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A Proposed Model for Measuring Cost of Quality to Promote Continuous Improvements in Manufacturing Sector in Palestine

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Declaration

I certify that this thesis submitted for the Master's degree in Quality Management is the result of my own research, except where otherwise acknowledged and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

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Abstract

This study aims to propose and build a model to measure the cost of quality in the manufacturing firms in Palestine to promote continuous improvement. It evaluated to adopt the four types of cost of quality: the prevention, the appraisal, the internal failure, and the external failure costs.

The quantitative and qualitative strategy was employed to achieve the research's objective. The quantitative method was followed to have quantitative data by designing and distributing a questionnaire to a randomly selected sample of employees working in the Palestinian manufacturing industries. That is to examine their interest in implementing a cost of quality in their departments. In addition, the financial reports for the years (2016, 2017, 2018, 2019) of the targeted industries were also analyzed. On the other hand, unstructured interviews were conducted to collect qualitative data. The study used the descriptive statistical analysis method to describe and analyze the study variables using the Statistical Package for Social Sciences (SPSS).

The results showed a statistically significant correlation between the cost of quality and its four components, as well as continuous improvement. When interpreting the dependent variable using all the independent variables, it showed that most of the effect on the variance in continuous improvements is explained positively by the costs of prevention, internal failure, and external failure. When the dependent variable was interpreted using only one independent variable, the findings indicated that the costs of prevention, appraisal, internal failure, and external failure explain the variation in continuous improvements. The findings also revealed that employees were very

interested in measuring the cost of quality to promote continuous improvement. However, a review of the financial reports found that systematic cost-of-quality measurement is still immature. The elements of quality costs are calculated without relying on quality cost reports. Due to a lack of administrative support, a lack of information and data on quality costs, as well as difficulties in acquiring these costs, greater efforts must be developed and institutionalized. To this purpose, the well-known PAF model on quality costs, which is directly linked to continuous improvement initiatives, is strongly recommended for implementation in the Palestinian manufacturing sector.

Dedication

To my idol, "My father, may God have mercy on him," who struggled for me and who never compromised in providing me with the means of goodness and happiness.

To earth heaven, "my mother," who is my ideal, whom I find by my side always and forever, and whose supplication accompanies me in everywhere.

To those I rely on in every big and small thing, "my dear brothers and sisters," they are the support in every moment and every situation since childhood until now.

To my life partner, "my husband," who overcame difficulties to complete this study.

To all my friends and everyone who stood by me and extended a helping hand, and helped me for better or for worse.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

1.1. Overview

This chapter provides an overview of the study. It starts with a background, then moves on to the research problem, the importance of the research, and its justifications. Then it defines the objectives of the study, and finally the research questions and hypotheses. The determinants of the research are also described. Next, a thesis structure given to help organize the process of conducting a literature review in the next chapter.

1.2. Background

Companies are facing quick and major changes in recent times. In order to attract new customers and/or maintain existing ones in the response to global competition, companies must continue to meet their customers' needs and expectations by producing high-quality products. As a result, companies must compete on delivery speed, price, technological level, and quality dimensions while preserving customer satisfaction (Sharma et al., 2007). That is why international companies spend a lot of money to reduce defective products before reaching the beneficiary's hands (the customers). Quality cost accumulates as a result of producing poor-quality products. Although poor products or defective products still exist in terms of customers' returns, and if the product contains a defect in the manufacturing process, the company spends lots of money on warranty costs, especially if it reaches the customer's hand (Garrison et al., 2010). Considering that studying the cost of quality is among the most critical issues in total quality management (TQM), it is a necessary and important component of any quality management system used in manufacturing operations. These costs are often associated with preventing, investigating, and correcting defective products, as these

costs are highly significant, around 25% of total sales. Some spend 40% to 50 % of total sales, but this cannot be applied to all industries. The percentage may vary from one company to another, from one industry to another, or from one sector to another (Hopmans, 2017). Taking this into consideration, measuring the cost of quality in all stages of production, through employing the prevention, appraisal, and failure (PAF) model to calculate the cost of quality, would ultimately help in promoting the need for continuous improvements in the quality of products and services, (Jafar et al., 2010). Despite the fact that the majority of companies listed in the Palestine Financial Market have quality management systems and ISO certifications, the usage of quality cost is not mentioned in any of the annual reports or financial disclosures from 2016 to 2019. This is also supported by interviewing some quality employees of some companies. Several studies argue that companies are not aware of the cost of quality, and others are aware of it but do not use it properly. In contrast, other companies know and apply them correctly (Kanapathy and Rasamanie, 2011). Given that the cost of quality is employed as a measure of organizational performance (Lari & Asllani, 2013), it is linked to the acquisition of excellent quality (Djekic, Zaric, and Tomic, 2014).However, the affirmation of the importance of using quality cost, from the perspective of quality employees, works to detect problems that help them find solutions to poor products at the lowest possible costs, thereby reducing failure and achieving good quality, which means that it is considered the center of profit and improvement for the company in the long run. Therefore, the study's significance lies in being an exploratory study aimed at encouraging Palestinian manufacturing industries to apply quality costs at all stages. It can assist other Palestinian firms in taking advantage of quality costs, particularly those

which are in great need of cost reduction, quality improvement, and competitive advantages.

Therefore, this study aims at developing a proposed model that presents the four dimensions of quality costs related to preventive costs, appraisal costs, and internal and external failure costs based on the PAF model.

1.3. Research Problem

Quality costs are one of the most effective approaches to measuring quality and track its progression and change. One of the most important goals of utilizing quality costs as a measuring tool is to achieve excellent quality at the lowest possible cost (Jafar & Mehrdad, 2010: p.21). Quality cost models classify expenditures on quality based on quality cost items and try to provide their optimum combination (Schiffauerova & Thomson, 2005: p.652). Maintaining production using traditional methods, as shown in the annual reports of industrial firms, without considering the measurement of quality costs and their negative impact on manufacturing companies' financial and operating performance in Palestine, even though most of these companies have quality management systems and ISO certificates. An effective model for measuring the cost of quality, such as adopting a PAF model, will stimulate and encourage companies and initiatives to continuously improve the quality of products and services for its use due to the benefits that companies will achieve by adopting such a model and keep customers satisfied with companies' products that in return will exceed the expectations of them. Therefore, this study aims to develop a proposed model that presents PAF configuring, running, and evaluating a quality cost system suitable for the PAF model. It will explain all the elements that belong to its dimension's prevention–appraisal–failure. They can be measured and calculated in all listed manufacturing companies in the Palestine

Financial Market with a quality management system and ISO certificate. Therefore, the study's problem lies in asking the following main question:

What is the proposed model for measuring the cost of quality to promote continuous improvements in Palestine's manufacturing sector?

1.4. Research Significance

The significance of the study is derived from the need of giving more attention to the notion of quality and cost of quality, which has lately become a focus, especially in light of the world's intense competition. It is necessary to increase the direction of companies that use quality standards in production with the goal of attaining sustainability and competitiveness for companies that consider meeting the needs and expectations of their consumers by providing high-quality products and services on time. In addition to the widespread belief that investment in quality costs must be raised to increase quality, business sector studies have removed this opinion's correctness. However, the idea of quality costs has gained greater attention as a result of the rise of such a view that the costs encountered are the costs of poor quality, not the costs of excellent quality. At this stage, it's critical for businesses to effectively control quality costs in order to avoid nonconformance production as part of an integrated production system that delivers the most value at the lowest cost. In line with this information and opinions in the literature, this study is considered vital as it pertains to the quality cost system's configuration to manage quality costs correctly. Second, the study provides a guideline on the steps to be followed and the points to be considered to manage the quality costs correctly in the selected companies. The lack of local studies conducted in this direction in the literature will also contribute to the literature by providing a new perspective on the subject, relying on the use of the prevention–appraisal–failure (PAF) model to evaluate the cost

of quality and to determine its optimum value as to the level of quality that minimizes the total cost of quality.

The researcher believes that no one can doubt the importance of applying the concept of quality in the manufacturing operations, nor argue about the value of exploring the gaps in the manufacturing operations and improving processes. Although the researcher visited some Palestinian manufacturing companies and found out there is a lack in understanding the benefits of implementing the cost of quality, taking into account, implementing such program can reduce operating expenses, improve efficiency and revenue at the sometimes. They are unaware that making adequate prevention costs to reduce production costs would reduce failure costs. Furthermore, researches on the cost of quality in Palestine are few and of a generic nature. They have nothing to do with the quality costs that emerge in service or manufacturing. There hasn't been any research into the relationship between quality costs and costs. The purpose of this study is to test the hypothesis that using the PAF model to decrease failure costs. For this purpose, the answers to questions sought in this study with the application of the PAF model is made in the selected companies: in accordance whether there are any activities related to quality costs in companies' annual reports, and if so, how much are the costs of these activities, and whether there is a relationship between the costs of prevention and failure by comparing the quality costs incurred in the selected companies. Considering the basic assumption of the traditional quality cost model, continuous investment in prevention costs would reduce the total cost of quality due to failure costs.

1.5. Research Objectives

This study aims to achieve the following objectives:

RO1: To identify the items of cost of quality at the selected companies listed on the Palestine Financial Market for the continuous improvements.

RO2: To determine the importance of continuous improvements in implementing a cost of quality in the selected companies.

RO3: To determine the elements of cost of quality that can be identified in selected companies' annual financial reports.

RO4: To explore the potential benefits of implementing the PAF model in the selected companies.

1.6. Research Questions and Hypotheses

1.6.1. Research Questions

The following are the research questions that motivated this study:

1. What are the items of cost of quality at the selected companies listed on the Palestine Stock Exchange Market are to be identified for continuous improvements?
2. Will it emphasize the importance of continuous improvements in implementing a cost of quality throughout the selected companies?
3. What are the elements of cost of quality to be identified and determined in selected companies' annual financial reports?
4. Is it worth it to recommend and advise the implementation of the PAF model in the selected companies?

1.6.2. Research Hypotheses

The following hypotheses could formulate:

• H1: According to companies' profile, there is no significant relationship at the level of (α=0.05) between quality cost items as analyzed in the annual reports of selected companies and their effects on the continuous improvements.

• H2: The quality cost items analyzed in the annual reports of selected companies will explain their effect and the variance positively in continuous improvements, at a significant level (α= 0.05).

• H3: There are no statistically significant differences at (α=0.05) in the responses of the research sample due to demographic profile.

1.7. Limitations of the Study

The following are some of the study's limitations:

- The difficulty of obtaining sufficient information on the costs of quality in detail from the companies in question is due to the company's failure in implementing this mechanism.
- The researcher uses annual reports issued by research companies that are not unique in any part of the report to any cost of quality, which makes it more difficult for the researcher to investigate items in these reports related to quality costs such as production defects, returns, customer complaints, research and development expenses, and other items related to quality costs.
- Quality and production employees have difficulty explaining and detailing the methods for controlling and measuring quality costs.
- The emergency conditions caused by the Corona virus pandemic impeded reaching to the companies, and sample participants studied.

- The occupation checkpoints made it difficult to travel between governorates to collect data.

1.8. Scope of the Study

To achieve the objectives of this research study, the scope of the study focused mainly on the employees working in the departments of production, quality, and finance in the manufacturing companies listed in the Palestinian market in multiple regions of the West Bank.

These companies were chosen because they have a quality certificate and have many employees since these companies are joint-stock companies.

The researcher summarized the systematic literature review of this study on the background and importance of the cost of quality, understanding how to implement and measure the cost of quality, and understand its role in continuous improvements, and the effects of applying the PAF model in promoting continuous improvements.

These companies were chosen because they have a quality certificate and because they have a large number of employees as these companies are joint-stock companies.

The researcher summarized the systematic literature review of this study on the background and importance of the cost of quality, understanding how to implement and measure the cost of quality, and understanding its role in continuous improvements. In addition, applying the Buff model in promoting continuous improvements data because the researched companies were stationed in several governorates.

1.8.1. Conceptual Framework

The conceptual framework in Figure (1) above shows that quality cost measurement (prevention, appraisal, internal failure, external) and its application play a role in

manufacturing companies in promoting continuous improvements in the company (dependent variable).

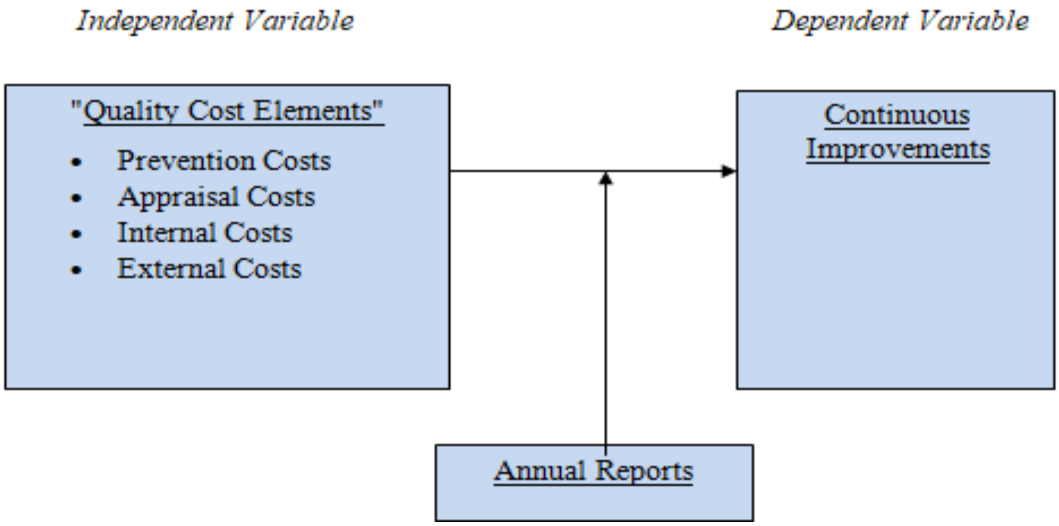

Figure (1.1): Conceptual Framework

Therefore, it is expected that both the independent variables (prevention cost, appraisal cost, internal failure cost, external failure cost) and the dependent variable (continuous improvements) are correlated.

In addition, from this conceptual framework, the researcher wanted to determine whether the measurement of the cost of quality in companies has a positive, rather than negative, impact on continuous improvements in companies.

1.9. Delimitations of the Study

The research covers the following aspects:

Geographical: The research covers the employees of the Quality, Finance, and Production Department in the manufacturing companies listed on the Palestinian market namely, in Ramallah, Nablus, Al-Eizariya, Hebron, Tulkarm, Beit Jala.

Population and Sample: The research population includes 1047 employees distributed in three departments (Quality, Financing, Production) distributed in 12 industrial

companies in the Palestinian market. The sample size was chosen to obtain sufficient information, which increases the reliability and validity .275 questionnaires were returned out of 400 questionnaires from the respondents.

Knowledge: The research focuses on the elements of quality cost to examine its role in continuous improvements by measuring the four elements of quality (prevention, appraisal, internal failure, external failure) to promote continuous improvements in companies. That helps to think about adopting the application of the PAF model to measure the cost of quality in manufacturing companies. Accordingly, an extensive literature review of relevant previous studies that achieved the research objectives was followed.

Approach and Instrument: The method of the research study was followed by quantitative survey research to achieve the desired goals. The research technique was formed on the study in the form of a questionnaire to meet the research objectives, answer the study questions, and collect data. The annual financial reports of the surveyed companies were also used, which can support the results and discussion drawn from them and help in writing recommendations.

1.10. Definitional Terms

- **Quality:** The definition of quality is the extent to which the products meet the customer's requirements. The product is of good quality whenever the product specifications meet the customer's needs (Crosby, 1992).
- **Total Quality Management:** TQM is defined as a culture that promotes the concept of total commitment to achieving customer satisfaction through continuous improvement and creativity in all aspects of work (Logothetis,1992: p.1).

- **Cost of Quality:** The cost of the activities necessary to manufacture a product under the intended circumstances and deliver it to the customer, as well as the cost of any part or product that does not meet the desired requirements at any stage of production, as quality costs cannot be avoided and are unavoidable, (Giakatis & Rooney, 2000: p.158).
- **Prevention costs:** refers to all costs of activities designed to prevent errors and avoid poor quality products and services (Campanella, 1999: p.31).
- **Appraisal costs:** are costs that the company incurs to ensure that the raw materials and products comply with quality standards (Drury, 2003: p.901).
- **Costs of internal failure:** What is meant by these costs are the resulting costs for the detection of failure and defective units of the products or services before they are shipped or delivered to the customer (Horngren et al., 2012: p.673).
- **External failure costs:** These are the costs incurred when the product or service fails to reach the designed quality standards, as it cannot be determined until the product is sent or the service is provided to the customer (Muhlemann et al., 1992: p.101).
- **PAF (Prevention, Appraisal, and Failure Model):** Most of the quality cost models are based on the PAF classification, and this model includes quality costs classified into prevention and appraisal costs, internal failure, and external failure, as these classifications have become universally accepted (Schiffauerova, 2006).
- **Continuous Improvement:** It is an organizational process that assists a company is positioning itself against competitors to gain a competitive advantage. Continuous improvement strategies can be used to create competitive plans and focus on activities that add value to the company. Companies can improve their profitability in various ways, including increasing production and sales, improving quality, lowering costs, and reducing cycle time (Agrawal et al., 2006).

1.11. Thesis Structure

The thesis is organized and then divided into five chapters to ensure that the content flows smoothly. The following is a summary of this research:

The first chapter (Chapter 1), of the study contains introduction, background; Moreover, the problem statement, the purpose of the study, the importance of the study, limitations of the study, definitions of terms, the study questions, hypotheses, research delimitations, and the study plan are all explained.

In the second part (Chapter 2), the definitions related to quality, the development of the concept of quality until today, and Total Quality Management (TQM) are emphasized and explained. In addition, quality costs are described in detail as well. In this context, the concept of quality cost, classification of quality costs, the importance of quality costs for businesses, the relations between quality costs, the quality cost system, the purpose of the quality cost system, analysis of quality costs, and reporting of quality costs and expected benefits from the quality cost system are the topics which are covered in the quality financial annual reports. In addition, the means of continuous improvement, its importance, and the impact of the cost of quality on it are also given. In this chapter, the researcher also addresses the Palestinian financial market and the manufacturing companies listed on the Palestinian financial market, which the researcher chose to be the study population.

In the third part (Chapter 3), the research methodology is explained, especially description of the selected research methodology, regarding the strengths and weaknesses, and why this method has been chosen as the research method. The sample

and population, study tools, data gathering and distribution methods, reliability and validity, and statistical tools are also provided.

In the fourth part (Chapter 4), the current status of the companies selected and the quality activities, and the costs of these activities are determined. Then, the resulting costs are classified and analyzed within the framework of the PAF model. In this part, the data was obtained due to the applications made in the selected companies and analyzed. Therefore, results were reached by making comments from the findings.

In the fifth part (Chapter 5), a summary, conclusions, and recommendations of the study and applications are presented including some suggestions for future researches related to the topic.

Chapter Two: Literature Review

2.1.Overview

In this chapter, previous studies are presented, including articles, book, and other references, that dealt with the subject of this research. This chapter enriches the research, enhances its contents and reaches new results that the researchers did not reach before.

2.2.Introduction

Quality has now become one of the fundamental criteria adopted by companies. It must be available in the products and services provided to business customers to maximize its potential in the face of immense growth and intense competitiveness in global markets. That achieves the company's consistency and survival in the industry's constant improvement. Quality improvement measures are based on the waste elimination rule and operations that do not add value to the customer. These are companies' views based on the concept of achieving long-term goals, resulting in decreasing (cost, effort, time to deliver products and services) and gaining customers by achieving their satisfaction, raising the market share of the company, and attaining high profits. The commitment process of the company to control and maintain quality at a certain level or its failure to control or maintain it at specific level results in costs known as quality cost.

The competitiveness of the companies for their products or services supplied to the company's customers lies in the balance between quality and cost elements to provide a tool to assess the overall effectiveness of quality management, create opportunities, identify action priorities, and identify problem areas and processes (Uyar, 2008: p.604). This is because the products are sold based on the type and product price and that the

type of product is related to the product's function. In contrast, the product's quality is connected to the benefits or losses resulting from its use, and conformity is often referred to as quality (Taguchi et al., 2005: p.171).

Moreover, businesses and individuals do not only differ in performance quality, but rather in terms of compliance with the required and standard specifications to achieve the best. Therefore, businesses always strive to compete by offering the highest quality levels and continuing to keep always at the forefront of continuous improvements, for excellence has no end, but rather is the research motivation for the best of things (An-Najjar, 2007).

2.3.Quality

2.3.1. Quality Concept

Several attempts have been made to define the concept of quality. As a result of these attempts, based on appreciation, each of the different definitions of quality differs, and that each definition revolves around highlighting a particular feature, as for the diversity definition, this is due to five main foundations, namely: quality based on (superiority, value, product, user, manufacturer) (Slack et al.,1998: p.633). Some definitions were characterized by objectivity and accuracy in expressing the concept of quality, regardless of the differences in quality definitions, which made those definitions prove themselves and impose themselves on managerial thinking. It cannot be readily defined. The quality guru Juran confirms this because we know that quality is widely known and available in dictionaries, but most technical use definitions are vague and philosophical.

To assess the product quality by Juran and his colleague's conviction, that there is a fundamental criterion for judgment as to whether the product is suitable or inappropriate

for use, irrespective of the condition and product position (Juran and Gryna, 1993). That is what the researcher confirmed, and disagreed with them that it is the user and the customer who knows and sees the quality, not the product or the supplier, and this means that the concept of quality is a relative term that depends on the needs of customers and changes its meaning (Suarez,1992: p.3). The researcher provided an example that explains what the researchers agreed on if a person needs to purchase a safe, economical, and simple car to meet his needs, then if at the same time he finds a luxury and expensive car, despite the luxury and sophistication of the car and its high level of perfection, it does not suit that person, and in return, it can be that when another person arrives the next day that same luxury car and sees it suitable and ideal to use to make him happy (and this contradicts the first person and opposes him).

In general, the concept of quality applies to goods and services, as it has many quality definitions. Crosby had also defined quality as the extent to which the products meet the customer's requirements and that the product is of good quality whenever the product specifications meet the customer's needs (Crosby, 1992). Crosby believes that clear and measurable conditions must be met to help the organization make sound decisions based on clear and tangible goals to achieve quality (Suarez, 1992: p.3). As for Feigenbaum, quality has recognized that engineering, industry, maintenance, and marketing activities result from the interaction to meet the customer's needs and requirements (Feignbaum, 1991). In general, quality is significant as Philips Electronics' President, Timmer Jan, expressed his opinion on the quality issue and said, "Quality is the way of life" (Crainer, 1999: p.189).

International standards (ISO 9000: 2000) set out that quality reflects the extent to which the product's inherited characteristics satisfy the needs and customer requirements ISO

9000 (2000). Whereas Capon (2000: p.232) said that the quality 'is the ability of the product or service to satisfy, and preferably exceed, the expectations of the customer", Deming agreed by defining quality as providing a product or service that meets or exceeds the customer's expectations.

How does the researcher see that the definition of quality in the supply and manufacture of a particular product or service that meets the specifications and required characteristics that meet customer needs and requirements in the right amount and time and at the lowest possible cost and that achieve customer satisfaction and breadth of customer satisfaction?

From the above, various definitions of quality can be said that all of the quality-conscious systems and companies are of great importance in implementing and following it to maintain existing customers, gain new customers trust, increase the number of customers, and increase the company's market share. It always strives primarily to meet the needs, desires, and expectations of customers, making it have a competitive advantage in the global market, which in turn increases the company's profits.

2.3.2. Dimensions of Quality

Feignbaum illustrates the quality dimensions as follows (Feignbaum, 1991: p.3-4):

Performance, Feature, Conformance, Reliability, Durability, Serviceability, Response, Aesthetics and Reputation.

