000	323
The contractor's staff is interested in carrying out the work with the required quality, as they are interested in getting the work done within the planned time and cost	.762**	.000	323
Contractors' performance is not affected by their bid prices	.715**	.000	323
The quality of the work is not affected by the lack of skilled manpower from the contractor's staff	.763**	.000	323
The quality of the work is not affected by the contractor due to the absence of the necessary equipment in a timely manner	.716**	.000	323
Subcontractors are committed to implementing quality as the main contractor’s commitment	.742**	.000	323
The quality of the work is not affected by the general financial status of the contractor	.779**	.000	323
The quality of work is not affected by the number of projects implemented by the contractor at the same time	.788**	.000	323

Table 39 Pearson Correlation Matrix- Internal Consistency for Material

Items	**Material**		
	R	**Sig.**	**No.**
The unavailability of the necessary materials for the work at the required time does not affect the quality of the work	.656**	.000	323
All the materials supplied for construction projects conform to the required level of quality	.770**	.000	323
Fluctuations in the prices of materials during implementation do not affect the quality of work	.681**	.000	323
The contractor's relationship with suppliers usually does not affect the quality of the materials used to carry out the works	.758**	.000	323
The contractor or supplier focuses only on the quality of materials, regardless of their price	.591**	.000	323
The engineering laboratories transparently check the compliance of the supplied materials with the required specifications	.680**	.000	323
The monopoly of suppliers for some materials does not affect their quality	.685**	.000	323

Table 40 Pearson Correlation Matrix- Internal Consistency for Owner

Items	**Owners**		
	R	**Sig.**	**No.**

There is continuous coordination between ministries and local councils with decisions related to the implementation of the work in the project	.864**	.000	323
There is a unified quality system issued by the relevant ministries	.849**	.000	323
The ministries provide a sufficient grant for local councils to enable them to design an integrated project that takes into account all aspects of quality	.773**	.000	323
Relevant ministries disburse the financial payments to contractors in a timely manner	.702**	.000	323
Referring bid to the lowest price contractor does not affect the quality of work implementation	.742**	.000	323
Local governments overcome the contractor's obstacles, allowing him to complete the project with the required quality.	.876**	.000	323
The local councils' give the supervision staff full powers to carry out their work according to the rules	.879**	.000	323
The local council and the funded ministry are constantly striving to improve procedures that reduce waste	.891**	.000	323
The Ministry's non-disbursement of currency exchange and material differences does not reduce the value of quality in implementation in general	.779**	.000	323

Donors' instructions do not affect the implementation of the work with the required level of quality	.781**	.000	323

Table 41 Pearson Correlation Matrix- Internal Consistency for External

Items	**External**		
	R	**Sig.**	**No.**
The intervention of citizens in the work of infrastructure projects does not limit the application of quality	.675**	.000	323
The contractor can work with the required level of quality on projects located within areas c	.776**	.000	323
Adverse weather conditions do not affect the contractor's commitment to quality application	.744**	.000	323
Occupation practices during implementation do not hinder contractors from performing the work as required	.752**	.000	323
Repeated closures due to epidemics and emergencies do not affect the quality of work implementation	.756**	.000	323
Changing the exchange rate between the local and foreign currency during implementation does not affect the quality of work	.748**	.000	323
The quality of work execution is not affected by the Israeli restrictions on importing materials	.697**	.000	323

الملخص

تهدف هذه الدراسة إلى التعرف على العوامل الحاسمة التي تؤثر على جودة أداء المشاريع الإنشائية في فلسطين ومشاريع البنية التحتية الحكومية في المجالس المحلية في الضفة الغربية كدراسة حالة. استخدمت الدراسة منهجية البحث الكمي ، وتم تطوير استبيان منظم لجمع البيانات الأولية. تتكون عينة الدراسة من 323 مستجيبًا من مجموعة كبيرة من المهندسين من عدة أجزاء ، مثل الوزارات والمجالس المحلية والمكاتب الهندسية والمقاولين. تظهر نتائج الدراسة أن أربعة من العوامل المختارة مرتبطة بشكل كبير ولها تأثير إيجابي على جودة الأداء ، واثنين من هذه العوامل ليست مهمة وليس لها أي تأثير. علاوة على ذلك ، تشير النتائج إلى أن عامل المالك كان له التأثير الأكبر على أداء الجودة ، ثم عامل الإشراف ، يليه عامل التخطيط والتصميم ، وكان لعامل التنفيذ أقل تأثير وفقًا لتحليل نموذج الانحدار متعدد الخطوط ؛ بينما لم يكن للعوامل المادية والخارجية أي تأثير أو علاقة بأداء الجودة وفقًا لتحليل نموذج الانحدار متعدد الخطوط. وبحسب الدراسة ، يتعين على الوزارات دفع الفروق في تحويل العملة والتكاليف المادية بين مرحلتي العطاء والبناء والمدفوعات المالية حسب شروط العقد. علاوة على ذلك ، يجب عليهم إنشاء تقييم تقني فعال خلال مرحلة تقديم العطاءات ، والتركيز على وجود فريق إشراف دائم في بناء الموقع ، واستخدام العمالة الماهرة الموجودة حسب الحاجة. تمثل القيود الرئيسية للدراسة في عدم وجود تعاون من قبل الجهات الحكومية وعدم توفر أبحاث أو دراسات كافية موثقة في فلسطين حول جودة مشاريع البنية التحتية الحكومية.