From the researcher's point of view, the product may have more than one dimension simultaneously. With the continuous progress, tremendous technological developments, and intense competition in the markets, other new dimensions of quality would appear.

2.3.3. The Significance of Quality

Quality is a prerequisite and essential to the success and failure of businesses, and this is due to the role and importance that quality plays, which is the competitive position of businesses in the market. Haksever et al. (2000: p.329) also stated that quality is of great importance, as it is represented in the following: high customer loyalty, higher market share, employee loyalty, low costs.

2.4.Cost of Quality

2.4.1. Concept of Quality Cost and Quality Models

The concept of quality has been considered as a concept for many businesses since its emergence, it has developed over time and has become increasingly important. In order to overcome the market challenges brought by globalization in our age, business organizations work towards this goal by targeting business excellence. Because quality, which has a comprehensive effect in many areas, is accepted as an important measure of business activities and businesses that do not accept quality as such a measure cannot gain a solid place in the market.

With the introduction of costs to measure the concept of quality which is considered an important issue for businesses, the concept of quality cost has emerged and has gained importance day by day. It has been recognized that measuring quality costs is an effective tool to follow changes and developments in quality, and measurement of these costs has gained importance for the management of quality costs. The belief that high quality level can be achieved with high quality costs has changed over time and has been replaced by the view that the costs encountered are the cost of poor quality, not good quality. Thus, it has become the main goal to prevent nonconformance production

and provide maximum quality with minimum quality cost. Considering all these developments, it becomes evident that an effective quality cost system needs to be configured in order to manage quality costs correctly. For this reason, structuring of an effective quality cost system in the sample selected industrial companies discussed in this study is considered.

Different quality cost models are encountered during the configuration of the quality cost system. That raises the question of which model will provide a more effective analysis in the configuration of quality cost systems. While in the literature, which of these models will manage the costs more effectively is the subject of discussion among researchers, different examples have been seen in practice. While establishing the model that they think will be more effective, the most preferred model in practice over time has been the Prevention-Appraisal-Failure (PAF) model (Burke & Ryan, 2014: p.128).

The PAF model is often preferred in practice because it has a preventive approach to errors and includes different aspects of other models. In this study, the PAF model is used for the same reason, and the approaches of this model are taken into account in the analysis, interpretation, and development of suggestions of quality costs (Bamford, 2004: p.269).

2.4.2. Quality Cost Concept

The importance of the concept of quality cost emerges considering its relationship with total quality management (TQM). In order to implement, internalize and ensure the sustainability of the TQM approach, changes and developments in quality should be followed up over time. The best criterion that shows the development and change in quality is quality costs related to suitability. Unless the product/service is suitable for

customer use, the design quality does not create a value as good as it wants (Bisgaard, 2007: p.668).

The management measures the costs of the activities necessary for quality control and the costs of the activities and the measures taken to correct the lack of quality control and this is part of the efforts of the administration to manage the quality of its products or services (Hilton et al., 2003: p.266). The terms describing these costs associated with the provision of a quality product or service vary, and these terms include: quality costs, poor quality costs, and quality-related costs (Summers, 1997: p.420). The main significance of the concept of quality cost, which is so important, emerged after the Industrial Revolution with the understanding of the importance of the customers in providing competitive advantage and the quality costs reaching significant amounts in the enterprises. With the book titled "Quality Control Handbook" published in relation to quality costs and the article titled "Total Quality Management" based on Feigenbaum's observations in General Electric, the attention of businesses has been drawn to quality costs and businesses have started to grasp the necessity of measuring these costs (Schiffauerova & Thomson, 2005: p.651). With the establishment of this awareness, some different definitions have been included in different studies over time, provided that they are essentially the same in terms of quality costs. First, quality costs are defined by the American Quality Control Association and the British Standards Institute as follows: "'Quality cost' is a frequently used and often misunderstood term. Quality cost is not the price of providing a quality product or service, but rather the cost of not being able to provide a quality product or service. Any cost that would not be tolerated if the quality was perfect is included in the quality costs. Quality costs is; the total cost of investments made to prevent non-compliance with requirements, appraisal

of the suitability of a product or service, and failure to meet the requirements. The total cost of quality, which is the sum of these costs, shows the difference between the actual cost of a product or service and the low cost that would occur if there were no manufacturing defects or sub-standard service quality risks." (BS 6143-2, 1990: 2; http://asq.org/learn-about-quality/cost-ofquality/overview/overview.html). Similarly, according to another definition, "Quality cost; is the sum of the costs incurred by an enterprise to avoid poor quality, the costs it incurs and other costs incurred due to the low-quality goods produced to assess whether the quality requirements are met. The low quality mentioned in this definition is defined as "the sum of activities that do not add value, scraps, errors and products that cannot meet customer requirements" (Beecroft, 2001: p.3).

In another study, the quality costs are defined as the cost of the activities required to produce a product under the desired conditions and deliver it to the customer, and the cost of the part or product that does not comply with the conditions sought at any stage of production, quality costs can be avoided and inevitable (Giakatis & Rooney, 2000: p.158). Horengren et al. (2003: p.655) defined the quality costs as those incurred in order to avoid the occurrence of a low-quality level or arising from the production of low-quality products. According to Campanella (1999: p.4), the cost is the difference between the actual cost of the product and the lower cost of the product resulting from the inability to manufacture nonconforming services, product failures and faulty units. As defined by Morse et al. (2002: p.383) it is the costs expended due to the occurrence of poor quality of conformity. As for Summers (1997: p.420), it is defined as the costs that the organization will not bear when the quality of its products or services is perfect, and also it is part of the operational costs involved in producing a product or service that

do not meet performance standards, and quality costs are the costs related to preventing poor quality.

Accordingly, the researcher believes that quality costs can be defined as all costs that the organization incur on all activities that ensure the production and delivery of products or services that conform to the specifications correctly and from the first time. And this is what makes the products or services enjoy the level of quality required by the customer at the lowest possible cost and to achieve customers' satisfaction and earn their loyalty.

2.4.3. Classification of Quality Costs

To distinguish between quality costs and other costs, companies classify quality costs to help them measure, analyze, and predict them.

There are at least four categories of quality cost, such as: prevention cost, evaluation cost, internal failure cost, external failure cost, and consider them costs associated with achieving quality when trying to improve quality (Khozeinetal., 2013). Moreover, Dale & Plunkett (1995) determined quality costs in both (appraisal costs, implementation costs, operating costs, costs of maintaining the quality management system, resources for continuous improvement, system costs, failure costs, and all other costs necessary for activities that do not provide added value but are required in order to achieve product or service quality). According to previous definitions of quality costs, there is a difficulty in obtaining a comprehensive definition that is adopted to determine the costs of quality. Machowski & Dale (1998), Summers (1997: p.424), Hilton et al. (2003: p.276), Morse et al. (2002: p.383), Crosby (1979) categorized quality costs into four types, within two main groups as follows:

1) **Quality control or control costs:** They are also known as compliance costs, as (Morse et al., 2002: p.383) describe and demonstrate the costs incurred by the company as a result of the possibility of poor matching between actual products or services and their design standards. Garrison et al. (2010: p.77) the cost of quality control includes all preventive costs of producing products without defects and conformity, and these costs include:
    a) **Prevention costs:** which refers to all costs of activities designed to prevent errors and to avoid poor quality in products and services (Campanella, 1999: p.31). As for Horngren et al. (2012: p.673), Drury (2003: p.901) they defined prevention costs as the costs that the company spends and incurs to prevent the production of products or the provision of services that do not meet the required specifications. It is considered one of the most effective ways to reduce quality costs while maintaining the high quality of the outputs and services provided by avoiding the occurrence of quality problems from the beginning, as companies found that the prevention costs were less than the cost of correcting defects after they occurred (Garrison & Noreen, 2002: p.996).From the above, the researcher agreed with Campanella (1999) that quality costs are all costs that the company spends to prevent errors and avoid producing defective units in production that do not match the quality standards.
    b) **Appraisal costs:** These are all costs associated with measuring, evaluating, or reviewing products or services to ensure that they conform to the required quality specifications, quality standards, and performance requirements (Campanella, 1999: p.32), which are costs that the company incurs to ensure that the raw materials and products comply with quality standards. Muhlemann et al.

(1992: p.101), Drury (2003: p.901). Appraisal activities are classified as activities that do not add value, as the customer does not pay money for the examination or those activities, but rather for the high-quality product.

Accordingly, appraisal costs can be defined as all the costs that the company spends on the activities related to appraisal, measurement, inspection, and ensuring that errors occur during and after the production process, which helps to discover errors from the beginning before they reach the customer.

2) **The costs of failure in quality control:** also called the cost of non-conformity, and it refers to the costs that the company bears due to the occurrence of defects in quality and failure to produce correctly the first time in production (Garrison et al., 2010: p.77). Also, Morse et al. (2002: p.383) sees it as all costs resulting from poor matching between products or services and their design standards. These costs are divided into two parts:
   a) **The costs of internal failure:** Horngren et al. (2012: p.673), McWaters et al. (2001: p.431) defined these costs as the resulting costs for the detection of failure and defective units of the products or services before they are shipped or delivered to the customer, or are the costs that the organization incurs as a result of the activities necessary to correct the processes, products and services. They are mainly referring to defects that have been identified before delivery to customers, and these activities are very costly, especially with the loss of process time to convert raw materials into a finished product (Hilton et al., 2003: p.268).

From the above, the costs of internal failure can be defined as the costs related to discovering defects and failures in products, services, or raw materials and taking corrective measures before delivering them to the customer.

b) **External failure costs:** those costs are the result of failure to discover defective units in the services or products after delivery or presentation to the customer (Campanlla, 1999: p.32), (Noori and Radford, 1995: p.158), (Drury, 2003), (Mc Waterset al., 2001: p.431). As for Muhlemann et al. (1992: p.101), defined them as the costs incurred when the product or service fails to reach the designed quality standards, as it cannot be determined until the product is sent or the service is provided to the customer. Such cost of these activities can be huge (Hilton et al., 2003: p.268).

The researcher also believes that the costs of external failure can be defined as all the costs associated with discovering defects and failure to conform to the specifications as required by the consumer, when delivering products or providing services to the customer.

Quality costs are not limited to the production process only but extend and exceed all company activities and processes. Table (2.1) shows the elements of quality costs and examples of the reasons for each category of quality costs as identified by scientists and researchers.

Table (2.1): Elements of Quality Costs and Examples of the Causes of Quality Costs.

Costs of Control or Compliance		**Costs of Failure to control (nonconformity)**	
Prevention cost items	**Appraisal cost items**	**Internal failure cost items**	**External failure cost items**

Quality planning and improvement	Examination and testing of the raw materials received	Scrap, damaged and lost	Process and manufacturing engineering related to external failure
Process planning and tuning	Preview (check) the process	Disposal of defective products	Field services and the delivery of alternatives to the consumer
Designs revisited	Checking and testing of in-progress output	Process and manufacturing engineering related to internal failure (failure analysis)	Warranty
Suppliers' appraisal	Inspection of finished goods and products	Coordination	Sales revenue
Education and training	Quality laboratory and supplies	Rework	Complaints and claims
Inspection equipment and its maintenance	Consumption of test equipment	Downgrading of the good	Discounts
Quality data and its analysis	Maintaining the accuracy of measuring instruments (calibration)	Repeat the test and check	Product repair
Quality reports	Stock assessment	Down time	Re-withdraw products from the market
New raw materials used in the manufacture of the product		Faults maintenance	

Source: (Al-Massoudi, 2010)

Ross (1995: p.336) links the costs of quality to the iceberg, and classifies quality costs into two parts:

1) **Visible costs:** For companies, these costs are considered to include components such as damage, rework, inspection, returns under warranty, and quality assurance costs, and it was mentioned that 10% of the iceberg are apparent costs.
2) **Hidden costs:** Murumkar et al. (2017), they are the costs of prevention, appraisal and failure are not the only costs of quality. Rather, there are other hidden costs that must be identified, to reduce customer complaints, and hidden costs are the costs associated with quality activities and do not appear in the apparent quality costs, but are charged to other activities such as the costs of modifications related to production and engineering, and the hidden costs represent 90% of the iceberg. Hence, hidden costs are considered to have a greater weight, even though they are often hidden, outweighing the costs of quality.

Murumkar et al. (2017) added that hidden costs include the indirect costs of poor quality, the intangible costs that affect the most and are difficult to measure, the loss of reputation, and the resulting loss of sales, they are three times higher than the elements of direct quality cost in the manufacturing company and can be reduced through correct tracking and understanding the root causes.

From the preceding, the researcher can see that the costs can be classified into more than one classification: the first classification, the costs of conformity and the costs of non-conformity, the second classification, apparent costs, and hidden costs. Also, the reality of hidden costs is higher than the elements of visible quality costs in manufacturing companies. So, looking at the hidden cost is considered a gold mine for improvements due to its tremendous impact on net profit, enabling companies to

establish strategies to stay in the market and face intense competition. Reducing them through accurate tracking and understanding the root causes is possible. Since the traditional appraisal cost of a quality system is insufficient in assessing the total costs of quality, the data produced by the traditional accounting system must be overridden by measuring and analyzing costs (Sailaja & Basak and Viswanadhan, 2015).

2.4.4. Importance of Costs of Quality

The concept of quality costs has evolved with the emergence of new concepts in operations management and managerial accounting and the development of management thinking. The scientist Juran used in his work on quality control in 1951 the famous example "went in the mine" as an indication of the costs of quality. He also suggested that the optimum quality level can be reached. As a result of defects achieved, it is equal to the cost of quality control, and because of the impact of quality costs and their importance in the activity of establishments, interest in studies and research on these costs increased (Zairi and Baidoun, 2003: p.15). At the level of companies identifying and measuring the cost of quality, it reflects that the company pays great and special attention to achieving quality, because the more the company pays attention to the costs of quality and delves into the study and analysis of these costs, and as a result, the company will achieve increased benefits in the near and long terms (Al-Massoudi, 2010). Khozein et al. (2013) added that paying attention to quality costs reduces manufacturing costs and helps increase productivity. Quality costs have been defined by several researches as follows:

1. Quality costs are the basic data of TQM and that the quality cost program provides advance inquiries against any future risks in the financial situation, so corporate

management uses quality costs as a common economic denominator to improve quality, customer satisfaction and market share (Zairi and Baidoun, 2003: p.15).

2. Using the method of determining quality costs, workers who manufacture the product or provide the service can know the cost estimate for poor quality (Summers, 1997: p.427).
3. By diagnosing quality costs, cost savings and quality improvement are determined. In addition, when the quality of the performance of the facility is improved, the quality costs also improve (Summers, 1997: p.482).
4. Among the benefits of studying quality costs: its direct impact on the financial objective of the company and focus on areas of poor performance to improve it, help in controlling total quality, increase competitive advantage by achieving higher quality and lower cost, and use quality cost as a management tool and as an indicator of the economic health of the organization (Murumkar and Bhushi and Deshpande, 2017).

From the above, the researcher believes that the importance of studying and applying the concept of quality costs lies in the companies ’pursuit of long-term benefits by knowing all the costs spent in the companies and measuring them, then reducing these costs as much as possible to offer the product or provide the service at competitive prices, and confirm studies that the companies that are interested in applying the concept of quality costs is that it has competitive advantages over other companies. It also helps companies to make quality decisions, and helps increase companies ’ability to identify and deeply analyze the forces of competition. The companies should also consider the application of the cost of quality as a viable alternative, because the implementation of quality costs provides the company with many benefits: such as

reducing customer complaints, re-work, warranty expenses, failure costs, and overall quality costs, and among its benefits is the improvement of sales and profits (Tye et al., 2011).

2.4.5. The Relationship between the Components Costs of Quality

To clarify the relationship between the components of quality costs, researchers and specialists Hilton (2005), Morse et al. (2002), Slake et al. (1998), and Nair (1996) discussed two main approaches to study and analyze the behavior and the relationship of quality costs. These are:

The traditional approach: This approach is based on the philosophy of balancing the costs spent on prevention and evaluation activities on the one hand and the costs spent on quality control failure activities on the other. It also assumes that when investment increases in prevention and appraisal activities, it will reduce the rate of defective units and thus reduce costs of internal and external failure at a rate higher than the increase in prevention and evaluation costs, which reduces the total costs of quality, which is the sum of the prevention costs and evaluation, internal failure and external failure, and to reach a high level of quality and defect rate at a minimum. The optimum level of quality is the point where the total costs of quality will be as low as possible, as shown in Figure (2.1).

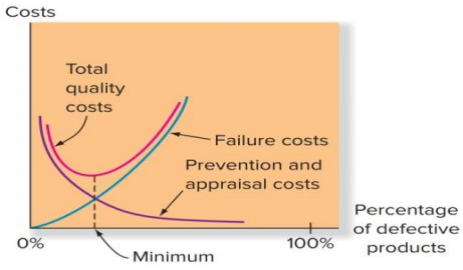

Figure (2.1): Behavior of Quality Costs according to the Traditional Approach

Source: (Hilton, 2005: 516)

To reach the optimum level of quality, companies resort to determining a level of quality efforts in which the benefits derived from these efforts are at their highest and the total costs of quality are at their lowest (Slake et al., 1998: p.770). As Nair (1996: p.376) sees that this approach is based on the fact that when the level of quality increases, production costs will increase at an increasing rate, while the product's value increases at a low rate.

Modern approach or TQM cost model: This approach states the philosophy of continuous improvement over time, with the possibility of achieving savings in failure costs while reducing costs spent on prevention and appraisal activities. Thus, the optimum level of quality is achieved when the total costs of quality are reached if they reach their minimum level, which occurs at the level of zero defects, the production of products at a quality level of 100%. Figure (2.2) shows the modern view of quality cost behavior.

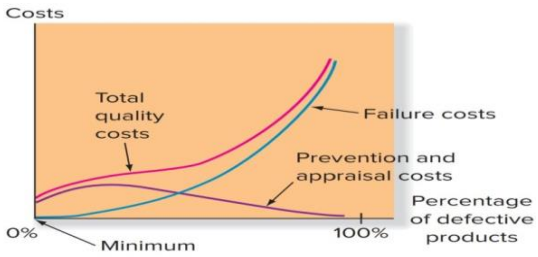

Figure (2.2): Modern View of Quality Cost Behavior

Source: (Hilton, 2005: 516)

The modern approach view seeks to reduce the costs of failure by preventing defects and errors. It also searches for the best levels of quality efforts to achieve a proportional balance between the types of quality costs within the four paragraphs. The two paragraphs of prevention and appraisal costs are open to the administration and its control, while the two paragraphs of internal and external failure costs work to clarify

the results of the change in the first two, as it becomes clear if more efforts were made. To prevent defects, it has a positive effect on the costs of internal failure and thus reduces the costs of appraisal and external failure (Slack et al., 1998: p.773).

A quality program is successful when the management performs the work in the right way from the first time to reduce appraisal costs. As for the implementation of the quality improvement program, it has important effects on the total amount of quality costs and their distribution, as it cannot be reduced quality costs to zero, but management must invest in prevention activities whenever new products are introduced or production procedures are changed (Morse et al., 2002: p.384).

The organizations found a high agreement between the cost of activities that add value and the prevention cost activities on the one hand and the cost of activities that do not add value, screening activities, internal failure, and external failure. On the other hand, strengthening prevention activities increases the value and reduces the need for screening activities, internal failure, and external failure. Thus, the wasted resources used for activities that do not add value are reduced (Hilton et al., 2003: p.268).

Erviansyah (2013) concluded that to achieve quality and reduce quality costs, this requires investment in prevention costs, such as training all employees working in the company, due to the direct and large impact of prevention and appraisal costs on damaged products, and the presence of an inverse relationship between them, so the more prevention and appraisal costs, the lower will be. Damaged products, in terms of their indirect effect, are reflected in the cost of internal failure, represented by increasing the prevention costs and appraisal, and damaged products will decrease with a decrease in the cost of internal failure, and therefore the opposite is true, and the impact of damaged products directly on the cost of internal failure, the more damage

products, the cost of internal failure increased. Ross (1995: p.336) added that investing in prevention activities has a great impact on other activities for quality costs and then on the volume of total costs and profits, and the rule (1-10-100) showed the relationship between the cost paragraphs, as spending one dollar on prevention activities saves $ 10 spent on appraisal activities and $ 100 spent on failure activities. Figure (2.3) shows the relationship between the quality cost items.

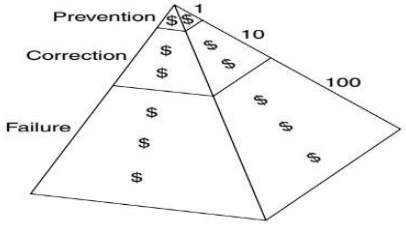

Figure (2.3): The Relationship between the Quality Cost Items

Source: (Ross, 1995: 336)

From the above, the researcher sees that in our present time and due to intense competition, quality does not stop at meeting customer requirements, but her idea is that the most important characteristic of the product is that it is presented in the market at the lowest possible cost and good quality, which leads to improving the relationship between quality and the cost of quality, which is the best way, to enhance customer satisfaction (Khozein et al., 2013). Therefore, companies that seek to face competition and remain in the market resort to reducing the costs of the product or service and improving its quality by increasing investment in prevention and appraisal costs, which in turn improves the quality of the product and reduces the costs of internal failure and external failure, and excludes costs that do not add value and which are not required by the customer. The relationship between quality costs shows that it is an inverse relationship, as the higher the investment in prevention and appraisal costs, the lower

the costs of internal failure, the costs of external failure, and the costs that do not add value to the customer.

2.4.6. Measuring the Cost of Quality

The availability of the facility's ability to measure quality costs and provide useful feedback to its members makes the facility able to provide the customer's needs and expectations in obtaining a distinct product or service, and most accounting systems are designed to achieve many goals, yet they are not designed to focus on the facility's quality costs, (Hilton et al., 2003: p.258). As Mc Waters et al. (2001: p.431) sees the difficulty in measuring quality costs due to the fact that most management accounting systems do not specifically diagnose quality costs, so most of the quality expenditures are dispersed in indirect cost accounts quality cost systems are designed to follow the different types of quality costs and that these systems have the ability to define and define quality costs, so as to enable better and more efficient quality management (Summers, 1997: p.427).

In traditional accounting measured by collecting data for organizational purposes, which makes measuring quality costs requiring additional analyses that some companies see as very expensive (Hilton et al., 2003: p.268).

Most companies adopt the traditional accounting system in dealing with tangible costs that are easy to recover, and this case is not fully applied quality and quality improvement - because there are hidden costs that are difficult to measure and analyze within the cost elements when using the traditional accounting system tools. As these costs constitute opportunity costs, and to calculate them, they must be identified by analyzing all the hidden costs elements and classifying them into indirect quality costs.

The number of these elements reached 20, 5 of which were the most important (Sailaja & Basak, and Viswanadhan, 2015). As for the organizations that measure quality costs using ABC's activity-based cost accounting techniques and ABM's activity-based cost management, they have the information necessary to classify quality cost information on the basis of activity. They classify activities on the basis of the four quality costs paragraphs, which requires arbitrators and cost management analysts work continuously and permanently with production personnel to develop these classifications, as the classification of quality costs resulting from the quality cost measures works on classifying activities cost data in a simplified manner. Firms will also find it difficult to prepare quality cost measures when ABC information is not used (Hilton et al., 2003:268).

One of the most critical problems facing most companies in handling and calculating quality costs is the insufficiency and ability of accounting systems to provide the necessary and appropriate data to handle costs fully. That considers the total costs, which require awareness, training, and managers to properly manage the quality cost, to maximize the profits of manufacturing companies through effective methods such as the inclusion of the cost of quality in quality management systems as a method. That is not a complicated and reliable method, allocating the budget for all processes related to improvement and quality costs, identifying and reducing manufacturing costs, and identifying hidden costs that are a source of increasing costs (Modhiya & Desai, 2016).

2.4.7. Quality Cost Measurement Models

After discussing quality costs by Juran, many researchers suggested several different measuring quality costs. Schiffauerova et al. (2009) presented a set of models for quality costs based on an analysis of quality costs. All these models aim to reduce costs

and improve the quality delivered to the customer. All models depend on the method of linking improvement measures and the costs involved on the one hand and the customer's needs, requirements, and expectations. On the other hand, the combination and balance between reducing costs and increasing the expected benefits from providing the quality that the customer desires and expects from these models (schiffauerova et al., 2009):

1. **PAF (Prevention, Appraisal and Failure Model):** Most quality cost models are based on the globally accepted PAF classification, and this model includes quality costs categorized into prevention and evaluation costs, internal failure and external failure (Schiffauerova, 2006: p.4).
2. **Crosby Model:** Quality costs are determined as the sum of the price of conformity and the price of non-conformity. As intended, the price of conformity is the cost of participating in ensuring that production processes are conducted correctly from the first time. And the price of non-conformity is the cost resulting from the loss when products or services fail to comply with customers' requirements (Vaxevanidis, 2008: p.275).
3. **The intangible cost model or the alternative opportunity:** It means the costs that can only be estimated, such as profits that did not occur due to the loss of customers and a decrease in revenues due to non-conformity. It was divided into three components:
    a. The lack of optimal production capacity
    b. Poor handling of materials
    c. Poor delivery of products and services

d. It also includes traditional PAF quality costs. It is also defined as the sum of both lost

e. revenue and unearned profit (Carr, 1992).

4. **Process cost model:** Is meant as the cost of conformity and non-conformity of a particular process. It means the cost of conformity with the actual cost of a specific process of production that conforms to specifications from the first time. In contrast, non-conformity means the cost associated with the failure of the process when it is not implemented in production at the required level. If the costs of non-conformance are high, there is a need to increase investment in failure prevention activities, while if the costs of conformity are high, this shows the need to re-design the process (Schiffauerova, 2006: p.5).
5. **ABC cost model:** This model uses two-stage procedures to arrive at accurate costs for different cost objectives (departments, products, customers, channels), track resource costs and activity overhead, and then track activity costs on target cost (Vaxevanidis, 2008: p.278).
6. **The quality loss function method** (Taguchi, 2005: 140): This relies on a set of tools and engineering and statistical methods to improve rapidly in reducing quality costs by controlling product design and manufacturing processes (Campanella, 1999: p.12). The product quality is also measured by the degree of its deviation from the target value of the specifications, which can measure the cost value quantitatively. This method reduces the variance around the target values without adding costs (Taguchi, 2005: p.134).

Schiffauerova et al. (2006: p.10) explained the differences between the quality cost models in a clearer and more precise way, as shown in Table (2.2).

Table (2.2): The Differences between the Quality Cost Models.

General form	Calculate the costs of quality (COQ)	Benefits achieved	References
PAF	Prevention + Appraisal + Failure	Reducing costs from 23% to 17%	Fruin, 1986
Crosby model	Prevention+ Appraisal + Internal failure + External failure	A reduction in the cost of quality from 4.1% to 2.5% within four years	Purgslove & Dale, 1996
The intangible or opportunity cost model	Prevention + Appraisal + Internal failure + External failure +Excess requirements + opportunity cost	Reducing 54 million in the first year	Carr, 1992
Operations cost model	Costs of conformity + costs of nonconformity	Reduce cost	Goulden & Rawlins, 1995
Activity Based Costing Model (ABC)	Added value + lack of added value	A cost reduction equivalent to 25% in the first year	Jorgenson and Enkerlina, 1992

Source: (Schiffauerova et al., 2006: p.10)

2.4.8. Components of Cost of Quality PAF Model

The basic concept of the PAF model is that investing in prevention and assessment-appraisal costs would reduce failure costs, as shown in Figure (2.4), and as a result, the estimate of assessment costs will be decreased with more investment in prevention costs (Juran and Gryna, 1989).

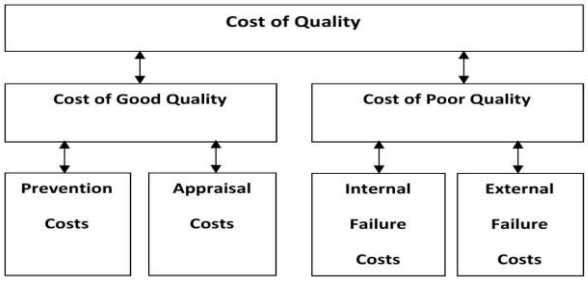

Figure (2.4): PAF Model

Quality is the most essential component in promoting the importance given to customers and the most vital success factor in a highly competitive market for many companies. Because the aim of continuous improvement is to satisfy customer demands at the lowest possible cost, the cost of any quality assurance operation is critical for each company. This is accomplished through lowering the costs required to meet the desired quality standard, as well as identifying and calculating them. It is critical to calculate and report quality costs. The PAF model, which is used to determine quality costs, allows companies to aggregate and calculate their quality-related costs. This model, which divides the cost of quality into four categories, implies that the prevention and failure costs are inversely related. One of the major names in the field of quality costs are Juran and Gryna (1989), they claimed that quality costs are made up of preventable and unavoidable costs. They view failure costs as gold in the mine, because companies may reduce failure costs by implementing effective prevention and measurement-appraisal costs. The fundamental goal of prevention costs is to capture high-quality production early on, reducing or even resetting failure costs later on. The quality of the companies' goods will also be enhanced with appropriate prevention and appraisal costs. Failure costs are significant because the measurement and management of these costs are costly for companies than other cost categories. In researches conducted, 5% of the quality costs arising in the enterprises are prevention, and 95% are failure costs. Today,

the world's leading companies such as Motorola, Xerox, General Electric have realized their quality costs and have achieved quality production and reduced their quality costs with successful quality cost programs (Schiffauerova and Thomson, 2006). Investments in prevention and appraisal costs in international studies have been observed to affect external failure costs (Schiffauerova and Thomson, 2006). Despite the importance of prevention costs, businesses focus more on failure costs. A study stated that 93% of the enterprises focused on failure costs (Kazaz, Birgonul & Uiuberyli, 2005: p.59).

Quality costs are significant for businesses. According to research carried out in several countries, the quality costs vary between 25% and 30% as a percentage of sales (Kazaz, Birgonul & Uiuberyli, 2005: p.60). Despite these high rates, businesses, in most cases, do not monitor and measure these costs. In many enterprises, quality costs are considered general production expenses and are not taken into consideration. In this regard, Gibson (2010: p.1013) found that in his research, prevention costs do not decrease failure costs of continuous investment, and even failure costs can be reduced without the prevention cost by the existence of an effective quality cost system in the enterprise. Fisher (2009: p.281) indicated that the cost of quality constitutes 6.6% of sales revenue. The cost of quality from external failure 19%, and the main cost factors, came from recycling, scrap, and warranty costs, resulting from the failure of the alloy industry to maintain a good quality control system as a result of their lack of knowledge necessary for the main causes of failure, rejection and how to reduce scrap costs and re-work that has a positive impact on the company's profits. Whereas Anrudh, Townsend, and RamaRao (2018) argue about the agreed indicators that can be applied uniformly in health and social systems in different countries, there is a need for indicators to monitor and measure the quality of health care in each country. Moreover, it is necessary to

describe the nature and quality of services provided for family planning and care to improve the quality that offers customers and improve health outcomes.

Heravi & Jafari (2014), through their research, developed the PAF model in the framework of three main operational inputs; Materials, machinery, and labor, to reduce the total cost of quality, to achieve a satisfactory level of quality, and to increase the appraisal cost, prevention cost, and quality, enhance and reduce the failure cost. To achieve quality, it is necessary to follow the example of the Pakistani Armed Forces, which showed the relationships between the cost of quality and quality, in the sense that there is a negative relationship between the cost of appraisal and the prevention cost by reducing the failure cost of materials, labor, and the company. The negative relationship between failure cost and quality of all components; should be made in PAF models that indicate adequate spending for appraisal and prevention activities for materials, machinery, and labor, thus reducing the total cost of quality to the company. Highlighting the importance of understanding cost and model quality; PAF considers it a useful tool for developing a strategic plan and developing a quality management system to reduce the cost of quality and improve its products, service, quality cost. Other inputs are not included because they only represent 6% of the total cost. According to Mahanty, Naikan, & Nath (2012), prevention activities are considered the best policy due to the significant impact on reducing failure costs. The materials, technology level, and training impact quality cost activities. Therefore, there should be a minimum required investment in assessment and prevention. In other words, it is necessary to increase the preventive investment and reduce the investment in the appraisal. If a decrease in investment in the appraisal is not possible for practical considerations, it is at least to remain at a constant level. The investment benefits lie in

the quality in terms of return on investment and sales revenue and make it more realistic.

From the above, the researcher sees that companies differ by using models to calculate the cost of quality and that they have achieved great success in quality and gained customers, depending on the purposes, environment, needs of the company and its structure, which results in different answers and numbers to calculate the cost of the company (Modhiya & Desai, 2016). However, the (PAF) model is the most used and preferred in companies, and this is what many researchers agreed upon, such as Murumkar, Teli, Bhushi, and Deshpande (2017), Modhiya & Desai (2016), Heravi & Jafari (2014), Vaxevanidis & Petropoulos (2008), Arabian, Jourabchi, Leman, & Ismail (2013).

2.4.9. Implementing a Quality Cost System

Murumkar et al. (2017) have found various results; one was that companies which use cost of quality (COQ) programs were very successful in reducing COQ and succeeded in improving quality for customers and that companies that ignore the implementation of COQ make goods and services more expensive, which affects competitiveness, salaries, jobs and the standards of living. Schiffauerova & Thomson (2006) reviewed the previous literature on the methods and approaches for different quality costs and studying its success reports. They came up with a number of indicators, including the fact that companies that utilize the cost of quality have had a lot of success in terms of improving quality and increasing customer satisfaction. Companies utilize many techniques of measuring quality costs depending on their demographic characteristics, environment, aims, and demands, and the most widely used method is the PAF model. One of the outcomes is that the application of quality cost methods is not given much

attention by many companies, and only a small number of companies use it, despite the fact that the companies have achieved the desired results. However, because they have quality systems that rely on continuous improvement processes, they use different techniques. Glogovac & Filipovic (2017) study aims to raise awareness and understanding about estimating the usage of quality cost in current practical practices by monitoring and evaluating the elements that affect cost quality management in Syria manufacturing firms. It was found that companies are not aware of the costs of quality, as 72% of companies do not implement quality control, and that the level of implementation of quality costs in small and medium-sized companies is not fully recognized, while companies of foreign origin, whether in whole or in part, that have been operating for ten years, were of a high level of the cost of quality.42% of these companies do not describe or utilize quality costs, while 28% are aware of the cost of quality and how to identify it but do not use it appropriately. Furthermore, 30% of businesses define and apply quality cost correctly. The study showed that the companies that applied the cost of quality achieved positive growth from 30% to 58%. Satanova & Sedliacikova (2015) indicated that 74% of companies believed in a match between quality management and quality cost control. Whereas 48% of companies considered that there is something in common between quality management and quality cost control, most of the small and medium Slovak manufacturing companies deal with quality costs. Still, their focus was on monitoring and dealing with the costs of internal and external failure. Meaning that these companies are still in the early stages of development and improvement. Rasamanie & Kanapathy (2011) study in their study that aimed to reveal the difficulties and consequences facing the Malaysian industrial companies when implementing the cost of quality, and the benefits that the companies

gain by using the quality costs. They concluded that it is not easy to implement quality costs and that 33 of the 84 organizations are implementing the compilation of quality cost reports. Based on the results, it was found that the most significant difficulties they face in implementing quality costs are the weakness and lack of cooperation between departments, followed by the difficulty of obtaining data. Thus, the study showed that implementing the cost of quality has many benefits for the company by improving product quality, lower rework, and less failure, which helps to reduce the cost of the product, and leads to customer satisfaction, and increases the market share of the product and the company. Sower and Quarles, & Broussard (2007) added, according to studies, that 40% of the companies that do not adopt the quality cost system in the quality management program were the most common reason for not applying the cost of quality, is their lack of administrative support and insufficient information. Therefore, companies that intend to use the cost of quality must increase administrative support and be prepared to increase the total short-term cost of quality, as the total cost of quality increases with the development of the quality maturity stages of companies from the low level to a higher level. As the quality system matures in the company, the preventive costs increase, the cost of external failure decreases, and that the longer the quality cost grows in the company, the volume of external failures decreases and the total cost of quality decreases on the long run, with the appraisal costs and internal failures remaining constant, as for the volume of sales and profits not significantly related to the application of the quality cost system or the level of maturity. In his study by Akkoyun & Ankara (2009), they concluded that there is a difficulty in applying the quality cost model and measuring it in marble industries due to the problems related to the environment and the dependence of most of the quality-related characteristics on the

uncontrolled and often uncontrollable natural and geological conditions. Also, quality costs vary with different products and range from 9% to 34% of total production costs for three different types. Shrout & Tiwari (2017), on the other hand, create a model for calculating poor quality costs in the Mumbai steel sector. They discovered that when measuring the costs of poor quality, there is a variation between research journals and reviews. Therefore, the researchers suggested three basic criteria for calculating the poor-quality cost represented by product mapping and process maps and cost maps for human resources management and the link between these data. Prevention and appraisal costs are not included in the definition of poor quality, according to the researchers, because they are basic costs in production and operations. They came to a conclusion and proposed nine steps to implement the cost of poor quality, starting with the creation of a departmental team, then the necessity of brainstorming in the various product processes, finally monitoring and assessing the results of brainstorming. By ensuring that the cost of poor quality is calculated by mapping the process and product, classifying different costs for all operations, collecting data at various stages while handling materials, and lastly calculating the costs thoroughly by adding non-value costs.

2.4.10. Report on Quality Costs

Most of the data is used to prepare operational reports for quality costs in the organization and its accounting system, as well as the time record, expenditure lists, purchase orders, rework reports, enrollment and credit notes, and other sources. To prepare the various items of quality costs and classify them under quality costs, data are obtained and drawn from these sources once (Feigenbaum, 1991: p.119). Morse et al. 2002: p.383) the reports in which the information related to the costs of quality are

summarized 'the quality reports,' as these reports contain information on quality costs that exceed the facility's limits to information related to activities and facilities for developing quality cost information to provide a reference. It is essential to compare the different paragraphs for different levels of activities, and in most cases, quality costs are based on a percentage of sales or total manufacturing costs. There is also the possibility to prepare quality cost information at any time and for any cost purpose, such as machinery, divisions, plant, and production line, based on the management's need for information quality problems. Also, Horengren et al. (2003: p.657) added that the quality, cost reports include analyzing the opportunity cost of the contribution margin and the lost income from lost sales, lost production, lost production, and price reduction resulting from poor quality.

TQM needs methods that facilitate the administrative process to understand quality reports, and one of the most used methods is the quality index method. Russell and Taylor (1998) defined the quality index as the relative relationship through which the relevant quality costs are measured on value bases, these indicators are also used to measure between levels of quality. As the percentage of these indicators increases, it is considered a negative indicator, and this means that there is an increase in quality costs and vice versa. There are many indicators for the disclosure of quality costs Russell and Taylor (1998) including:

1) **Labor indicator:** It shows the relationship between the cost of quality and the total direct labor hours.

   Labor Cost Index = Total Cost of Quality / Direct Labor Hours.

2) **Cost index:** It is the relative relationship between quality costs and direct and indirect production costs.

Quality Cost Index = Total Quality Costs / Direct Labor Hours.

3) **Sales index:** It shows the relative relationship between the cost of quality and the total value of sales, and this indicator is considered the most used indicator.

Sales Cost Index = Total Cost of Quality / Total Sales.

4) **The production index:** It shows the relative relationship (percentage) between the cost of quality and the quantity of production.

Production costs index = total costs of quality/quantity of final production.

2.4.11. Benefits of Reporting Quality Costs

Adopting the writing and reporting of quality cost reports is part of the system's quality management, due to its importance in limiting corporate failure, in addition to increasing service and product quality, and considering it a tool that enables managers to measure the company's quality costs, which helps them achieve and continuously improve quality cost leaders. Still, there are manufacturing companies that tend to have a quality certificate. However, they do not fully implement the quality management system. They do not adopt quality cost reports in their system due to their lack of training, education, understanding, and awareness of quality cost reports (Kanapathy & Rasamanie, 2011), they also added through this study, which aimed to explore the practices of COQ reporting among manufacturing organizations in Malaysia, the study showed results that: (39.3%) of the companies adopt quality cost reports as part of the quality management system, for two reasons, to reduce corporate failure rate, and to increase quality of service or product quality. For organizations that did not implement COQ reports as part of their quality, it was due to a lack of understanding of COQ principles and the lack of administrative support.

Providing various financial and non-financial reports and measures motivates and drives efforts to improve quality, which helps organized management accounting systems to achieve quality goals, as many companies do not realize the number of sums they spend on quality, which is why companies must prepare quality costs. Also, to calculate the total cost when the company produces products or services that do not conform to quality specifications and requirements (Drury, 2000: p.901). Therefore, the cost of quality reports have many benefits, including:

In addition to the previous benefits, Horengren (2003: p.663) added that the quality cost report brings the attention of the top management to the company and makes it aware of the number of costs associated with quality.

As added by Drury (2000: p.901), quality cost reports estimate some paragraphs as the lost contribution margin as a result of lost sales resulting from poor quality that is difficult to anticipate, and with the possibility that the lost margin is huge, so it is better to include the forecast.

2.5. Continuous Improvement

Client demands, expectations, and the external environment change throughout time, necessitating the organization's improvement and development of products and processes in response to these changes. As a result, organizations of all types must strive for continuous improvement in their activities, processes, and products. The improvement is not implemented once. Instead, improvement efforts must be carried out continuously to become that improvement has already been implemented.

2.5.1. The Concept of Continuous Improvements

Continuous improvement is a management philosophy that attempts to achieve full mastery for the company by continuously improving production processes and activities

connected to machines, materials, people, and production procedures on an ongoing basis. Although achieving perfection is difficult, but maximum efforts must be made to reach it and continuous process improvement. It is a comprehensive process that includes all the activities of the organization for the inputs, conversion processes or outputs and even the transfer of outputs and products to the customer. The continuous improvement process may result in a reduction in inputs, an increase in outputs and improvement in their quality, achieving customer satisfaction, or high employee satisfaction (Jouda, 2004). Continuous improvements are also known as is an organizational process that assists a company in positioning itself against competitors to gain a competitive advantage. Continuous improvement strategies can be used to create competitive plans and focus on activities that add value to the company. Companies improve their profitability in various ways, including increasing production and sales, improving quality, lowering costs, and reducing cycle time (Agrawal et al., 2006).

2.5.2. The Activities Support Continuous Improvement

Four activities support continuous improvement (Jouda, 2004), including:

1. **Benchmarking:** It is the process of measuring and comparing the organization's performance with the performance of another organization or organizations, whether in the same industry or outside the industry. This process may assist the organization in making continuous improvements in its operations and activities significantly.
2. **Customer Information System:** Information is considered power, and upon the availability of accurate and complete information, the ability to manage and take correct decisions and actions becomes greater, which contributes to the success of the organization's management efforts in applying the comprehensive quality

management methodology, to make the organization able to meet the customer's needs and requirements. Therefore, it is necessary to establish a quality information system, an organized method for collecting, storing, and analyzing quality information in the organization, to help and empower managers to make decisions.

3. **Training and motivation of workers:** The training aims to raise the efficiency of workers by increasing their knowledge, developing their skills, and changing their directions to perform their work at the required level and competence. Training also brings many benefits, such as higher productivity of the worker and increased readiness to implement continuous improvement projects, raise the morale of workers, make them feel stable at work, consolidate the concept of teamwork and it reduces the rates of errors that are committed during work.
4. **A climate of creativity:** Encouraging creativity and innovation and providing the appropriate conditions has a significant role and a fundamental pillar in making continuous improvements. Therefore, the availability of a creative climate is one of the basic conditions for continuous improvement activities.

In this study. The Palestine stock exchange was used to extract companies list and companies reports used in the study since it is considered the body and a framework that enlist Palestine companies since1995 and 2021.

2.6. Palestine Stock Exchange

The Palestine Stock Exchange was established in 1995 as a private shareholding company. It started its trading session in 1997 with 18 companies and a capital of $81 million. In 2000, the number reached 25 companies, and the number increased in 2007 to 35 companies. The year 2009 numbered 37 companies, and in 2015 the number of listed companies reached 49 companies with a market value of $3.285 million. The

notable development in 2010 was its conversion from a private joint-stock company to a public joint-stock company, according to its consistency with the rules of governance and transparency, which operates under the supervision of the Palestinian Capital Market Authority by the Securities Law No. (12) of the year 2004. The Stock Exchange also seeks to regulate trading in securities through modern laws and regulations that provide the foundations of protection and safe trading. The Palestine Exchange seeks to be a local financial market with international standards based on its vision of "a national market with global aspirations" that it aspires to achieve, in light of providing innovative services to dealers through a trading environment characterized by fairness, transparency, and security. The companies listed on the Palestine Stock Exchange are among the largest companies in Palestine, as these companies helped support the market and its success (Website of the Palestine Capital Market Authority, 2021).

2.6.1. Companies listed on the Palestinian market Exchange

They are the companies whose securities are listed on the stock exchange according to the provisions of the law. The listing provides them with many advantage that are not available to them outside the stock exchange, in terms of the public's knowledge of them, the follow-up of their production and commercial activities, and the fair appraisal of their shares, to enable them to take appropriate decisions to increase their capital. These matters only come through listing in the stock markets supported by proper legislation and regulatory systems. They are committed to disclosing their data through the annual financial report. The number of companies listed in the Palestinian market reached 48 in 2019 (Website of the Palestine Capital Market Authority, 2021).

Chapter Three: Methodology

3.1.Overview

This chapter provides a comprehensive description of the methodology used in this research. Also, it presents the targeted population, sample methods, data collection, tool's (the questionnaire, interviews and companies reports) description, and how to build the proposed model.

3.2.Research Philosophy

Saunders et al. (2016) suggested other philosophical positions for scientific research, and it was pointed out that choosing between a positive or an explanatory position may be unrealistic. The researcher followed the realistic, critical scientific philosophy, a mixed philosophy (positivism and interpretation), criticizing the observed validity. The researcher tests the validity that she obtained by developing the theory based on interviews with a few institutions and then verifying results using a questionnaire (hypothesis testing). These results are used to develop a tool.

3.3.Approach to Theory Development

The researcher followed the deductive approach as Melnikovas (2018) did to develop the theory. The study begins with a pre-existing theory, then asks a question or hypothesis, and collects data to confirm or refute the hypothesis. According to Wiles et al. (2011), the reason for choosing this approach is that it is most appropriate for the contexts in which the research is interested in examining whether the observed phenomena fit the expectations based on previous research.

3.4.Research Strategy

The research strategy determines how to conduct the research and the followed method in an organized and comprehensive manner. It also specifies the data that should be

collected, collected and analyzed. To achieve this, the researcher followed the descriptive-analytical approach. The quantitative survey approach was used as the main approach to investigate the research questions and its hypotheses about adopting a quality costing model proposal to promote continuous improvements in the manufacturing sector in Palestine.

3.5.Research Period

Following the approval of the research proposal, the research began in the first semester of the 2019/2020 academic year and at the end of November 2020 during which the literature review was completed. At the end of January 2021, the validity test and the trial test were completed, and at the beginning of February 2021 the questionnaire was distributed and collected on the study sample. And at the end of April 2021questionnaires collection was completed, and at the end of June 2021, the results analysis, discussion, conclusion and recommendation were completed.

3.6.Framework of the Research Methodology

The method used to obtain the necessary information requires it to be reliable, and to conduct a search with high efficiency and accuracy, it must be well organized and planned (Olivier, 2004). This allows building and developing a solid foundation to focus on answering research questions meaningful and adding new insights to help solve the problem (Latham, 2013). According to UK Essays (2018) the research methodology is not just a design or step-by-step approach, but a complete framework of components that starts from problem identification and ends with a theory. The work of the study framework is the philosophy of the research methodology, which adopts certain steps for it to achieve the desired results. Research philosophy is also considered a tool to find the best way to conduct the research, enabling the researcher to get a

balanced result. To simplify and make the most of the research, a framework of the study must be adopted.

One of the ways to build a research methodology is based on the theoretical concept of "research onions" Figure (3.1), which was suggested by Saunders et al. (2016). This tool helps organize research and develop a research design by following the research layers step by step; it consists of six layers, Figure (3.1). The research onion model is primarily designed for business studies. According to Raithatha (2017), onion research provides an accurate description of the main layers or stages required to be accomplished to formulate an effective methodology. It stimulates knowledge and generates ideas to find a solution for a research problem. The onion model principles are generally used for each research question.

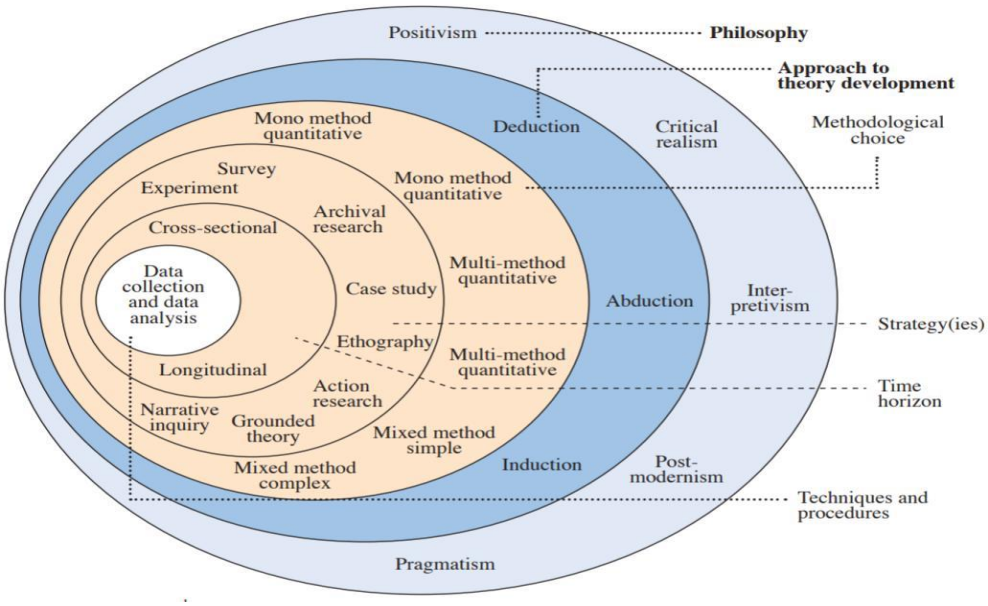

Figure (3.1): Research Onions

Source: Saunders et al. (2016)

After the researcher adopted the research techniques, a comprehensive methodology was designed for this research, the questionnaire construction and development,

validation of the survey tools, and data collection to obtain the largest amount of work outputs. Therefore, the main stages were followed, divided into six phases, as follows:

Phase 1: Subject Development.

At this stage, the topic was determined, the problem was found and defined, the study questions were identified, and the objectives, hypotheses, and framework were developed.

Phase 2: Literature Review

The second stage contains a comprehensive examination of the selected literature related to implementing a quality costing model that has provided many benefits and improvements to the companies. Also, this stage contributed to the formation of the theoretical framework, the research methodology, development of the framework, and extracted from it the most important elements for developing the questionnaire and determining the researcher's position among researchers and theorists, and the gaps in this research and filling them to solve the research problem.

Phase 3: The Pilot Study

At this stage, the tool used in the study (the questionnaire) was developed to verify the validity and reliability of the questionnaire using statistical methods to verify the validity of the tools. To apply it, a pilot study was conducted on a random sample of (21) quality employees, accountants, production officials, and supervisors from the Palestinian industrial companies that obtained a quality certificate to conduct a pre-test of the survey. As a result, it was modified, and errors were corrected before issuing the final version. The pilot study results contributed to modifying the questionnaire and selecting the final list of variables to be used in the study.

Phase 4: The main survey based on the questionnaire and annual financial reports:

At this point, a quantitative approach was used as a significant component of this study. In order to obtain reliable quantitative data, the final questionnaires were distributed to the employees of the production, financial, and quality departments in the manufacturing companies listed on the Palestinian stock exchange market. These companies are located in several places in the West Bank **(Beit Jala, Tulkarm, Nablus, Ramallah, Hebron, Al-Eizariya)**. As for the annual financial reports, all the elements and costs related to quality were reviewed and considered.

Phase 5: Statistical Analysis and Results:

The questionnaires: (SPSS v 26.0) was used to analyze the collected data using both descriptive and inferential tools. The descriptive tools used include percentages, mean and standard deviations, Pearson and Spearman correlation coefficients were used for validation, Cronbach's alpha for reliability statistics, and nonparametric tests (signal test). In addition, the analysis of the annual financial reports included the ratios of the quality costs spent in the researched companies.

Phase 6: Conclusions and Recommendations

In this final phase, conclusions and recommendations are included based on previous stages of research.

3.7.Design of the Study (Methodological Choice)

The use of mixed methods has grown and spread as a result of the limitations of the quantitative method and the qualitative method. In addition to the possibility of the mixed method to solve many common context problems in administrative research (Latham, 2013). Therefore, the mixed approach was used, which was developed by

Greene et al. (1989), where the researcher used a quantitative and qualitative research design, by following two stages. Conducting interviews and discussing the results with some experts to reach a deeper understanding about the study, according to Das (1983). The use of qualitative and quantitative methods together is an auxiliary and complementary method. This allows the researcher the ability to better answer the research questions and better evaluate the extent of confidence in the research results, and the conclusions reached (Saunders, Lewis & Thornhill, 2009).

3.8.Research Location

The research was conducted about the manufacturing companies located in various places in the West Bank **(Beit Jala, Tulkarm, Nablus, Ramallah, Hebron, Al-Azariya)**, which operate within the pharmaceutical, food, chemical, and mineral industries. The questionnaires were distributed to employees in the departments of production, finance, and quality.

3.9.Research Population, Sample and Sampling Procedure

Identifying the target group is the first step in the sampling process. This is followed by defining the sampling frame to represent the study community and then choosing the appropriate method to determine the characteristics of the study community for sampling all data (Taherdoost, 2016).

The study population is defined as all members of the phenomenon studied by the researcher. Based on the nature of the study, its problem, and its objectives, the researcher have chosen companies that are listed in the Palestinian market. The Palestinian market includes 48 companies operating in different (Website of the Palestine Capital Market Authority, 2021). The study was applied to the manufacturing companies, 13 companies distributed in many governorates of the West Bank. The

researcher chose 12 manufacturing companies to be the study community due to the closure of the plastics company, and it's out of the financial market due to its annual losses. The study population represents 1047 employees in the companies surveyed, including all employees in each company's financial, quality, and production departments. Table (3.1) shows the distribution of the study population in the companies surveyed.

The study sample defined according to Webster (1985) is a limited part of a statistical population whose characteristics are studied to obtain information about it. When dealing with people, the sample is defined as a group of respondents selected from a larger population for the survey (Mugo, 2002). Because the method of probabilistic sampling is the gold standard in sampling methodology, which included the goal of generalizing results, the method of sampling followed simple random sampling that gives each member of the study population an equal chance to be selected from the study population (Achari et al., 2013). That made it one of the most important samples and free of bias (Mugo, 2002).

The random sample should be of sufficient size to generalize the results and avoid sampling errors or biases. The sample size for categorical data can be calculated in several ways, using various formulas (Taherdoost, 2016).

Gill et al. (2010) presented a formula for calculating sample size:

$$\mathbf{n= p\ (100\text{-}p)\ Z^2\ /E^2}.$$

n is the required sample size.

p is the percentage occurrence of a state or condition (50%)

E is the maximum percentage error required (5%).

Z is the value corresponding to the level of confidence needed.

In management research, the typical levels of confidence used are 95 percent (0.05: a Z value equal to 1.96).

When the sample size is 95% confidence levels and the margin of error is 5, and the study population is more than 1000, the sample size will be 278. The larger the sample size, the smaller the sampling error (Gill et al., 2010). Therefore, 400 questionnaires were distributed to finance departments, production, and quality in all the companies surveyed. According to the study group, the mechanism for distributing the questionnaires was different from one company to another to ensure a balance in the distribution so that data would be collected more comprehensively and accurately. Table (3.1) shows the reality of distributing questionnaires to companies. Only 275 questionnaires were retrieved, or 68.75% of the total study population, as this percentage is considered scientifically acceptable to analyze the data and adopt the results extracted from it. Also75 or 18.75% of questionnaires were excluded due to the lack of fulfillment of the conditions required to answer the questionnaire. There are 50 questionnaires, or 12.5%, that were not answered due to the definitive refusal by Jerusalem Pharmaceutical Company, and thus the number of questionnaires answered is 275.

Table (3.1): The Distribution of the Study Population and Sample in the Surveyed Companies.

No.	The Company's name	Population	Sample Size
1	The Arab Company for Paints Industry (APC Paints)	26	18
2	Palestine Poultry Co. (AZIZA)	54	30
3	Birzeit Pharmaceuticals Company (BPC)	163	66
4	Golden wheat mills Company (GWMC)	13	12
5	Jerusalem cigarettes Company (JCC)	74	35
6	Jerusalem Pharmaceuticals Company (JPH)	154	61
7	Palestine plastic industries Company (PPIC)	-	-
8	National Carton Industry (NCI)	36	28
9	Vegetable oil industries (VOIC)	32	20
10	AL-Shark Electrode Company	21	9
11	National aluminum and profiles Company (NAPCO)	163	66
12	Beit Jala pharmaceutical Company (BJP)	145	55
13	Dar Al-Shifa pharmaceutical Company (GSC)	166	50
Total		**1047**	**400**

3.10. Instruments of the Study

The tools of this study were based on quantitative and qualitative research methods, where the following research tools were used:

1. A questionnaire.
2. Unstructured interview: a set of questions that are less formal than questionnaires. The interviewer changes the order of the questions and their formulation to collect the necessary data.
3. Analysis of annual financial reports: the financial reports for four years **(2016, 2017, 2018, 2019)**.

3.10.1. Questionnaire Design

If there is insufficient information to address all aspects of study questions, the researcher needs to collect primary data and collect information through questionnaires (Christensen et al., 2010). Therefore, a draft of the initial questionnaire was designed and revised by the supervisor and five arbitrators. Then the pilot study was conducted to review and modify and verify its validity and stability. Finally, based on the results, the questionnaire was reached in its final form as show in Appendix (B), (C). The questionnaire included a cover letter and an introduction explaining the purpose of the research.

In this research, the questions varied to achieve the study's objectives, cover the study's main questions, and collect the necessary data supporting the results and discussion of the recommendations extracted from the research. Accordingly, the questionnaire is divided into three sections: Section A, Section B, and Section C.

Section A: Demographic Information

Section A mainly contains demographics that indicate the background of the respondents and companies. Nine variables were included: four of them in this section pertain to the respondents, namely **(gender, qualification, years of work experience,**

years of quality experience), and five questions related to companies **(the approved quality system, company ownership, company name, nature of work, and years since founded)**.

Section B: represents the role of implementing the elements of quality costs on continuous improvement in manufacturing companies and includes five areas. Each one uses a five-point Likert scale to determine the respondent's preference or degree of agreement with a set of data generated by the questionnaire. Moreover, the neutral option can be considered an easy option when the respondent is unsure of the statement made in the questionnaire set, which gave respondents a wider range of options.

First dimension: It deals with the elements of prevention costs and includes eight paragraphs.

Second dimension: It deals with the elements of appraisal costs and includes nine items.

Third dimension: It deals with the elements of internal failure and includes nine paragraphs.

Fourth dimension: It deals with the elements of external failure and includes nine paragraphs.

Fifth dimension: It deals with the impact of the quality cost elements on continuous improvements and includes ten paragraphs.

Table (3.2) shows the use of a five-way Likert to measure the sample members' responses to this research questionnaire.

Table (3.2): The Five-Dimensional Likert Scale.

Category	Very weak	Weak	Medium	Large	Very large
Degree of approval	1	2	3	4	5

In response to a big classification, the researcher selected score number 5, where each degree's relative weight equals 20 percent, which makes it proportional to the response.

Section C – Open-ended Question (optional): An open-ended question represents the most significant obstacles preventing quality costs measurement, and it does not include paragraphs.

The use of a survey questionnaire has many advantages:

1. The questionnaire is not bound by spatial determinants, and the possibility of sending it by regular mail, e-mail, or direct contact by the researcher herself.
2. Adequate time for the researcher to design the questionnaire, examine it, review its items, present it to the experts and try it out in principle, which gives the questionnaire scientific accuracy and logical value.
3. Giving enough time to the respondent, which eliminates anxiety when answering.

3.10.2. Pilot Study

Experimental studies are small-scale versions or experimental runs of a planned, comprehensive study (Van Teijlingen et al., 2001). They were designed to test multiple aspects of the planned methods of confirmation or investigation, Arain et al. (2010), in addition to evaluating implementation issues related to research design and methods. Experimental studies have a role in gaining and developing an experience for the researcher, understanding the potential risks and costs associated with the study, and

helping researchers to determine whether studies can be pursued on a large-scale (Van Teijlingen et al., 2001). That means the primary purpose of the pilot study is not to answer specific research questions but to prevent researchers from distributing the study on a large scale without sufficient knowledge of the basic information and the proposed methods, and this reduces the cost of the study in terms of time and money (Polit & Beck, 2017).

The pilot study of quantitative data was conducted for this research after the supervisor and judges approved the survey form. The developed questionnaires were checked in terms of the language and sentences used and the suitability of the questions.

The experimental study of qualitative data was not conducted according to Holloway (2008) because it is not considered necessary and has flexibility.

Moreover, the pilot study of quantitative data was performed by running a small version of a larger study to find if all the resolution components would work together (Arnold et al., 2009), Arain et al. (2010). Moreover, testing methods and procedures for sampling and designing a questionnaire to evaluate the raw data (Lancaster et al., 2004).

Leon et al. (2011), Shanyinde et al. (2011) and Kilanowski (2006) indicate that the pilot study supports the researcher in evaluating and preparing techniques for data collection and analysis (Lancaster et al., 2004), Bebe (2007), testing the data for quality and relevance (Lowe, 2019), allowing him to make amendments and review (Kim, 2011) and enhance the credibility of the study (Padgett, 2008).

Julious (2005) indicates that the sample size for the pilot study is desirable to have a minimum of 12 for each group or study, so the researcher distributed 21 questionnaires. That means 21 respondents participated in determining the validity of the questionnaire.

Using (SPSS) version 26, the reliability and validity of the questionnaires were analyzed. To measure reliability, the Cronbach's Alpha statistic was employed which uses correlations between items to determine whether component items measure the same (Bowling 1997, Bryman & Cramer 1997, Jack & Clarke 1998). Santos (1999) defines Cronbach's Alpha as a measure of the squared correlation between observed and valid scores. The questionnaire items have good internal consistency if the Cronbach's Alpha questionnaire exceeds 0.7 (Bowling, 1997), Bryman & Cramer (1997).

Based on the analysis and validity of the Cronbach's Alpha, it was found that all Cronbach's alpha values for all sub-sections of the questionnaires exceeded the value of 0.7, and Table (3.3) shows this. That indicates all the questions for the dimensions of the study are reliable. Based on that, the researcher proved the validity and reliability of the questionnaire and adopted it for distribution.

Table (3.3): Reliability Coefficient (Alpha Cronbach Method).

Dimension	No. of Items	Cronbach's Alpha
Elements of prevention cost	8	0.929
Elements of appraisal cost	9	0.962
Elements of internal failure cost	9	0.940
Elements of external failure cost	9	0.927
The impact of quality cost items on continuous improvements	10	0.966
All dimensions	**45**	**0.986**

* Correlation is statistically significant at $(0.01) \geq \alpha$.

3.10.3. Data Collection Method and Procedures

Primary and secondary data are two sources of data collection that can be used in research (Zikmund et al., 2010). Therefore, the researcher relied on two basic types of data:

1. **Secondary data:** the researcher has dealt with the theoretical framework of the study, its aspects, and dimensions through the data found in magazines, articles, internet sites, and Arabic and foreign books.

2. **Primary data:** the researcher, using interviews, annual financial reports for the companies surveyed, and a questionnaire.

First, quantitative part: the questionnaires were distributed immediately after obtaining the general managers' approval and the heads of departments for each company. The questionnaires were collected within four weeks, then checked and sorted according to the required standards.

Second: the annual financial reports; data and related costs were compiled through the company's financial reports on the Palestinian Stock Exchange website.

3.10.4. Data Analysis Technique

When analyzing the data for the mixed-method approach, it included many processes and techniques. The research data were examined and analyzed for the quantitative method through descriptive statistics and inferential statistics using (SPSS v 26.0).

Before analyzing the quantitative data to test its relevance towards the research hypotheses, it was preceded by a careful examination of the data to ensure that the data were entered correctly. Then, the data were checked using the “frequencies” or

“descriptive” commands within the descriptive statistics method. The result of checking the data showed that there were no missing values in each of the variables. That means there are no data losses or biases.

The demographic profile (section A) was also analyzed using descriptive statistics to summarize some general observations about the collected data. The general demographic profile of the respondents was explained in the form of percentages and frequencies. On the other hand, inferential statistics were used to explain the whole community to test the research hypotheses. The Spearman correlation test was used to measure the level of statistical correlation between two variables. It is a non-parametric statistical technique compared to the Pearson correlation coefficient. The level of significance represented by the output of the 'correlation' column was the primary concern in determining whether the research hypotheses tested using this technique were significant. Depending on the value of the p, the null hypothesis will be accepted or rejected. If p-value is less than 5% which is the significance level the null hypothesis would be rejected, if it's equal or more than 5% then we would fail to reject the null hypothesis.

To determine the strength of the relationship between the variables, Spearman's correlation test was used. Since the Spearman correlation table values are equal to the Pearson correlation table values, the correlation values lie between +1 and -1 for each of them. In contrast, Pearson's correlation evaluates linear relationships, while Spearman's correlation evaluates monotonous relationships (whether they are linear or not) (Daniel, 1990).

Therefore, the relationship strength was determined by looking at the value of "r" shown in the Pearson correlation Table (3.4). It expresses the strength of the relationship or the

degree of correlation between two variables. If there is no relationship, then the correlation coefficient is zero.

Table (3.4) gives the strength of the relationship between the independent and dependent, variables were adapted from (Muchinsky, 1993).

Table (3.4): Pearson Correlation Value.

Value of "r"	Strength of relationship between variables
0.00-0.20	Very low or no relationship
0.21-0.40	Low relationship
0.41-0.60	Moderate relationship
0.61-0.80	High relationship
0.81-1.00	Very high relationship

(Source: Muchinsky, 1993)

On the other hand, Table (3.5) summarizes the analysis of the data technique used to analyze all of the data and meets each of the study's research objectives.

Table (3.5): Summary of Data Analysis Technique.

Research Hypothesis	Data Technique Analysis
. Demographic Variable	Descriptive statistics (Frequency and Percentage)
2. There is no significant relationship at the level (a=0.05) between quality cost items as analyzed in the annual reports of selected companies and their effects on the continuous improvements.	Sperman Correlation

3.11. Demographic Characteristics of Respondents

Four hundred questionnaires were distributed to the respondents (quality, production, and finance departments) in the manufacturing companies listed on the Palestinian financial market. Thus, the researcher collected 350 sets of questionnaires, of which only 275 were filled out, as shown in Table (3.6).

Table (3.6): Overall Frequencies for Demographic Variables of Respondents.

Items	Valid	Missing
Qualification	275	0
Gender	275	0
Years of experience in work	275	0
Years of experience in quality	275	0
The approved quality system	275	0
Company ownership	275	0
Nature of work	275	0
The Company's name	275	0
Year since founded	275	0

According to the information in the above table, all demographic variables are available, and there are no missing values.

Table (3.7) shows a summary of the demographic characteristics results of the respondents.

Table (3.7): Frequencies, Percentages of Demographic Variables of Respondents.

Demographic data	Frequency	Percent	Demographic data	Frequency	Percent
Gender			**Company ownership**		
Male	197	71.6%	Family business	0	0
Female	78	28.4%	Non family business	275	100%
Total	275	100%	Total	275	100%
Qualification			**Years of experience in work**		
Diploma or less	20	7.3%	Less than 5yr	54	19.6%
Bachelor	199	72.4%	5-10 yr	79	28.7%
Others.	56	20.4%	More than 10 yr	142	51.6%
Total	275	100%	Total	275	100%
Years of experience in quality			**The approved quality system**		
Less than 5yr	87	31.6%	ISO	196	71.3%
5-10 yr	86	31.3%	PSI	28	10.2%
More than 10 yr	102	37.1%	Both	51	18.5%
Total	275	100%	Total	275	100%
Year since Founded			**Nature of work**		
Less than1990	201	73.1%	Pharmaceutical sector	109	39.6%
From 1991 to 2000	52	18.9%	food sector	53	19.3%

More than 2000	22	8%	other industries	113	41.1%
Total	**275**	**100%**	**Total**	**275**	**100%**

In addition, Table (3.7) shows a list of respondents' demographic profiles, containing eight variables, four of which belong to the employee and the rest to the company. It was found that most of the respondents were males with a percent of 71.6%, and most of them held a bachelor's degree, which constituted 72.4%, and this gives an indication of the ability and efficiency of the respondents to understand and answer the questions of the questionnaire and give correct information. The majority of employees who have work experience of more than ten years account for 51.6%. As for the employees who have experience in quality, the majority have more than ten years, where their percentage constituted 37.1%. On the other hand, all the companies surveyed share the nature of ownership as they are non-family companies, 100%; in addition, most companies were established before 1990, at 73.1%. The table also showed that the nature of the work of companies operating in the other industrial sector (paints, cigarettes, aluminum and profiles, cardboard and welding, and metal bars) was 41.1%. It was also found that the highest percentage of the quality certificate adopted by companies is the ISO certificate, with a percent of 71.3%.

3.12. Non-Parametric Test

In the study of population groups that take a ranked order, non-parametric methods have been widely used. When the data contains an order but no clear numerical interpretation, or when the data is on an ordinal scale, non-parametric methods may be required. In addition, when the distribution of this population is abnormal and when

taking inaccurate numerical measurements, parametric tests in such cases may lead to incorrect results. Therefore, non-parametric methods should be used that does not depend on certain conditions related to the distribution of the population and do not require precise measurements. Also, the non-parametric tests are characterized by ease of application. When applied, they do not need many conditions, which makes their conclusions and results logical and very close to the truth.

3.12.1. *Mann-Whitney Test*

The Mann-Whitney U test, also called the Wilcoxon rank-sum test, tests the differences between two groups on a single ordinal variable with no specific distribution (McKnight & Najab, 2010). It was used to test a statistically significant difference between the two groups of respondents towards prevention costs, appraisal costs, and internal and external failure costs to apply the principle of quality cost according to the perspective **(gender and nature of company ownership)**.

3.12.2. *Kruskal-Wallis Test*

A non-parametric statistical test examines differences between three or more independently sampled groups in a single continuous variable with an abnormally distributed distribution (McKnight & Najab, 2010). It was also used to examine a statistically significant difference between three groups of respondents towards prevention costs, appraisal costs, and internal and external failure costs to apply the principle of quality cost according to the perspective **(qualification, years of work experience, quality, nature of companies' work, year since founded, and the approved quality system)**.

The results are shown in Table (3.8) indicated the interest in measuring the prevention cost based on gender, educational qualification, years of work experience, years of experience with employees, nature of ownership, nature of the company's work, approved quality certificate and year of incorporation in manufacturing companies. In addition, the "Mean value" column was used to identify the category that was serious and interested in measuring the prevention cost.

Table (3.8):The Reality of Measuring Prevention Costs according to Demographic Data.

The reality of measuring prevention costs	Mean	St. Dv	The reality of measuring prevention costs according to demographic data	Mean	St. Dv
Gender			**Company ownership**		
Male	3.96	.50	Family company	0	0
Female	3.88	.60	Non family company	3.94	.53
Qualification			**Years of experience in work**		
Diploma or less	4.10	.70	Less than 5yr	3.84	.53
Bachelor	3.94	.47	5-10 yr	3.89	.54
Others..	3.89	.66	More than 10 yr	4	.52
Years of experience in quality			**The approved quality system**		
Less than 5yr	3.91	.52	ISO	4.03	.52
5-10yr	3.76	.55	PSI	3.76	.43
More than 10yr	4.11	.46	Both	3.67	.49
Year since Founded			**Nature of work**		

Less than1990	3.92	.53	Pharmaceutical sector	4.09	.54
From 1991 to 2000	4.08	.48	food sector	3.75	.51
More than 2000	3.71	.56	other industries	3.87	.49
Overall				**3.91**	**.53**

In general, the researcher concluded that despite the employees' different levels of educational qualifications, they are interested in measuring the prevention cost. At the same time, the results showed that employees who have years of work experience and years of experience in quality above ten years are the most interested in measuring the prevention cost, and this indicates that practical and scientific experiences and educational qualifications complement each other and that no one can be dispensed with and this is evidence of their significant role in measuring the cost of prevention.

According to the nature of the company's ownership, the researcher noted that they are non-family companies and are interested in measuring the cost of prevention. However, the companies established in the period (1991-2000), the boom period of the Palestinian industries and the Palestinian economy, have a higher interest in measuring the prevention cost due to the experience gained in those long years of its establishment. At the same time, companies that adopt the ISO certificate in quality have a high interest in measuring the cost of prevention, according to the innovations and developments in the international ISO certificate. As for the nature of the companies' work, companies working in the pharmaceutical industry have a higher interest than other companies in measuring the cost of prevention. That is because the pharmaceutical sector is sensitive and affected. The researcher also noted that companies working in different industries are interested in measuring the prevention cost because working in those industries seeks to provide protection and safety for employees.

Moreover, the results are shown in Table (3.9) indicated the interest in measuring the cost of evaluation based on gender, educational qualification, years of work experience, years of experience with employees, the nature of ownership, the nature of the company's work, the approved quality certificate, and the year of incorporation in manufacturing companies. In addition, the Average Value column was used to identify the serious category and interested in measuring the cost of the appraisal.

Table (3.9): The Reality of Measuring Appraisal Costs according to Demographic Data.

The reality of measuring appraisal costs according to demographic data	Mean	St. Dv	The reality of measuring appraisal costs according to demographic data	Mean	St. Dv
Gender			**Company ownership**		
Male	4.05	.48	Family company	0	0
Female	3.83	.54	Non family company	3.99	.51
Qualification			**Years of experience in work**		
Diploma or less	3.97	.59	Less than 5yr	3.97	.51
Bachelor	4.02	.5	5-10 yr	3.88	.57
Others..	3.89	.66	More than 10 yr	4.05	.46
Years of experience in quality			**The approved quality system**		
Less than 5yr	4.02	.49	ISO	4.09	.46
5-10 yr	3.81	.53	PSI	3.86	.49
More than 10 yr	4.12	.46	Both	3.68	.55
Year since Founded			**Nature of work**		
Less than1990	3.95	.50	Pharmaceutical sector	4.04	.45

From 1991 to 2000	4.24	.39	food sector	3.87	.59
More than 2000	3.68	.58	other industries	3.99	.51
Overall				**3.95**	**.32**

The researcher also noted that employees who have bachelor's qualifications have an average (M=4.02). That indicates bachelor holders have a higher interest than holders of higher educational qualifications (Masters) and diplomas.

At the same time, the results showed that employees who have years of work experience and years of quality experience above ten years have more interest in measuring the evaluation cost. That indicates that practical experience coincides with scientific experience and that each complements the other by measuring the appraisal cost. Furthermore, according to the nature of the company's ownership, the researcher noted that they are non-family companies and are interested in measuring the appraisal cost. However, the companies established in the period (1991-2000) have a higher interest in measuring the appraisal cost due to the experience gained in those long years since its establishment.

Also, companies that adopt the ISO certificate in quality have a high interest in measuring the cost of prevention, according to the innovations and developments in the international ISO certificate. As for the nature of the companies' work, companies working in the pharmaceutical industry have a higher interest than other companies in measuring the appraisal cost. That is due to the influence and sensitivity of the pharmaceutical sector and its heavy reliance on conducting analyses, tests, and

calibrations. However, the researcher also noted that companies operating in other industries measure the appraisal cost.

The results are shown in Table (3.10) indicated that there is interest in measuring the cost of internal failure based on gender, educational qualification, years of work experience, years of employees' experience, the nature of ownership, the nature of the company's work, the approved quality certificate, and the year of incorporation in manufacturing companies. In addition, the Average Value column was also used to identify the serious category and interested in measuring the cost of internal failure.

Table (3.10):The Reality of Measuring Internal Failure Costs according to Demographic Data.

The reality of measuring internal failure costs according to demographic data	Mean	St. Dv	The reality of measuring internal failure costs according to demographic data	Mean	St. Dv
Gender			**Company ownership**		
Male	3.84	.53	Family company	0	0
Female	3.91	.48	Non family company	3.86	.52
Qualification			**Years of experience in work**		
Diploma or less	3.84	.53	Less than 5yr	3.82	.54
Bachelor	3.85	.52	5-10 yr	3.88	.54
Others…	3.89	.52	More than 10 yr	3.85	.50
Years of experience in quality			**The approved quality system**		
Less than 5yr	3.91	.54	ISO	3.94	.48
5-10 yr	3.78	.51	PSI	3.87	.46

More than 10 yr	3.89	.5	Both	3.56	.59
Year since Founded			**Nature of work**		
Less than1990	3.82	.50	Pharmaceutical sector	3.89	.49
From 1991 to 2000	4.09	.46	food sector	3.81	.52
More than 2000	3.66	.62	other industries	3.86	.55
Overall				**3.85**	**.49**

In general, the researcher concluded that, despite the employees' different levels of educational qualifications, they are interested in measuring the cost of internal failure. At the same time, the results showed that employees who have years of work experience and years in quality experience show an interest in measuring the cost of internal failure. That indicates that practical and scientific experiences and educational qualifications complement each other and cannot dispense with one.

According to the nature of the company's ownership, the researcher noted that they are non-family companies and are interested in measuring the cost of internal failure. However, the interest in measuring the cost of internal failure in the companies established in the period (1991-2000), which adopt the ISO certificate in quality, has a higher interest than others. As for the nature of the companies' work, all companies are interested in measuring the cost of internal failure. That may be because all manufacturing companies, according to the nature of their production, share some behavior, such as wanting to get rid of defective goods.

The results in Table (3.11) explained that there is an interest in measuring the cost of external failure based on gender, educational qualification, years of work experience,

nature of ownership, nature of the company's work, approved quality certificate, and year of establishment in manufacturing companies. In addition, the Average Value mean column was used to identify the severe category and interested in measuring the cost of external failure.

Table (3.11): The Reality of Measuring External Fialure Costs according to Demographic Data.

The reality of measuring external failure costs according to demographic data	Mean	St. Dv	The reality of measuring external failure costs according to demographic data	Mean	St. Dv
Gender			**Company ownership**		
Male	4.04	.52	Family company	0	0
Female	3.98	.54	Non family company	4.03	.52
Qualification			**Years of experience in work**		
Diploma or less	4.26	.58	Less than 5yr	4.01	.60
Bachelor	4.05	.49	5-10 yr	4.06	.58
Others…	3.86	.56	More than 10 yr	4.02	.46
Years of experience in quality			**The approved quality system**		
Less than 5yr	4.08	.59	ISO	4.09	.49
5-10 yr	3.96	.54	PSI	4.01	.46
More than 10 yr	4.04	.45	Both	3.78	.59
Year since Founded			**Nature of work**		
Less than1990	3.97	.43	Pharmaceutical sector	3.99	.47
From 1991 to 2000	4.34	.47	food sector	3.97	.54

More than 2000	3.78	.66	other industries	4.09	.56
Overall				**4.02**	**.53**

The researcher also noted that employees who have a diploma or less educational qualifications and fewer years of experience in quality are more interested in measuring the cost of external failure. Perhaps the reason for this is that the level of awareness of holders of high educational qualifications and those with years of experience in quality is more companies not to reach the stage of the cost of external failure.

In general, the results showed that all employees who have years of work experience are interested in measuring the cost of external failure. Furthermore, according to the nature of the company's ownership, the researcher noted that they are non-family companies and are interested in measuring the cost of external failure. However, the interest in measuring the cost of external failure in companies established in the period (1991-2000), which adopt ISO certification in quality, has a higher interest than others. As for the nature of the companies' work, companies operating in other industries have a higher interest in measuring the cost of external failure because they can remanufacture the returned units, unlike the pharmaceutical and food companies, which often require the destruction of these defective units.

3.13. Validity of Questionnaire

Statistical validity indicates whether the questionnaire measures what it is and what it is supposed to measure (Bryman & Cramer, 1997). Its purpose is to ensure that the questionnaire is measurable. That means the clarity of the questionnaire and its paragraphs and vocabulary. The researcher also verified the validity of the questionnaire in two ways:

First: The validity of the questionnaire's paragraphs:

Using two methods, the questionnaire items were validated:

1. **The validity of the study tool (external validity):** The questionnaire was presented in its model form to (6) faculty members at the Arab American University, An-Najah National University, and arbitrators at Al-Quds Open University, with their names mentioned in the arbitrators in Appendix (A). The researcher learned from the arbitrators' suggestions and recommendations and made the modifications discussed based on the length of the questionnaire and causal data, which helped create the final version of the questionnaire as shown in Appendix (B), (C).
2. **Internal consistency validity:** The internal consistency was verified by distributing the questionnaire to a survey sample consisting of 21 samples, then comparing the Spearman coefficient of correlation between each paragraph and the overall result of the sector.

Tables (D1), (D2), (D3), (D4) and (D5) in Appendix (D) indicate the correlation coefficient between each paragraph of the internal consistency axis respectively, for prevention costs, evaluation costs, internal failure costs, external failure costs, and the impact of quality cost elements on continuous improvements and the degree total for the same axis. That shows the correlation function coefficients at a certain level of significance $(0.01) \geq \alpha$. That reflects the extent of alignment of the axis's paragraphs with the same axis and the consistency of the paragraphs with the same axis; accordingly, the vertebrae were faithful, and the scale was as it should be.

Second: the structural validity of the questionnaire's axes

Constructive validity is a measure of the validity of the study instrument, as it measures the objectives that the instrument seeks to achieve. In addition, it shows each field of study is related to the total score of the paragraphs.

Table (3.12) shows the Spearman correlation coefficient between each dimension of accuracy and the overall score for all items. It shows that all correlation coefficients in all dimensions operate at a certain significance level (0.01) ≥ α. That reflects the internal consistency between all dimensions, which is true to what they mean to measure.

Table (3.12) :The Correlation Coefficient between each Axis of the Resolution and the Total Score for all Paragraphs of the Resolution.

Dimension	Spearman Correlation	Sig. (2-tailed)
Prevention	.734**	0.000
Appraisal	.835**	0.000
Internal Failure	.866**	0.000
External Failure	.822**	0.000
CIM	.734**	0.000

* Correlation is statistically significant at the level of significance (0.01) ≥α

3.14. Reliability Analysis

Sekaran (2006) point that the reliability of the questionnaire means the degree of consistency in the results it gives if applied to a sample of respondents more than once under similar application conditions. That means that the questionnaire will provide the same results if it is repeated over and over. Reliability is used to check whether the components measure the same field (Bowling, 1997), Bryman & Cramer (1997).

The importance of the reliability test lies in that it expresses the consistency in the parts of the measuring tool (Huck, 2007). The standard measure of internal consistency is Cronbach's alpha coefficient, which is the most appropriate measure of reliability when using Likert scales (Robinson, 2009), Whitley (2002). The normal range of Cronbach's alpha value is between 0.0 and +1.0 (Richard and Anita, 2008). The minimum internal consistency coefficient is 0.7 (Whitley, 2002), Robinson (2009). Thus, the higher values reflect the higher degree of internal consistency.

Cronbach's alpha coefficient was calculated for each area of the questionnaire. Table (3.13) shows that the value of Cronbach's alpha coefficient is high for each axis, as it ranges between (0.760, 0.797). The reliability coefficient for all items of the questionnaire is (0.918), which is high. These results were very supportive for the researcher to ensure the reliability of this questionnaire and its validity.

Table (3.13): Reliability Coefficient (Alpha Cronbach Method).

Dimension	No. of Items	Cronbach's Alpha
Elements of prevention cost	8	0.760
Elements of appraisal cost	9	0.791
Elements of internal failure cost	9	0.795
Elements of external failure cost	9	0.797
The impact of quality cost items on continuous improvements	10	0.789
All dimensions	**45**	**0.918**

Chapter4: Data Analysis and Discussion

4.1. Overview

This chapter includes a complete presentation of data analysis and testing of the study's hypotheses. The study questions were answered by analyzing the questionnaire's paragraphs and analyzing the financial reports and personal interviews to review the most prominent results reached. The statistical analysis program (SPSS) was used to answer the study's questions and analyze its paragraphs.

4.2.Analysis of Research Questions

Research questions have been developed to study the relationships between variables, support the implementation of quality costing as the first step to propose and support the use of the quality cost measurement model, and promote continuous improvements in manufacturing companies.

Descriptive statistic measures were used and explained, based on the mean (M), the relative arithmetic mean (RAM), standard deviations (SD), coefficient of variation (CV) = *100% (SD/M), and the degree of agreement (DOA) presented in research questions to answer with quality cost data.

To determine the results, a Likert scale was used to describe the agreement on each element in the following survey, as shown in Table (4.1):

Table (4.1): Arithmetic Averages Key for the Answer Scale.

Degree	Its arithmetic mean range
Very weak	1.0-1.80
Weak	1.81-2.60

Medium	2.61-3.40
Large	3.41-4.20
Very large	4.21-5.0

Q1: What are the items of cost of quality at the selected companies listed in Palestine Stock Exchange Market are to be identified for continuous improvements?

To answer this question, the researcher prepared 35 items to evaluate the use of quality cost measurement and consider it in selected manufacturing companies in the Palestinian market to promote continuous improvements. The results of the analysis appeared in Tables (4.2), (4.3), (4.4), (4.5), and (4.6).

According to Table (4.2), the researcher reached the results that the general average of measuring the cost of quality and considering it to promote continuous improvements, where it was: (M = 3.96) and the relative average (RAM = 79.2%) and that (SD = 0.85) and (CV = 0.21). That means the employees of the selected companies have a high interest in measuring the cost of quality for improvement. The researcher also agreed with (Zairi and Baidoun, 2003), to reach the optimum level of quality, and due to the impact of quality costs and their importance in the establishments' activity, interest in studies and research on these costs increased. The researcher added, according to Al-Massoudi (2010), the more the company pays attention to quality costs and the deeper the study and analysis of these costs, the more the company achieves benefits in the short and long term .In agreement with (Kanapathy & Rasamanie, 2011), one of the most important reasons companies adopt quality cost reports as part of the system's quality management is to reduce the failure rate of companies to increase the quality of

service / product. As for organizations that did not adopt COQ reports as part of their quality, due to several reasons, including lack of understanding of COQ principles and lack of administrative support. The researcher proves this by conducting interviews with some employees of companies' accounting, production, and quality department. They answered that they are calculating costs related to the elements of quality costs such as evaluating suppliers, calculating the value of inventory, and re-manufacturing without relying on quality cost reports, and not including these costs in the annual financial reports and that because of the lack of administrative support in addition to the lack of information and data on quality costs and the difficulty of obtaining these costs, as they need training, time and effort.

Table (4.2): Descriptive Statistics on Measurement of Quality Costs to Promote Continuous Improvements.

NO.	Cost	M	SD	CV	DOA
1	Overall Average (Cost of quality)	3.96	.85	0.21	Large

In order to answer the first question more accurately, the researcher identified the elements of quality costs according to their four categories for continuous improvement, where four questions were branched from this question.

Q1.1 What are the items of prevention cost at the selected companies listed on Palestine Stock Exchange Market are to be identified for continuous improvements?

According to the results in Table (4.3) below, the researcher concluded that most employees are interested in measuring the prevention cost to promote continuous

improvements. Which means that all items of prevention cost are necessary to promote continuous improvement, as their overall average was (M = 3.94), (RAM = 78.8%) and (CV = 0.22), (SD = 0.87). In addition to their high interest in constantly measuring the cost of supplier reliability (M = 4.04), RAM = 80.8% and (SD = 0.76), and this indicates the need to evaluate the reliability of suppliers to avoid sudden stoppage of supply. The researcher also noticed that there is a high interest in measuring the cost of designing new products that meet the needs and expectations of the customer in order to prevent the possibility of errors. At the same time, employees have a high interest in measuring the cost of ensuring the safety of equipment and machines before starting the production process to avoid sudden breakdowns and lost time and ensure that costs are reduced to a minimum. In general, there is great interest in measuring the cost of prevention, as shown in Table (4.3). In agreement with (Garrison and Noreen, 2002), the prevention cost is necessary for companies because it is considered one of the most effective ways to reduce costs while maintaining the high quality of output and services provided. By avoiding problems from the beginning, to reduce non-conforming products, prevention costs should be less than the cost of correcting defects after their occurrence.

Table (4.3): Descriptive Statistics on Measurement of Prevention Costs to Promote Continuous Improvements.

NO.	Prevention Cost	M	SD	CV	DOA
1	The cost of designing new products that meet the needs and expectations of customers is accurately calculated.	3.98	.82	0.21	Large
2	The costs of assessing supplier reliability are continually measured.	4.04	.76	0.19	Large

3	The costs of holding training courses and participating in quality-related conferences are calculated.	3.81	.95	0.25	Large
4	The costs of ensuring the safety of equipment and machinery are calculated before the production process begins.	3.99	.82	0.21	Large
5	The costs of planning the quality system and the costs resulting from the implementation of these plans are calculated.	3.98	.86	0.22	Large
6	The cost of reviewing, examining and analyzing quality data is calculated in the company.	3.98	.84	0.21	Large
7	The costs related to cleaning, pest and insect control is calculated.	3.87	.93	0.24	Large
8	Calculates the cost of developing quality systems.	3.85	.95	0.25	Large
	Overall Average (Prevention cost)	**3.94**	**.87**	**0.22**	**Large**

Q1.2: What are the items of the appraisal cost at the selected companies listed on the Palestine Stock Exchange Market to be identified for continuous improvements?

Based on Table (4.4) data, which shows the results of the appraisal cost items, where the researcher concluded that there is interest among employees in measuring the appraisal cost for continuous improvement, as its general average was (M = 3.99) and (RAM = 79.8) and (SD = 0.83) and (CV = 0.19).The researcher indicated that the employees are highly interested in measuring the cost of testing supplies of raw and semi-finished materials, which means their keenness to ensure that the materials conform to the specifications. In addition, the cost of calibrating test and inspection

equipment and tools is calculated to ensure the safety of the equipment and test tools used to give the correct result. In addition, they are interested in measuring the costs related to the value of inventory (raw materials and finished goods) and check before using them. In general, the employees of the selected companies have great interest in measuring the cost of evaluation with all its items to reduce costs from the beginning. That means that all elements of the evaluation cost are necessary for continuous improvement. In agreement with (Khozein et al., 2013), the researcher believes that the companies' quest to achieve the goal of facing competition and staying in the market was a reason for these companies to increase investment in prevention and appraisal costs, which in turn improves product quality and reduces the costs of internal and external failure. However, excluding costs does not add value, and the customer does not require to reduce the costs of the product or service and improve its quality. That means the nature of the relationship between quality costs is an inverse relationship, as the higher the investment in prevention and appraisal costs, the lower the costs of internal failure, external failure costs, and costs that do not add value to the customer.

Table (4.4): Descriptive Statistics on Measurement of Appraisal Costs to Promote Continuous Improvements.

NO.	Appraisal Cost	M	SD	CV	DOA
1	Raw and semi-finished material supply testing costs are measured.	4.17	.8	0.19	Large
2	The cost of analysis and reporting of inspection results are accurately calculated.	4.03	.76	0.19	Large
3	The testing and inspection costs are measured during the manufacturing processes.	3.99	.82	0.21	Large
4	The cost of calibrating test and inspection	4.12	.83	0.20	Large

	equipment and instruments is calculated.				
5	The costs related to the stock's value (raw materials, finished goods) are measured and checked before its usage.	4.10	.78	0.19	Large
6	The cost of checking for impairment of equipment is measured.	3.89	.83	0.22	Large
7	The cost of testing a new product is measured before it is put on the market.	3.82	.87	0.23	Large
8	The final inspection cost of products is measured before they are shipped.	3.98	.88	0.22	Large
9	The cost of the field quality control tests is measured.	3.79	0.9	0.24	Large
	Overall Average (Appraisal cost)	**3.99**	**.83**	**0.19**	**Large**

Q1.3: What are the items the cost of internal failure at the selected companies listed on the Palestine Stock Exchange Market are to be identified for continuous improvements?

According to Table (4.5), the researcher concluded that there is interest on the part of the employees to measure the cost of internal failure to a large extent for the sake of continuous improvements, as its general average was (M = 3.86), (RAM = 77.2%), and (SD = 0.84) and (CV = 0.22). In addition, the employees' high interest in measuring the cost of treating workers due to work injury, their interest in calculating the cost of getting rid of defective goods that cannot be reused, and measuring the cost of analyzing the cause of defects and deviations in production.

In general, the researcher concluded that there is an interest in measuring internal failure cost with all its items. That is because attention to the costs of internal failure enables

the company to diagnose defects and deviations before delivering them to the customer. That indicates that all components of the cost of internal failure are necessary for continuous improvement. In agreement with (Hilton et al., 2003), companies measure the costs of internal failure, which are the costs incurred by the company due to the activities necessary to correct defective processes, products, and services that have been challenged before delivering them to customers. However, as these activities are very costly by losing the processing time to convert the raw materials into a finished product, the processing time is considered the most expensive and the most difficult to measure because it will affect the facility's sales in the future. To avoid these activities, the researcher agreed with (Donabedian, 1980) that companies could reduce failure costs by taking appropriate costs of prevention, measurement, appraisal, and investment at the prevention and appraisal cost. The purpose of prevention and appraisal costs is to obtain quality in production, evaluate processes and materials, and detect errors from the outset, thus reducing or even recalibrating failure costs that may arise later.

Table (4.5): Descriptive Statistics on Measurement of Internal Failure Costs to Promote Continuous Improvements.

NO.	Internal Failure of Cost	M	SD	CV	DOA
1	The cost of losses incurred due to a sudden stop in operations is calculated.	3.85	.84	0.22	Large
2	The cost of re-designing products that did not pass the initial tests are counted as a new product.	3.64	.87	0.24	Large
3	The costs of rework defective products are calculated.	3.79	.92	0.24	Large
4	During operation fails, the costs involved in finding potential solutions are measured.	3.81	.82	0.22	Large

5	The costs of disposing of defective goods that cannot be reused are calculated.	3.99	.91	0.23	Large
6	The costs of treating workers due to work injuries are measured.	4.08	.88	0.22	Large
7	The cost of scheduling and redesigning production processes is calculated to ensure unplanned work does not stop.	3.81	.75	0.20	Large
8	The retest cost is measured for modified products.	3.87	.75	0.19	Large
9	The cost of analyzing the cause of defects and deviations in production is measured.	3.92	.83	0.21	Large
	Overall Average (Internal Failure of Cost)	**3.86**	**.84**	**0.22**	**Large**

Q1.4: What are the items the cost of external failure at the selected companies listed on the Palestine Stock Exchange Market are to be identified for continuous improvements?

According to the results of Table (4.6), the researcher concluded that respondents have a high interest in measuring the cost of external failure to promote continuous improvements, as the arithmetic mean (M = 4.03), the relative arithmetic mean (RAM = 80.6%), (SD = 0.85) and (CV = 0.21). All of their answers were significant, and this means that all the elements are essential for continuous improvements. However, the arithmetic mean was the highest for item No. (6), that means employees are interested in calculating the difference between the decrease in sales volumes compared to previous years. Followed by item No. (5), which indicates that employees are interested in measuring the cost of discount losses and exchange on defective or damaged goods created by the customer, which indicates that the company is interested in compensating

the damaged units that the customer returned. As well as Item No. 4 and Item No. 9, this indicates that most employees have a high interest in measuring the cost of external failure because it is necessary and improves the company's reputation and benefits in the long run. Therefore, the researcher concluded that all elements of the cost of external failure are required for continuous improvement in manufacturing companies.

The researcher added in agreement with (Satanova & Sedliacikova, 2015) that companies that deal with quality costs and focus on monitoring and dealing with internal and external failure costs are still in the early stages of development and improvement. That is because external failure activities are the most expensive; after all, they affect the facility's reputation. The costs spent on these activities can be huge, which the researcher agreed with (Hilton et al., 2003). Therefore, companies should invest in prevention and appraisal costs (matching costs); for this reason, the researcher emphasized that the relationship between the prevention cost and appraisal is inverse to the costs of internal and external failure.

Table (4.6): Descriptive Statistics on Measurement of External Failure Costs to Promote Continuous Improvements.

NO.	External Failure of Cost	M	SD	CV	DOA
1	The cost of losing reputation is calculated as a result of a company failure.	3.85	.95	0.25	Large
2	The costs of handling customer complaints are measured remarkably and met as required.	4.05	.80	0.20	Large
3	Litigation costs against the Company (warranties and remedies) are calculated as a result of a customer damage event.	4	.84	0.21	Large
4	Losses resulting from the warranty that the	4.07	.78	0.19	Large

	distributor returns products that are not sold are calculated during the product's life.				
5	The cost of discount losses is calculated on defective or damaged goods that the customer Founded.	4.12	.83	0.20	Large
6	The difference between lower sales compared to previous years is determined.	4.18	.82	0.20	Large
7	The cost of selling products is calculated at the market discount to ensure that they are sold and not returned through distributors.	3.95	.82	0.21	Large
8	Calculate the cost of repairing the returned units returned by the customer.	3.96	.89	0.22	Large
9	Calculates the cost of withdrawing the product from the market.	4.07	.88	0.22	Large
	Overall Average (External Failure of cost)	**4.03**	**.85**	**0.21**	**Large**

The results that appeared in the respondents' statements showed that the elements of quality cost were identified in the selected companies listed on the Palestine Financial Market for continuous improvement. These elements included prevention, appraisal, internal failure, and external failure costs. The researcher agreed with Arabian et al. (2013). The investment of industrial and service companies in managing quality costs, identifying its elements, organizing its measurement from international and desirable standards, using a model commensurate with the situation, environment, purpose, and needs of the company, and adopting the quality cost reporting system, ensures that it's a successful methodological tool in the quality management system, and to control price and total costs. Furthermore, the quality of its products also leads to achieving customer

satisfaction and helps institutions achieve competitive advantages by providing high-quality products and services at a lower price in the market.

Q2: Will it emphasize the importance of continuous improvements in the implementation of cost of quality throughout the selected companies?

Table (4.7) shows that the general average of the effect of quality cost elements on continuous improvements and the importance of these improvements, as (M = 4.22) and (RAM = 84.4%) and (SD = 0.78).

Table (4.7): Descriptive Statistics on Continuous Improvements.

NO.	Improvement Continuous	M	SD	CV	DOA
1	Optimization of used resources.	4.17	.82	0.20	Large
2	Increase the matched output.	4.24	.74	0.17	Very large
3	Improving product specifications.	4.25	.79	0.19	Very large
4	Achieve superiority over consumer expectations.	4.25	.76	0.18	Very large
5	Effective use of available equipment, machinery and resources.	4.13	.83	0.20	Large
6	Implement a "just-in-time warehousing" system that reduces storage costs and reduces inventory spoilage.	4.21	.85	0.20	Very large
7	Increase the satisfaction of the operators (workers).	3.94	.79	0.20	Large
8	Make operations more effective and efficient.	4.29	.71	0.17	Very large
9	Improve productivity.	4.35	.73	0.17	Very

					large
10	Increase profitability.	4.32	.80	0.19	Very large
	Overall Average (continues Improvement)	**4.22**	**.78**	**0.19**	**Very large**

That means the effect of quality cost elements on continuous improvements was very high. It reflects the importance of implementing the cost of quality for continuous improvements in the selected companies. The researcher also noted that most respondents answered most of the items of the importance of continuous improvements to a considerable degree, as in item No. (2), (3), (4), (6), (8), (9) and (10).

Moreover, it indicates the importance of continuous improvements when implementing quality cost, which is to increase conformity in output, improve product specifications, exceed consumer expectations and convenient storage in reducing inventory damage, making operations more effective and efficient, improve productivity, increase profitability, and effective use of available machines and materials. Accordingly, the researcher states that it is necessary to focus on continuous improvements to implement the cost of quality in manufacturing companies.The researcher also agreed with Jouda (2004), that continuous improvement is a comprehensive process that includes all activities of the organization for inputs, transformation processes or outputs, and even the transfer of outcomes and products to the customer, and aims to develop and improve processes and activities related to machines, materials, people and production methods on an ongoing basis. As a result, it will lead to a reduction in inputs, an increase in outputs and an improvement in their quality, and customer satisfaction, which has given great attention to continuous improvements.

Q3: What are the elements of cost of quality to be identified and determined in selected companies' annual financial reports?

In general, the cost of quality that must be identified in the annual financial reports in companies includes all elements of the cost of quality and must be included in the annual financial reports. Thus, the researcher agreed with (Morse et al., 2002) the reports summarize the information on quality costs to compare different items for different activities. In most cases, quality costs are placed based on a percentage of sales or total manufacturing costs. Also, these reports include quality costs in their four paragraphs and extensive information such as estimated losses on lost sales resulting from quality problems. In addition, the researcher also added and agreed with Horengren et al. (2003), the quality cost reports include analyzing the opportunity cost of the contribution margin and the lost income from lost sales and lost production and the reduction of prices resulting from poor quality. The market research department estimates the opportunity cost because it is not included in the financial accounting systems. Based on the annual financial reports of the selected companies for the four years 2016, 2017, 2018 2019 and the financial analysis of these reports, the quality cost items were identified and used in those reports, are: research and development expenses, laboratory expenses, damaged goods, returned goods, inventory of goods, and expenses for courses, employees training workshops, and cases against the company. These items were used to calculate the total cost of quality and find the ratio of quality cost of sales and the ratio of quality cost to sales cost. In addition, the percentage of research and development expenses, laboratory expenses, returns, goods inventory, employee’s courses and workshops, cases against the company for net profits, and profits for total sales were also calculated, as Appendix (E) explains this. Through the researchers'

review and analysis of the financial reports, she concluded that there is a difference in the inclusion and presentation of the report's items and lack of standardization. In addition, there are data for necessary costs that are not available in these reports, as shown in Appendix (E), which is challenging to identify and calculate accurate quality costs. Therefore, the financial reports of the selected companies were analyzed as in Appendix (E).

The researcher concluded that the ratio of quality cost of sales and the ratio of quality cost to the cost of sales was the highest for the Palestine Plastics Manufacturing Company, where it was 213.8 - 278.7. The increase in these costs is due to the high rate of lawsuits against the company, equivalent to 30.8, which indicates the company's loss. Therefore, the company exited from the Palestinian financial market. By briefing the researcher with the research and studies related to measuring the cost of quality, the researcher agreed with Hopmans (2017) that the cost of quality is 12-20% of the sales value of organizations and constitutes; it considered 10% of the gross national product. And this indicates the importance of quality costs and their role in the proper planning and management of the company to know its behavior, activity, and profits, to make decisions and actions. Therefore, this rate should be reduced to improve quality and productivity, as these percentages relied upon and compared with the results in Appendix (E). Therefore, the percentage should be reduced to improve quality and productivity. Followed by Jerusalem Pharmaceutical Company, where the ratio of quality cost of sales amounted to 1.4 and the ratio of quality cost to the cost of sales was 3.1. Because of the high percentage of goods inventory and the percentage of 8.3 and the increase in the returned goods percentage, which equals 0.67, the percentage of profits for sales is 0.15, which is less than the required percentage (more than 20%).

In general, there is a shortcoming on companies in terms of their lack of interest in research and development. Some of these companies spend a very small percentage on research and development or never spend. Knowing that investing in research and development efforts helps anticipate customer demands and direction and leads to improved productivity and increased profits, superiority over competitors, and allows the company to survive in the face of intense competition. The researcher also concluded that there is spending by companies on the inventory of goods, where the employees of the selected companies answered that inventory costs are calculated as in item No. (5) of the evaluation costs, and this means that there are large quantities of inventory. There is no estimate of the required production quantities and the import of raw materials. In addition, the increase in inventory increases costs in terms of taking up space in warehouses, increasing the amount of damaged and obsolete materials, and increasing costs when using correct ways to store them, as in the pharmaceutical and food companies. In addition, companies' failure to provide training courses and workshops for workers, where the degree of calculating the cost of training workers, as in Clause No. (3), was the lowest in the prevention cost items. That increases the number of damaged materials and returns, as in NAPCO, where the percentage of returns reached 0.73 and workers' injury when they do not use the machines correctly. Based on the analysis of financial reports as in Appendix (E), there is a failure in laboratory tests and conducting tests during the manufacturing process Item No. (3), where it was among the lowest averages in the items of evaluation cost. Thus, this increases product failures and the arrival of damaged products to the customer, which harms the company's reputation and the customer's loss, as shown in the financial reports. The researcher added that some companies spend heavily on damaged goods,

such as Aziza Company, National Carton Company, NAPCO Company, and Jerusalem Pharmaceutical Company, and companies paying for returns, as these costs are considered among the costs of external failure. The researcher confirmed this through the employees' responses to the selected companies that these companies spend heavily on internal failure costs. The researcher also concluded that the expenditure of Palestine Plastics Manufacturing Company on the cases brought against it was considerable, followed by Golden Mills Company. However, some companies did not include data about the company's costs towards the cases brought against it; the researcher concluded through the questionnaire that there is a large amount of the costs of complaints and cases filed against the company as in items No. (2) and No. (3) of external failure cost items. In addition, to calculating the costs of compensating workers, as in item No. (6) for the items of internal failure cost.

Q4: Will it be worth taking to recommend and advise the implementation of Prevention, Appraisal, Failure (PAF) model in the selected companies?

The researcher concluded that the answer to this question is yes. Hence, it is worth recommending the implementation of the Prevention, Appraisal, and Failure (PAF) model in the companies selected to implement and use activity-based costing (ABC) models. Furthermore, she found a great interest of the employees of the selected companies in measuring the cost of prevention, evaluation, and failure and the importance of measuring those costs for continuous improvement, as they are the main components of the PAF model, and this supports applying the PAF model in the selected companies. Furthermore, all quality cost models are based on (P-A-F) quality cost analysis.

In addition to the researcher's agreement with Schiffauerova (2006: p.4) that most of the quality cost models are based on the PAF classification, as this model includes (prevention and evaluation costs, internal failure, and external failure), and these classifications are universally accepted. Furthermore, in agreement with Ryan (2014: p.128), the most preferred model in practice over time is the Prevention-Assess-Fail (PAF) model. Finally, the researcher added that the (PAF) model contains a preventive approach to errors, including various aspects of other models, and considered the basis when implementing any quality cost models; in other words, it constitutes the basic basis for implementing the quality cost.

Hilton et al. (2003: p.268) state that the organizations that measure quality costs using the techniques of activity-based cost accounting (ABC) and activity-based cost management (ABM) have the necessary information to classify quality cost information based on activity. They classify activities based on paragraphs of quality costs (PAF) requires cost management arbitrators and analysts to work continuously and permanently with production personnel to develop these classifications. The second goal was achieved; the cost of quality components can be measured within the activity-based cost perspective. Also, the third objective, which is to employ PAF in the selected companies, can improve quality and increase awareness and competitiveness. In addition, the fourth objective was achieved, which is to verify that the development of the PAF model can measure the cost of quality with continuous improvements.

4.3.Testing of Research Hypotheses

Hypotheses have been developed to study the relationship between the variables, quality costs in its dimensions (preventive costs, appraisal costs, internal failure costs, external failure costs), and continuous improvements in the selected companies in the Palestine

Financial Market, to support the implementation of the quality cost as a starting point to support applying of the (PAF)model for continuous improvements in the manufacturing sector in Palestine. To verify the validity of these hypotheses, the researcher used Spearman's correlation coefficient to measure the strength and direction of the relationship (linear correlation/correlation) between two quantitative variables, where the value (r = 1) means a perfect positive correlation and the value (r = -1) indicates a negative relationship. Also, the closer the value of (r) to +1, the stronger the positive correlation. Whereas the closer the correlation (r) to -1, the stronger the negative correlation.

The first hypothesis: There is no statistically significant relationship at the level ($\alpha \leq 0.05$) between the quality cost items as analyzed in the annual reports of the selected companies and their impact on continuous improvements according to the companies' file. According to the result of Table (4.8), the researcher concluded that Spearman's relationship between the interest of the employees of the selected companies in the Palestinian financial market to implement the prevention cost and the continuous improvements that the test has significant significance, and the correlation value r = 0.617 and a significant value of p = 0.000. That means there is a positive significant correlation relationship. Thus, the first hypothesis was rejected, as there is no statistically significant relationship between quality cost items as analyzed in the annual reports of the selected companies and their impact on continuous improvements according to the companies' profile.

Table (4.8): Relationship between the Cost of Quality towards Continuous Improvements.

Variables	

Cost of Quality	**r = .617****
Continuous Improvements	**p = .000**

Objective 1: To verify the extent to which the employees of the selected companies are interested in implementing quality costing so those manufacturing companies can adopt the quality cost model for continuous improvements in manufacturing companies.

From the above, the researcher concluded that the relationship between "quality cost" and "continuous improvements" is positive (strong and high) because (r = 0.617). This result means that when one variable increases in value, the second variable also increases in value. That means that the greater the application of the cost of quality in manufacturing companies, the greater the continuous improvements and their positive impact and benefits on manufacturing companies.

To find out the relationship between each of the independent factors, which are the costs of quality in its dimensions (preventive costs, appraisal costs, internal failure costs, external failure costs) and the dependent factor, which is continuous improvement; the researcher divided the previous hypothesis into four sub-hypotheses and examined them using the Spearman correlation coefficient:

Ha1.1: There is no statistically significant relationship at the level ($a \leq 0.05$) between the items of the prevention cost as analyzed in the annual reports of the selected companies and their impact on continuous improvements according to the companies' file. According to the result of Table (4.9), the researcher concluded that Spearman's relationship between the employees' interest in the selected companies in the Palestinian financial market to implement the prevention cost and the continuous improvements

that the test has significant significance, and the correlation value r = 0.538 and a significant value of p = 0.000. That means there is a positive significant correlation relationship. Thus, the hypothesis (Ha1.1) was rejected that there is no statistically significant relationship between the cost items of prevention as analyzed in the annual reports of the selected companies and their impact on continuous improvements according to the companies' profile.

Table (4.9): Relationship between the Prvention Cost towards Continuous Improvements.

Variables	
Prevention cost	**r = .538**** **p = .000**
Continuous Improvements	

Objective 1.1: Verify which employees of the selected companies are interested in implementing quality cost using prevention cost items so that manufacturing companies can apply quality costing as a first step to applying the quality cost model for continuous improvements in manufacturing companies.

From the above, the researcher concluded that the relationship between "prevention cost" and "continuous improvement" is positive (medium) because (r = 0.538). This result means when one variable increases in value, the second variable also increases in value. That means the greater the application of the prevention cost in manufacturing companies, the greater the continuous improvements and their positive impact and benefits on manufacturing companies.

Ha1.2: There is no statistically significant relationship at the level ($a \leq 0.05$) between the appraisal cost items as analyzed in the annual reports of the selected companies and

their impact on continuous improvements according to the companies' files. According to the result of Table (4.10), the researcher concluded that the Spearman relationship between the employees of selected companies in the Palestinian financial market's interest in implementing the appraisal cost and the continuous improvements, and the test is significant, the correlation value r = 0.527 and the significant value p = 0.000. That means there is a positive significant correlation relationship. Accordingly, the hypothesis (Ha1.2) was rejected, assuming that there is no statistically significant relationship between the items of appraisal cost and their impact on continuous improvements according to the company's file.

Table (4.10): Relationship between the Appraisal Cost towards Continuous Improvements.

Variables	
Appraisal cost	**r = .527**** **p = .000**
Continuous Improvements	

Objective 1.2: To verify the employees of the selected companies' interests in implementing the quality cost using the appraisal cost items. As a result, the manufacturing companies can adopt quality costing as the first step for continuous improvements in the manufacturing companies.

Accordingly, the researcher concluded that the relationship between "appraisal cost" and "continuous improvements" is positive (medium) because (r = 0.527). That means when one variable increases in value, the second variable also increases in value. It also means applying the appraisal cost in manufacturing companies, the more significant the

continuous improvements and their positive impact and benefits on manufacturing companies.

Ha1.3: There is no statistically significant relationship at the level ($a \leq 0.05$) between the internal failure cost items and their impact on continuous improvements, according to the companies file as analyzed in the annual reports of the selected companies. The researcher concluded from Table (4.11) that the result of the Spearman relationship between the interest of the selected companies' employees in the Palestinian financial market to implement the cost of internal failure and the continuous improvements that the test has significant significance, and the correlation value r = 0.538 and a significant value of p = 0.000. That means there is a positive significant correlation relationship.

Table (4.11): Relationship between the Internal Failure Cost towards Continuous Improvements.

Variables	
Internal failure cost	**r = .538**** **p = .000**
Continuous Improvements	

Thus, the hypothesis (Ha1.3) was rejected, assuming that there is no statistically significant relationship between the internal failure cost items and their impact on continuous improvements as analyzed in the annual reports of the selected companies.

Objective 1.3: To verify the employees of the selected companies are interested in implementing quality costing using internal failure cost items, the manufacturing companies can adopt the application of quality costing as a first step to applying the quality cost model for continuous improvements.

The researcher concluded that the relationship between "the cost of internal failure" and "continuous improvements" is positive (medium) because (r = 0.538). That result means when one variable increases in value, the second variable also increases in value. And tells the implementation of internal failure cost in manufacturing companies, the more significant the continuous improvements and their positive impact and benefits.

Ha1.4: There is no statistically significant relationship at the level ($a \leq 0.05$) between the external failure cost items as analyzed in the annual reports of the selected companies and their impact on continuous improvements according to the companies' profile.

The researcher concluded from Table (4.12), the result of the Spearman that the relationship between the employees' interest of the selected companies in the Palestinian financial market to implement the cost of external failure and the continuous improvements that the test is significant, and the correlation value r = 0.510 and a significant value of p = 0.000. That means there is a positive significant correlation relationship.

Table (4.12): Relationship between the External Failure Cost towards Continuous Improvements.

Variables	
External failure cost	**r = .510**** **p = .000**
Continuous Improvements	

Thus, the hypothesis (Ha1.4) was rejected, assuming that there is no statistically significant relationship between the external failure cost items analyzed in the annual

reports of the selected companies and their impact on continuous improvements according to the companies' profile.

Objective 1.4: To verify that the employees of the selected companies are interested in implementing the quality cost using the internal failure cost items. So, the manufacturing companies can adopt quality costing as a first step to applying the quality cost model for continuous improvements in the manufacturing companies. Accordingly, the researcher concluded that the relationship between the "external failure cost" and "continuous improvements" is a positive (medium) relationship because (r = 0.510). The result means when one variable increases in value, the second variable also increases in value. That means that the greater the application of external failure cost in manufacturing companies, the greater the continuous improvements and their positive impact and benefits. Table (4.13) summarizes the previously-mentioned results of hypotheses.

Table (4.13): Summary of Hypotheses Testing.

Research Hypothesis	Measures	Significance
Ha1: There is no statistically significant relationship at the level (A ≤ 0.05) between cost of quality items as analyzed in the annual reports of the selected companies and their impact on continuous improvements according to the companies' files.	Spearman Correlation (r=0.617)	(Rejected, where p = 0.000) p≤0.05
Ha1.1: There is no statistically significant relationship at the level (A ≤ 0.05) between the prevention cost items as analyzed in the annual reports of the selected companies and their impact on continuous improvements according to the companies' files.	Spearman Correlation (r=0.538)	(Rejected, where p = 0.000) p≤0.05

Ha1.2: There is no statistically significant relationship at the level (A ≤ 0.05) between the appraisal cost items as analyzed in the annual reports of the selected companies and their impact on continuous improvements according to the companies' files.	Spearman Correlation (r=0.527)	(Rejected, where p = 0.000) p≤0.05
Ha1.3: There is no statistically significant relationship at the level (A ≤ 0.05) between the internal failure cost items and their impact on continuous improvements, according to the companies file as analyzed in the annual reports of the selected companies.	Spearman Correlation (r=0.538)	(Rejected, where p = 0.000) p≤0.05
Ha1.4: There is no statistically significant relationship at the level (A ≤ 0.05) between the external failure cost items as analyzed in the annual reports of the selected companies and their impact on continuous improvements according to the companies' profile.	Spearman Correlation (r=0.510)	(Rejected, where p = 0.000) p≤0.05

The researcher has verified the first goal based on the results of the main hypothesis and its sub-hypotheses.

To explain the dependent variable with more than one independent variable, hypotheses have been developed that test the positive impact and variance of quality costs in their dimensions (preventive costs, appraisal costs, internal failure costs, external failure costs) for continuous improvements in the selected companies in the Palestine Financial Market. That is to support implementing the quality cost as a starting point to promote

applying the (PAF) model. To verify the validity of these hypotheses, the researcher used the Multiple Linear Regression test, as shown in Table (4.14).

Objective 2: To verify that the employment of PAF in the selected companies can improve quality, increase awareness and competitiveness to promote continuous improvements.

Second Hypothesis: The items of quality costs that have been analyzed in the annual reports of selected companies will explain their impact and the variance positively in continuous improvements at a significant level ($a \leq 0.05$).

To accept or reject the hypothesis, to determine the effect relationship between the dimensions of quality costs and continuous improvements, and to explain the discrepancies and differences in continuous improvements explained by the four dimensions of quality costs, a multiple regression model was conducted. The results of Table (4.14) showed that the percentage of variance and differences (R-Square) in the continuous improvements was 52.3%. The highest beta value (0.393) for the prevention cost reached Sig = 0.00, which is positive and statistically significant at the level (0.05).

Table (4.14): Multiple Regressions Analysis.

Constructs	Beta	T	Sig	R^2
Employee interest in implementing the cost of prevention.	.393	6.874	.000	.523
Employee interest in implementing the cost of appraisal.	.108	1.714	.088	
Employee interest in implementing the cost of internal failure.	.135	2.048	.041	
Employee interest in implementing the cost of external failure.	.227	3.615	.000	

a. Dependent Variable: Continuous improvement

b. Predictors: (Constant) prevention, appraisal, internal, external.

That means most of the effect on the variance in continuous improvements and its positive interpretation will be through the cost of prevention, followed by the cost of external failure and then internal failure because they have a positive effect on continuous improvements and explain the variance positively. Accordingly, the researcher concluded that three independent variables (the cost of prevention, internal failure, and external failure) would explain the variance positively in the dependent variable, which is continuous improvement, supporting the second hypothesis (2).

As for the appraisal cost, its beta value was (0.108) at Sig = 0.088, greater than the (0.05) level. That means the evaluation cost does not affect the variance in continuous improvements and therefore does not support the second hypothesis. Thus, the researcher agreed with Hilton et al. (2003) since the customer does not pay money for the examination or those activities, but instead pays for the high-quality product, so the appraisal cost activities can be classified as activities that do not add value. Appraisal activities can also be avoided by increasing the reinforcements in defect prevention to provide a flawless and failure-free design. The researcher added that the manufacturing companies should pay attention to the appraisal cost, which helps discover errors before they occur and avoid reaching the internal or external failure stage.

Objective 2: To verify that the employment of PAF in the selected companies can improve quality and increase awareness and competitiveness.

Objective 4: To verify that the development of the PAF model can measure the cost of quality with continuous improvement.

To know the positive impact and variance of independent factors, namely, quality costs in all its dimensions (preventive costs, appraisal costs, internal failure costs, external failure costs) on the dependent factor, which is the continuous improvements in the selected companies in the Palestine Financial Market, to support the implementation of the cost of quality and support applying of the (PAF) model for continuous improvements in the manufacturing sector in Palestine. In order to explain using one independent variable, therefore, the researcher divided the previous hypotheses into four sub-hypotheses and tested them using the Simple Linear Regression model as in Table (4.15).

The first hypothesis: the items of prevention costs analyzed in the annual reports of selected companies will explain their impact and the variance positively in the continuous improvements, at a significant level ($a \leq 0.05$).

The second hypothesis: the items of appraisal costs analyzed in the annual reports of selected companies will explain their impact and the variance positively in the continuous improvements, at a significant level ($a \leq 0.05$).

The third hypothesis: The items of internal failure costs analyzed in the annual reports of selected companies will explain their impact and the variance positively in continuous improvements, at a significant level ($a \leq 0.05$).

The fourth hypothesis: the items of external failure costs analyzed in the annual reports of selected companies will explain their impact and the variance positively in continuous improvements, at a significant level ($a \leq 0.05$).

Table (4.15): Simple Regressions Analysis.

Constructs	Beta	T	Sig	R^2

Employee interest in implementing the cost of prevention.	0.642	13.82	0.00	0.412
Employee interest in implementing the cost of appraisal.	0.583	11.87	0.00	0.340
Employee interest in implementing the cost of internal failure.	0.588	11.99	0.00	0.345
Employee interest in implementing the cost of external failure.	0.567	11.36	0.00	0.321

a. Dependent Variable: improvement

b. Predictors: (Constant) prevention, appraisal, internal, external.

As shown in Table (4.15), for each independent variable, the value of the significance level is 0.00, which is statistically significant. The researcher also noted that all the independent variables have a positive and strong relationship with continuous improvements, according to the value of beta. It also concluded that the highest R^2 value was for the cost of prevention, which means that 41.2% of the variance is explained by the cost of prevention, followed by the cost of internal failure, then appraisal cost, and the cost of external failure, and accordingly the four sub-hypotheses are accepted.

From the above, the researcher concluded that the third objective was achieved, which is to verify that the employment of PAF in the selected companies improves quality and increase awareness and competitiveness. In addition, she achieved the fourth objective, which is to verify that the development of the PAF model can measure the cost of quality with continuous improvement.

Accordingly, the researcher added that companies are seeking to face competition and stay in the market resort to reducing product or service costs and improving its quality

by increasing investment in prevention and appraisal costs, which improves product quality and reduces internal and external failure costs. That shows the relationship between quality costs as an inverse relationship, as the higher the investment in prevention and appraisal costs, the lower internal and external failure costs. The researcher agreed with Hilton et al. (2003: p.268) that there is a high agreement between the dimensions of the cost of quality. Promoting prevention activities increases the value and reduces the need for inspection activities, internal failure, and external failure. Thus, the wasted resources used in activities that do not add value are reduced. It also agreed with Murumkar, Bhushi, and Deshpande (2017) that the cost of quality directly impacts the company's overall financial goal. The benefits of studying quality costs are multiple: its use as a management tool and as an indicator of the economic health of the organization, focus on areas of weak performance to improve and helps on total quality control, achieving higher quality, lower cost, and increasing competitive advantage. (Khozein et al., 2013). The concern for quality costs reduces manufacturing costs and increases productivity.

Through interviews, the researcher agreed with Glogovac & Filipovic (2017) about the knowledge and level of awareness of estimating the use of quality cost in current practical practices. Through monitoring and analyzing the factors that affect the measuring quality cost methods, it was found that there are some selected companies from the Palestinian financial market whinchat are aware of quality costs. Moreover, the implementation level of quality costs in these companies is not fully recognized, some of them do not specify or use quality costs, and some have a cost of quality knowledge but do not use it in the right way. The researcher also agreed with Kazaz, Birgonul, & Uiuberyli (2005: p.59) that the selected companies focused heavily on the costs of

failure, indicating that these companies are still in the early stages of improvement. As well as, the future of these companies will decline significantly and exit the market, as happened with the Palestine Company for the manufacture of the plastics.

4.4.Hypothesis Related to Respondents' Profiles (Respondent's Analysis)

Third Hypothesis: There are no statistically significant differences at $\alpha \leq 0.05$ in the responses of the research sample according to the demographic profile.

According to the demographic profile, the hypothesis was developed to analyze the differences in respondents' opinions towards the application of quality costing in the selected companies in the Palestinian financial market. To validate this hypothesis, the Mann-Whitney and Kruskal-Wallis test was used, a non-parametric method used to discover whether two or more samples come from the same distribution or test whether the medians between comparison groups are different.

Ha3.1: There are no statistically significant differences at $\alpha \leq 0.05$ in the responses of the research sample due to qualification.

Table (4.16) shows that the Sig value is higher than the significance level $\alpha \leq 0.05$ for the field "Employees' interest in implementing the cost of prevention, appraisal, and internal failure, "continuous improvements."

Table(4.16): Kruskal-Wallis Test Grouping by Qualification.

Constructs	Sig
Employee interest in implementing the cost of prevention.	0.384
Employee interest in implementing the cost of appraisal.	0.192
Employee interest in implementing the cost of internal failure.	0.963
Employee interest in implementing the cost of external failure.	0.008

That means that there are no differences between respondents towards implementing the cost of prevention, evaluation, and internal failure. The researcher said that the reason for the absence of differences between the responses of the respondents due to the scientific qualification is that the majority of the respondents are equal to 92.8%, which is a total of 72.4% of the bachelor's holders and 20.4% of the master's holders. That indicates the convergence of their experience, awareness, and thinking that work must be done. Therefore, to invest in prevention and evaluation costs so that the company does not reach the stage of the external failure cost. The researcher also concluded that the value Sig is less than the significance level $\alpha \leq 0.05$ for the field "Employees' interest in implementing the cost of external failure," "continuous improvements." That means that there is a significant difference among respondents towards implementing the cost of external failure attributed to the educational qualification. The researcher concluded that this difference is because employees with educational qualifications have a diploma or less. Perhaps this is the lack of experience, awareness, and knowledge that it is necessary to invest in the prevention costs and appraisal. So, the company does not reach the cost of external failure; based on these results, the researcher concluded that practical experience does not replace scientific specialization in implementing the cost of quality in manufacturing companies.

Ha3.2: There are no statistically significant differences at $\alpha \leq 0.05$ in the responses of the research sample due to years of work experience.

Table (4.17) shows that the Sig value is higher than the significance level $\alpha \leq 0.05$ for all domains, and this means that there are no differences between the respondents

towards "implementation of prevention cost and appraisal, internal failure and external failure" "continuous improvements" due to years of work experience.

Table (4.17): Kruskal Wallis Test Grouping by Years of Work Experience.

Constructs	Sig
Employee interest in implementing the cost of prevention.	0.127
Employee interest in implementing the cost of the appraisal.	0.181
Employee interest in implementing the cost of internal failure.	0.774
Employee interest in implementing the cost of external failure.	0.752

The researcher concluded that this is because the characteristics of the sample have work experience (practical experience) at a rate of 80.3%, which is a total of 28.7% of the sample members have work experience from 5 to 10 years. Moreover, 51.6% of the sample members have work experience of more than ten years, and they have practical experience within the Palestinian industrial companies. That supports the hypothesis, so the null hypothesis (Ha3.2) was accepted.

Ha3.3: There are no statistically significant differences at $\alpha \leq 0.05$ in the responses of the research sample due to years of quality experience.

Table (4.18) shows that the Sig value is less than the significance level $\alpha \leq 0.05$ for the field "Staff's interest in implementing the prevention cost and appraisal, "continuous improvements."

Table (4.18): Kruskal Wallis Test Grouping by Years of Quality Experience.

Constructs	Sig
Employee interest in implementing the cost of prevention.	0.00

Employee interest in implementing the cost of the appraisal.	0.00
Employee interest in implementing the cost of internal failure.	0.213
Employee interest in implementing the cost of external failure.	0.283

That means a significant difference between the respondents towards implementing the prevention and appraisal cost due to years of experience in quality. The researcher said that this is because the characteristics of the sample have experience in quality at a rate of 68.4%, which is a total of 31.3% of the sample members. They have experience in quality from 5 to 10 years, and 37.1% of the sample members have experience in quality of more than ten years. By conducting interviews with the sample members, the researcher added that their quality experience was gained through the quality certificate approved by the company, as each quality certificate does not contain the same items. But they are not applied; others answered that some of the quality cost items are applied, but without their knowledge, they are related to the quality cost. This indicates that years of experience in quality do not replace the follow-up and continuation to take courses and training related to quality or pain academic qualification. The researcher added that it was concluded that there are no differences between the respondents towards implementing "the cost of internal failure and external failure" and "continuous improvements" due to years of experience in quality. That is because the sample characteristics have a quality experience at an average of 68.4%, which is 31.3% of the sample members, and they have a quality experience from 5 to 10 years. And 37.1% of the sample members have more than ten years of experience in quality, which means their experience is close to the cost of internal and external failure.

Ha3.4: There are no statistically significant differences at $\alpha \leq 0.05$ in the responses of the research sample according to the approved quality system.

Table (4.19) shows that the Sig value is less than the significance level $\alpha \leq 0.05$ for all areas: "Employees' interest in implementing prevention costs, appraisal, internal failures, external failures, and "continuous improvements."

Table (4.19): Kruskal Wallis Test Grouping by the Approved Quality System.

Constructs	Sig
Employee interest in implementing the cost of prevention.	0.00
Employee interest in implementing the cost of the appraisal.	0.00
Employee interest in implementing the cost of internal failure.	0.00
Employee interest in implementing the cost of external failure.	0.001

That means a significant difference between respondents towards implementing the cost of quality in its four dimensions. This is due to the quality system adopted in the selected companies. The researcher concluded that the reason for the differences is that most of the companies chosen have the ISO certificate for quality at a rate of 71.3%. That means the quality certificates do not replace continuing the activities of training and courses and participation in conferences related to the cost of quality. These activities include all company employees, which does not support the hypothesis, so the null hypothesis (Ha3.4) was rejected.

Ha3.5: There are no statistically significant differences at $\alpha \leq 0.05$ in the responses of the research sample according to the nature of work.

Table (4.20) shows that the value Sig is less than the significance level $\alpha \leq 0.05$ for the field: Employees' interest in implementing prevention costs" continuous improvements.

Table (4.20): Kruskal Wallis Test Grouping by the Nature of Work.

Constructs	Sig
Employee interest in implementing the cost of prevention.	**0.00**
Employee interest in implementing the cost of the appraisal.	**0.493**
Employee interest in implementing the cost of internal failure.	**0.697**
Employee interest in implementing the cost of external failure.	**0.291**

That means that there is a large difference between respondents towards implementing prevention costs due to the nature of the company's work. The researcher concluded that the reason is due to for pharmaceutical companies due to their high sensitivity. The researcher concluded the Sig value is higher than the significance level $\alpha \leq 0.05$ for the dimensions "employees' interest in implementing the appraisal cost, internal failure, external failure" continuous improvement. This indicates no differences between respondents towards implementing the appraisal cost, internal failure, and external failure due to the nature of the work. The absence of differences is due to the manufacturing sector (pharmaceuticals, food, and other industries), which is concerned with consumer and employee protection.

Ha3.6: There are no statistically significant differences at $\alpha \leq 0.05$ in the responses of the research sample according to the year founded.

Table (4.21) shows that the Sig value is less than the significance level $\alpha \leq 0.05$ for all areas: "Employees' interest in implementing prevention costs, appraisal, internal failure, external failure cost, and “continuous improvements”.

Table (4.21):Kruskal Wallis Test Grouping by Year since Founded.

Constructs	Sig
Employee interest in implementing the cost of prevention.	0.023
Employee interest in implementing the cost of the appraisal.	0.00
Employee interest in implementing the cost of internal failure.	0.00
Employee interest in implementing the cost of external failure.	0.00

That implies a significant difference between respondents towards implementing the cost of quality in its four dimensions. It is attributed to the founding year of the selected companies; the reason is that most of the companies selected in the year of their founding were less than 1990 when it was at a rate of 73.1%. That signifies a difference in the experiences gained through the years of work for the companies. This indicates that the period in which the companies operate does not dispense with research and development, training and courses related to the cost of quality. This does not support the hypothesis, so the null hypothesis (Ha3.6) was rejected.

4.5.Answers to the Open-Ended Question

To find the obstacles limiting the costs of quality determination, the researcher asked a question whose answers are open to know comprehensive answers. The question was as follows: *From your point of view, what are the most important obstacles that may prevent identifying quality costs, such as the lack of training and the ability to measure these costs, for example?*

Therefore, I ask you to identify these obstacles and arrange them according to their importance:

The question answers were numerous and repeated. Hence, the researcher arranged the most frequent obstacles, according to their importance and viewpoint of the selected companies' employees:

1- Lack of training in calculating and determining the cost of quality, education, and less use of materials and reduce operational cost. This means the absence or shortage of trained human cadres or the absence of a team to calculate these costs.
2- The difficulty of measuring the cost of quality, due to the lack of experience, scientific and practical knowledge of the cost of quality, familiarity with the necessary criteria for its calculation, the written procedures explaining how to calculate the cost of quality, data about costs, and thus some costs are measured in an odd way clear.
3- Senior management failure to conduct studies and research to develop the quality system, which supports the cost of quality use.
4- Measuring the cost of quality requires knowledge, experience, time, and effort.
5- The small number of cadres interested in quality follow-up, neglect of the quality system, and the lack of incentives to calculate the cost of quality.
6- A lack of academic qualifications related to the cost of quality.
7- The lack of a good accounting information system, as the accounting systems of companies, lack knowledge of all quality costs, but rather depend only on financial accounts far from aspects that have benefits for the company in the long run, such as customer satisfaction or the company's reputation.
8- Weak communication between the quality management team and the administration's failure to calculate the cost of quality.

Chapter 5: Conclusions and Recommendations

5.1.Overview

This chapter is the result of the efforts made to prepare this research. It includes a summary of the research, conclusions, and recommendations based on the results of data analysis to adopt, develop and support the proposed PAF model, which can measure the cost of quality to promote continuous improvements in the manufacturing companies in Palestine. In addition, it contains suggestions for future studies related to the topic of the research.

5.2.Conclusions

Through the results of questionnaire analysis and literature review, the purpose of the study was achieved, and four main objectives were identified.

The results include:

5.2.1. Outcomes related to objective one

Based on the results achieved from the analysis of the questionnaires, quality cost components were identified in the selected manufacturing companies for continuous improvement. These elements included prevention, appraisal, internal failure, and external failure costs. The researcher concluded that the employees' interest in measuring the cost of quality with its four elements (prevention cost, appraisal cost, internal failure cost, external failure cost) was high to promote continuous improvements. In addition, they had an increased interest in:

- Measuring supplier reliability costs to avoid sudden supply disruptions.

- Measuring the cost of testing supplies of raw and semi-finished materials indicates their keenness to ensure that the materials conform to the specifications.

- Calculating the cost of calibrating testing and inspection equipment and tools to ensure the safety of the equipment and testing tools used for the tests to give the correct result.

- Measuring the costs related to the inventory values (raw materials and finished goods) and checking them before using.

- Measuring the cost of treating workers due to work injuries.

- Calculating the cost of disposal of defective goods that cannot be reused.

- Measuring the cost of analyzing the defects and deviations caused in production.

- Calculating the difference between the sales volume decreases in the previous years.

- Measuring the cost of discount losses and replacement of defective or damaged goods indicates that the company is interested in compensating the damaged and the returned units.

During the researcher's analysis of the annual financial reports of the companies, the quality cost items were identified and used in those reports, which are: research and development expenses, laboratory expenses, damaged goods, returned goods, inventory, training course expenses, workshops, and amounts of cases against the company. The researcher concluded that companies have a significant shortcoming in measuring the cost of quality. In addition, there was a lack of interest in research and development regarding the prevention cost and failure to provide training courses and workshops. As

for the appraisal costs, there are huge expenses on the stock due to the large quantities of stock, the lack of the required production quantities estimated, raw materials, and the laboratory tests failure and examinations during the manufacturing process. As for the internal failure cost, some companies spent heavily on the damaged goods, such as Aziza Company, National Carton Company, NAPCO Company, Jerusalem Pharmaceutical Company. Finally, the external failure cost was spent on returns and lawsuits against the company.

Through the researcher conducting interviews with some employees of the companies' accounting, production, and quality departments, the answers were, these costs were not included in the annual financial reports due to the lack of administrative support, the lack of information and data on quality costs, and the difficulty of obtaining these costs as they need training, time, and effort.

When the researcher verified the relationship between measuring the cost of quality in general and continuous improvements, she concluded that there is a positive (strong) relationship ($r = 0.617$). There was also a positive (medium) relationship between the measurement of prevention cost, evaluation cost, internal failure cost, and external failure with continuous improvements.

Regarding the cost of prevention, there was a discrepancy among the respondents' interest value in measuring prevention cost according to the variable (years of experience in quality, a quality system approved by the company, the nature of the company's work, the company's founding year). As for the appraisal cost, there was a discrepancy among the respondents' interest value to measure appraisal costs according to the variables (years of quality experience, quality system approved in the company,

the company's founding year). According to the variables (educational qualification, years of work experience, the nature of the company's work), there was no interest in measuring appraisal costs. Moreover, there was a discrepancy among respondents in the interest value in measuring the internal failure cost according to the variable (the approved quality system in the company, the company's founding year). In terms of the variable (educational qualification, years of work experience, years in quality experience, the nature of the company's work) there was no interest in measuring the internal failure cost. Finally, about the external failure cost, there was a discrepancy among respondents in the interest value to measure the external failure costs according to the variable (educational qualification, quality system approved in the company, the company's founding year). Also, there was no interest in measuring the external failure cost to the variable (years of work experience, years of quality experience, the nature of the company's work).

5.2.2. Outcomes related to objective no. two

Through the results of the questionnaire analysis, the researcher concluded that there is a great interest to measure the prevention, appraisal, and failure costs to promote continuous improvement. Considering the prevention, appraisal, and failure costs they are the main components of the PAF model, all quality cost models are established to analyze the cost of quality based on (PAF). The previous studies (Jourabchi, Leman, & Ismail, 2013), and the researcher reported and agreed that the PAF model is the most used and preferred by companies. Most of the quality cost models are based on the PAF classification, these classifications have become universally accepted (Schiffauerova, 2006). The researcher added that the (PAF) model contains a preventive approach to avoid errors and includes various aspects of other models, and is considered the basis

when implementing any quality cost model. The researcher concluded that the cost of quality can be measured from the perspective of cost components based on activity.

5.2.3. Outcomes related to objective no. three and objective no. four

The researcher concluded that the elements of quality cost (prevention, appraisal, internal failure, external) on the improvements and the importance of these improvements, at a high level 84.4%. The researcher added that implementing quality cost (PAF) brings positive benefits to the company for continuous improvements in selected companies. Its importance lies in increasing output, improving product specifications, exceeding consumer expectations, and warehousing promptly to reduce stock damage, make operations more effective and efficient, improve productivity, increase profitability, and effectively use available machines and materials. Accordingly, the researcher stated that focus should be placed on using and developing the (PAF) model to measure the cost of quality in manufacturing companies for continuous improvement. Where the researcher agreed with (Jouda, 2004) that continuous improvement is a comprehensive process that includes all activities of the organization for inputs, transformation processes or outputs, and even the transfer of outputs and products to the customer, which aims to develop and improve processes and activities continuously related to machines, materials, personnel, and production methods, that will lead to a reduction in inputs, an increase in outputs, an improvement in their quality, and the achievement of customer satisfaction.

When the researcher looked at the relationship between measuring the cost of quality in general and continuous improvement, she discovered that it was ($r = 0.617$) positive (strong). Furthermore, there was also a positive (medium) relationship between the

measurement of prevention cost, appraisal cost, internal failure cost, and external failure with continuous improvements.

5.2.4. Outcomes related to dependent variable (Continuous Improvement)

The study came to the conclusion that measuring the cost of quality had a big impact on continuous improvement.

According to the results of multiple regression analysis, the dimensions of quality costs explained 52.3 % and differences (R-Square) in continuous improvement. The researcher concluded that the independent variables of quality cost (prevention cost, internal failure cost, external failure cost) were interpreted positively the variance in the dependent variable (continuous improvements). Thus, while the appraisal cost does not affect the variance in the continuous improvements, it did not positively explain the variance in the continuous improvements.

According to the results of simple regression analysis, the researcher also added that all independent variables (prevention cost, appraisal cost, internal failure cost, external failure cost) had a positive and strong relationship with continuous improvements. This result means that the more quality cost implementation in manufacturing companies increases the improvements and its positive impact and benefits on the manufacturing companies. In addition to that, all independent variables positively explained the variance in the variable. The dependent (continuous improvements), where the largest effect was the prevention cost, which constituted 41.2% of the variance, explained by the prevention cost in continuous improvements, followed by the cost of internal failure, then the cost of the appraisal, then the cost of external failure.

5.2.5. Results related to the open-ended question of the challenges that limit the application of the cost of quality:

In this research, the researcher identified the most critical challenges that employees of the selected manufacturing companies may face when measuring the cost of quality.

The researcher found that employees in manufacturing companies encounter issues relating to top management:

• High Management not conducting studies and research to develop the quality system that supports the cost of quality.

• The small number of cadres interested in quality follow-up, neglecting of the quality system, and the lack of incentives to calculate the cost of quality.

• Weak communication between the total quality management team.

• Management not adopting the calculation of the cost of quality

• Collaboration between departments is lacking.

• The lack of interest of senior management in training on calculating and determining the cost of quality, education, and optimal use of materials and reducing operational cost, which means the absence or shortage of trained human cadres or the absence of a team to calculate these costs.

The researcher also found that the employees of manufacturing companies face challenges related to capabilities:

• The accounting system adopted by the selected manufacturing companies is the traditional accounting system, where the researcher agreed with Sailaja, Basak, & Viswanadhan, (2015).

• Evaluating the cost of quality is challenging, due to the lack of experience, scientific, practical knowledge of the cost of quality, the lack of familiarity with the necessary criteria for its calculation, written procedures that explain how to calculate the cost of quality, and lack of data about costs. Thus, some costs are measured in an unclear manner.

• Quality cost measurement necessitates knowledge, experience, time, and effort.

• There is a shortage of scientific qualifications concerned with the cost of quality.

• The lack of a good accounting information system, as the accounting systems of companies lack knowledge of all quality costs, but rather rely only on financial accounts far from aspects that have benefits for the company in the long run, such as customer satisfaction or the company's reputation.

• Lack of training on measuring the cost of quality.

5.3.Recommendations

The application of the PAF model to measure the cost of quality has a great role in industrial companies, as it works to determine costs more accurately to reduce them, increase profits and achieve compliance with customer requirements and expectations. In addition, it helps achieving long-term benefits such as gaining customer satisfaction and staying in the face of intense competition. Therefore, the top management must realize this to promote continuous improvement. Also, attention should be paid to workers and the work environment, not only to operations, production and costs.

The researcher came up with the following recommendations based on the findings of this study:

5.3.1. Design a system for reporting quality costs

The quality costs report has an essential role in detecting other indirect costs, so a system must be designed to report on quality costs and include them within the financial reports. These reports include sufficient data for cost accounting in the company.

5.3.2. Increase the level of knowledge of the cost of quality measuring importance

The researcher concluded from the findings of this study that measuring the cost of quality has a major impact on continuous improvement. Furthermore, the advantages of calculating the cost of quality are not restricted to the short term, but also extend to the long term. Therefore, companies must strive to increase the level of knowledge of their employees about the importance of measuring cost. In addition to participating in conferences, workshops, and introductory seminars on quality costs and their importance, manufacturing companies must collaborate with quality cost researchers and benefit from the results of their research to motivate employees and persuade them of the importance of measuring quality costs. As well as using a case study and documenting the company's findings and position before measuring the cost of quality and comparing it to the company's results and position after adopting the cost of quality measurement to ensure the validity of the results convince them.

5.3.3. Increase the level of implementation of quality cost measurement

The senior management must apply the cost of quality measurement and support it through cooperation between departments and communication with employees to facilitate obtaining sufficient and comprehensive data and information. In addition, it must provide training courses for employees, establish qualified human cadres, and train a team of accountants to deal with how to measure, implement and classify quality

costs. To promote continuous improvements, quality costing must be implemented, and to increase the level of quality costing implementation. Companies must be concerned with how to reduce costs by increasing their focus on prevention and appraisal costs. Therefore, the researcher developed a PAF model to measure the cost of quality, in agreement with the researcher Al-Massoudi (2010), as shown below. The researcher advised that the manufacturing companies should calculate the cost of quality and considering all the elements of the quality cost PAF as shown in the model below as the model PAF and include the costs of these elements in the financial reports:

PAF MODEL

PAF Model			
Prevention cost	**Appraisal cost**	**Internal failure cost**	**External failure cost**
Quality planning and improvement	Examination and testing of the raw materials received	Scrap, damaged and lost	Process and manufacturing engineering related to external failure
Process planning and tuning	Preview (check) the process	Disposal of defective products	Field services and the delivery of alternatives to the consumer
Designs revisited	Checking and testing of in-progress output	Process and manufacturing	Warranty

		engineering related to internal failure (failure analysis)	
Supplier appraisal	Inspection of finished goods and products	Coordination	Sales revenue
Education and training	Quality laboratory and supplies	Rework	Complaints and claims
Inspection equipment and its maintenance	Consumption of test equipment	Downgrading of the good	Discounts
Quality data and its analysis	Maintaining the accuracy of measuring instruments (calibration)	Repeat the test and check	Product repair
Quality reports	Stock assessment	Down time	Re-withdraw products from the market
New raw materials used in the manufacture of the product		Faults maintenance	

5.4.Future Researches

The researcher added to the recommendations that future studies and research should be conducted, and these future studies include:

5.4.1. Developing a model for calculating the cost of quality in service companies in the Palestinian market

This is necessary to ensure that data on the cost of quality can be collected more broadly and adequately. In addition, it will enable researchers in the future to make a comparison between the importance of applying the quality cost model for each of the manufacturing and service sectors in the West Bank.

5.4.2. The effect of applying costs of quality on the financial performance of manufacturing companies in Palestine.

This is effective to know the importance of applying the cost of quality to increase profits and market share and reduce product costs.

5.4.3. Develop an activity-based quality costing model to measure quality costing in manufacturing companies in the Palestinian market in order to promote continuous improvements.

This is vital for comparing the quality costing models, as it makes it easier for researchers and managers to adopt the best quality costing model.

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Appendixes (A)

Judges of Research Instrument

Name	Position
Dr. Naser Abdelkarim Mufrej	Assistant Professor, Arab American University
Dr. Mohammad Abusharbeh	Assistant Professor, Arab American University
Dr. Raed Iriqat	Assistant Professor, Arab American University
Dr. Yahya Salahat	Associate Professor, An-Najah National University
Dr. Waseem Sultan	Associate Professor, Arab American University – Ramallah

Appendix (B): Questionnaire-Arabic

الجامعة العربية الأمريكية

كلية الدراسات العليا

تخصص إدارة الجودة

الأخت العزيزة / الأخ العزيز

تحية طيبة

تقوم الباحثة بدراسة ميدانية بعنوان " نموذج مقترح لقياس تكلفة الجودة لتعزيز التحسينات المستمرة في قطاع التصنيع في فلسطين"، ولتحقيق هدف الدراسة تعرض الباحثة إليكم أداة الدراسة المتمثلة في الاستبانة المرفقة والتي تهدف إلى تشخيص واقع قياس تكاليف الجودة في شركتكم بهدف تحديد نقاط الضعف وأوجه القصور في قياس تكاليف الجودة المتمثلة بالأبعاد الأربعة: التكاليف الوقائية، وتكاليف التقييم، وتكاليف الإخفاق الداخلي، وتكاليف الإخفاق الخارجي، وبحكم خبرتكم التي سوف تكون مفيدة في انجاز هذه الدراسة، ارجوا التكرم بالإجابة على فقراتها، بهدف تشخيص واقع قياس تكاليف الجودة في شركتكم. للخروج بنموذج مقترح لقياس تكاليف الجودة بأبعاده الأربعة. مؤكدة لكم أن الهدف من هذه البيانات أكاديمي، وسوف تعامل بسرية كاملة، ولن تستخدم الا لأغراض البحث العلمي فقط.

شاكرة حسن تعاونكم معنا.

الباحثة

إيناس أبو مويس

الأخت العزيزة / الأخ العزيز، تقسم هذه الاستبانة إلى ثلاث أقسام، يحوي القسم الأول المعلومات الشخصية الخاصة بك، والقسم الثاني يمثل المتغيرات الخاصة بأبعاد تكاليف الجودة، والقسم الثالث يمثل أهم المعيقات التي قد تحول دون قياس تكاليف الجودة في شركتكم. لذا أرجو منك وضع إشارة(X) في المكان المناسب لمعرفة إجابتك عن كل متغير من متغيرات البحث.

القسم الأول: المعلومات الشخصية:

1. المؤهل العلمي:	**[] دبلوم فما دون**	**[] بكالوريوس**	**[] غير ذلك، حدد....**
2. الجنس:	**[] ذكر**	**[] أنثى**	
3. سنوات الخبرة في العمل	**[] أقل من 5 سنوات**	**[] 5 – 10 سنوات**	**[] أكثر من 10 سنوات**
4. سنوات الخبرة في الجودة:	**[] أقل من 5 سنوات**	**[] 5 – 10 سنوات**	**[] أكثر من 10 سنة**
5. نظام الجودة المعتمد	**[] ISO**	**[] PSI**	**[] كلاهما**
6. ملكية الشركة	**[] عائلية**	**[] غير عائلية**	

7. اسم الشركة: .....

8. طبيعة عمل الشركة: .....

9. سنة التأسيس: .....

القسم الثاني:

الأخت العزيزة / الأخ العزيز، فيما يلي مجموعة من العناصر صممت وفقا لأبعاد تكاليف الجودة ممثلة بأبعادها الاربعة، لذا أرجو منك التفضل بوضع إشارة X في المكان المناسب لكل عبارة بهدف معرفة إلى أي درجة تتوافق عمليات الشركة مع بنود تكاليف الجودة، وذلك على كل عبارة من عبارات هذا القسم من وجهة نظرك، حيث درجة كبير جدا تأخذ قيمة الرقم العظمى 5، في حين درجة ضعيفة جدا على العبارة تأخذ قيمة الرقم الصغرى 1. علما بأن الاستجابة ستكون وفق تدرج خماسي هو (درجة كبيرة جدا (د.ك.ج)، درجة كبيرة (د.ك)، درجة متوسطة، درجة ضعيفة (د.ض)، درجة ضعيفة جدا (د.ض.ج)).

أبعاد تكاليف الجودة: (التكاليف الوقائية، تكاليف التقييم، تكاليف الإخفاق الداخلي، تكاليف الإخفاق الخارجي)

الرقم	**فقرات التكاليف الوقائية**	د.ك.ج	ك	متوسطة	د.ض	د.ض.ج
1	يتم حساب تكلفة تصميم المنتجات الجديدة التي تلبي احتياجات وتوقعات العملاء بدقة.					
2	يتم قياس تكاليف تقييم موثوقية الموردين باستمرار.					
3	يتم حساب تكاليف إجراء الدورات التدريبية والمشاركة في المؤتمرات ذات الصلة بالجودة.					
4	يتم حساب تكاليف ضمان سلامة المعدات والآلات قبل بدء عملية الإنتاج.					
5	يتم حساب تكاليف تخطيط نظام الجودة وتنفيذه.					
6	يتم حساب تكلفة مراجعة وفحص وتحليل بيانات الجودة في الشركة.					
7	يتم حساب تكاليف تتعلق بالنظافة ومكافحة الآفات والحشرات.					
8	يتم حساب تكلفة تطوير أنظمة الجودة.					
	فقرات تكاليف التقييم					
1	يتم قياس تكاليف اختبار التوريدات من المواد الخام ونصف المصنعة.					
2	يتم القياس بدقة لتكلفة التحليل والإبلاغ عن نتائج التفتيش.					
3	يتم قياس تكاليف الاختبار والفحص أثناء عمليات التصنيع					
4	يتم حساب تكلفة معايرة معدات وأدوات الاختبار والفحص					
5	يتم قياس التكاليف المتعلقة بقيمة المخزون (المواد الخام والسلع التامة الصنع) وفحصها قبل استخدامها.					
6	يتم قياس تكلفة فحص انخفاض قيمة المعدات.					
7	يتم قياس تكلفة تجريب المنتج الجديد قبل طرحه في السوق.					
8	يتم قياس تكلفة الفحص النهائي للمنتجات قبل شحنها.					
9	يتم قياس تكلفة اختبارات رقابة الجودة الميدانية.					
	فقرات تكاليف الفشل الداخلي					
1	يتم احتساب تكلفة الخسائر المتكبدة بسبب التوقف المفاجئ في العمليات.					
2	يتم احتساب تكلفة إعادة تصميم المنتجات التي لم تجتاز					

	الاختبارات الأولية كمنتج جديد.					
3	يتم احتساب تكاليف إعادة عمل المنتجات المعيبة.					
4	أيتم قياس التكاليف التي ينطوي عليها إيجاد الحلول المحتملة في حال فشل العملية.					
5	يتم احتساب تكاليف التخلص من السلع المعيبة التي لا يمكن إعادة استخدامها.					
6	يتم قياس تكاليف علاج العمال بسبب إصابات العمل.					
7	يتم حساب تكلفة جدولة وإعادة تصميم عمليات الإنتاج بطرق تضمن عدم توقف العمل غير المخطط له.					
8	يتم قياس تكلفة إعادة الاختبار للمنتجات المعدلة.					
9	يتم قياس تكلفة تحليل سبب العيوب والانحرافات في الإنتاج.					
	فقرات تكاليف الفشل الخارجي					
1	يتم حساب تكلفة فقدان السمعة كنتيجة لفشل الشركة.					
2	يتم قياس تكاليف معالجة شكاوى العملاء وتلبيتها على النحو المطلوب.					
3	يتم احتساب تكاليف الدعاوي القضائية ضد الشركة (الضمانات والتعويضات) كنتيجة لحدث ضرر للعميل.					
4	يتم احتساب الخسائر الناتجة عن ضمان إرجاع الموزع للمنتجات التي لم يتم بيعها خلال فترة صلاحية المنتج					
5	يتم احتساب تكلفة خسائر الخصم أو التبديل على السلع المعيبة أو التالفة التي أوجدها العميل.					
6	يتم حساب الفرق بين انخفاض حجم المبيعات مقارنة بالسنوات السابقة.					
7	يتم حساب تكلفة بيع المنتجات بخصم مسموح في السوق لضمان بيعها وعدم إرجاعها من خلال الموزعين.					
8	يتم حساب تكلفة إصلاح الوحدات المرتجعة من قبل العميل.					
9	يتم حساب تكلفة سحب المنتج من السوق.					
	تأثير عناصر تكلفة الجودة على التحسينات المستمرة					
1	الاستغلال الأمثل للموارد المستخدمة.					
2	زيادة المطابقة في المخرجات.					
3	تحسين مواصفات المنتج.					

4	تحقيق التفوق على توقعات المستهلك.					
5	الاستخدام الفعال للمعدات والآلات والموارد المتاحة.					
6	تطبيق نظام "التخزين في الوقت المناسب" والذي يقلل تكاليف التخزين وتقليل التلف في المخزون.					
7	زيادة رضا القائمين بالعمليات (العاملين).					
8	جعل العمليات أكثر فعالية وكفاءة.					
9	تحسين الإنتاجية					
10	زيادة الربحية					

القسم الثالث:

من وجهة نظرك ما أهم المعيقات التي قد تحول دون تحديد تكاليف الجودة، كنقص التدريب والقدرة على قياس هذه التكاليف على سبيل المثال. لذا أرجو منك تحديد ما يخطر في ذهنك حول هذه المعيقات وترتيبها وفقا لأهميتها:

1. .....
2. .....
3. .....
4. .....
5. .....

أية إضافات ترى في إضافتها، من فضلك اكتبها، وسأكون سعيدة برؤيتها:

.....

.....

انتهت الأسئلة، مع خالص شكري وتقديري لكم

Appendix (C): Questionnaire-English

Arab American University

Faculty of Graduate studies

Major in Quality Management

Dear sister / dear brother

Greetings

The researcher conducts a field study titled "A Proposed Model for Measuring Cost of Quality to Promote Continuous Improvements in Manufacturing Sector in Palestine" To achieve the study's goal, the researcher provides you with the study tool represented in the attached questionnaire, which aims to: Diagnose the reality of measuring quality costs in your company to identify weaknesses and deficiencies in measuring the quality costs represented. In the four dimensions: preventive costs, appraisal costs, internal failure costs, and external failure costs, and by your experience, which will be useful in completing this study, please kindly answer its paragraphs to diagnose the reality of measuring costs quality in your company. To come up with a proposed model for measuring quality costs in its four dimensions. Confirming that this data's goal is academic, it will be treated with complete confidentiality and will be used for scientific research purposes only.

Thank you for your cooperation with us.

The researcher:

Enas Abumowais

The questionnaire paragraphs

Dear, this questionnaire is divided into three parts. The first section contains your personal information. The second section represents the variables for the dimensions of quality costs, and the third section represents the most significant obstacles that may prevent measurement quality costs in your company. Therefore, I request you to place the sign (X) in the appropriate place to know your answer for each variable search.

Section one: demographic characteristic.

Qualification:	[ ]	Diploma and less	[ ]	Bachelor's
	[ ]	Others…		
Gender	[ ]	Male	[ ]	Female
Years of work experience:	[ ]	Less than 5 years	[ ]	5 to 10 years
	[ ]	More than 10 years		
Years of quality experience:	[ ]	Less than 5 years	[ ]	
	[ ]	More than 10 years		5 to 10 years

The approved quality system: [ ] ISO [ ] PSI [] Both

Company ownership: [ ] Family company [ ] Non family company

7. Nature of work: …….

8. The Company's name: …….

9. Year since Founded: …….

Section Two:

Dear Sister / Dear Brother, the following is a group of elements designed according to the dimensions of quality costs represented by its four dimensions. So kindly, I ask you to place an X in the appropriate place for each statement to know to what degree the company's operations correspond to the terms of quality costs. On each statement, from the expressions of this section from your point of view. Where a very large degree takes the value of the maximum number 5, while a very weak score on the phrase takes the value of the smallest number 1. Note that the response will be according to a five-point gradient (very large degree (V.L.D), A large degree (L.D), a medium degree (M.D), a weak degree (W.D), a very weak degree (V.W.D)).

Dimensions of quality costs: (preventive costs, appraisal costs, internal failure costs, external failure costs)

NO.	Preventive cost paragraphs	V.L.D	L.D	M.D	W. D	V.W.D
1	The cost of designing new products that meet the needs and expectations of customers is accurately calculated.					
2	The costs of assessing supplier reliability are continually measured					
3	The costs of holding training courses and participating in quality-related conferences are calculated.					
4	The costs of ensuring the safety of equipment and machinery are calculated before the production process begins					

5	The costs of planning the quality system and the costs resulting from the implementation of these plans are calculated.					
6	The cost of reviewing, examining and analyzing quality data is calculated in the company					
7	The costs related to cleaning, pest and insect control is calculated.					
8	Calculates the cost of developing quality systems					
	Appraisal cost paragraphs					
1	Raw and semi-finished material supply testing costs are measured					
2	The cost of analysis and reporting of inspection results are accurately calculated.					
3	The testing and inspection costs are measured during the manufacturing processes					
4	The cost of calibrating test and inspection equipment and instruments is calculated					
5	The costs related to the stock's value (raw materials, finished goods) are measured and checked before its usage					
6	The cost of checking for impairment of equipment is measured					
7	The cost of testing a new product is measured before it is put on the market					
8	The final inspection cost of products is measured before they are shipped.					
9	The cost of the field quality control tests is measured					
	Internal cost paragraphs					
1	The cost of losses incurred due to a sudden					

	stop in operations is calculated.					
2	The cost of re-designing products that did not pass the initial tests are counted as a new product.					
3	The costs of rework defective products are calculated.					
4	During operation fails, the costs involved in finding potential solutions are measured.					
5	The costs of disposing of non-recyclable defective products are calculated.					
6	The costs of treating workers due to work injuries are measured.					
7	The cost of scheduling and redesigning production processes is calculated to ensure unplanned work does not stop.					
8	The retest cost is measured for modified products.					
9	The cost of analyzing the cause of defects and deviations in production is measured					
	External cost paragraphs					
1	The cost of losing reputation is calculated as a result of a company's failure.					
2	The costs of handling customer complaints are measured remarkably and met as required.					
3	Litigation costs against the Company (warranties and remedies) are calculated as a result of a customer damage event					
4	Losses caused as a result of the distributor's warranty to return unsold items are calculated throughout the product's lifetime.					
5	The cost of discount losses is calculated on defective or damaged goods that the customer Founded					
6	The difference between lower sales compared to previous years is determined.					
7	The cost of selling products is calculated at the market discount to ensure that they are sold					

	and not returned through distributors.					
8	Calculate the cost of repairing the returned units returned by the customer.					
9	Calculates the cost of withdrawing the product from the market.					
	The impact of quality cost items on continuous improvements.					
1	Optimization of used resources.					
2	Increase the matched output.					
3	Improving product specifications.					
4	Achieve superiority over consumer expectations.					
5	Effective use of available equipment, machinery, and resources.					
6	Implement a "just-in-time warehousing" system that reduces storage costs and reduces inventory spoilage.					
7	Increase the satisfaction of the operators (workers).					
8	Make operations more effective and efficient					
9	Improve productivity.					
10	Increase profitability.					

Section Three:

In your opinion, what are the most significant obstacles that may prevent the determination of quality costs, such as the lack of training and the ability to measure these costs? As a result, I'd like you to write down anything that comes to mind regarding these obstacles and rank them in order of importance:

1. .....
2. .....
3. .....

Any additions you want to add, please write them, and I will be happy to see them:

.....
.....

The questions ended with my sincere thanks and appreciation to you

Appendix (D): Correlation coefficient

Table No.(D.1):Correlation coefficient of each item of "Prevention cost" and the total of this field

Preventive cost paragraphs	Spearman correlation coefficient	Sig. (2-tailed)
The cost of designing new products that meet the needs and expectations of customers must be accurately calculated.	.644**	000.0
It is essential to measure the costs of assessing the reliability of suppliers**.**	.848**	000.0
It is necessary to calculate the costs of conducting training courses and engaging in quality-related conferences.	.740**	000.0
The costs of ensuring equipment and machines' safety must be calculated before starting the production process	.725**	000.0
It is necessary to calculate the quality system's planning costs and the costs resulting from implementing these plans**.**	.821**	000.0
The cost of reviewing, examining and analyzing quality data is calculated in the company.	.830**	000.0
The costs related to cleaning, pest and insect control are calculated.	.869**	000.0

Calculates the cost of developing quality systems.	.854**	000.0

** Correlation is statistically significant at the level of significance (0.01) ≥ α.

Table No.(D.2): Correlation coefficient of each item of "Appraisal cost" and the total of this field.

Appraisal cost paragraphs	Spearman correlation coefficient	Sig. (2-tailed)
Raw and semi-finished material supply testing costs must be measured	.876**	000.0
It is necessary to accurately calculate the cost of analysis and reporting of inspection results.	.909**	000.0
The testing and inspection costs are measured during the manufacturing processes	.847**	000.0
It is essential to consider the cost of calibration of the testing and inspection equipment and instruments	.914**	000.0
The costs related to the stock's value (raw materials, finished goods) are measured and checked before its usage	.832**	000.0
The cost of checking for impairment of equipment is measured.	.814**	000.0
The cost of testing a new product is measured before it is put on the market.	.801**	000.0
The final inspection cost of products is measured before they are shipped.	.865**	000.0

The cost of the field quality control tests is measured.	.879**	000.0

** Correlation is statistically significant at the level of significance (0.01) ≥ α

Table No.(D.3): Correlation coefficient of each item of "Internal failure cost" and the total of this field.

Internal cost paragraphs	Spearman correlation coefficient	Sig. (2-tailed)
The cost of losses incurred due to a sudden stop in operations is calculated.	.858**	000.0
The cost of re-designing products that did not pass the initial tests are counted as a new product	.842**	000.0
The costs of rework defective products are calculated	.885**	000.0
During operation fails, the costs involved in finding potential solutions are measured.	.833**	000.0
The costs of disposing of defective goods that cannot be reused are calculated	.862**	000.0
The costs of treating workers due to work injuries are measured.	.848**	000.0
The cost of scheduling and redesigning production processes is calculated in ways that ensure unplanned work does not stop.	.804**	000.0

The retest cost is measured for modified products.	.671**	000.0
The cost of analyzing the cause of defects and deviations in production is measured.	.859**	000.0

** Correlation is statistically significant at the level of significance (0.01) ≥ α.

Table No.(D.4): Correlation coefficient of each item of "external failure cost" and the total of this field.

External cost paragraphs	Spearman correlation coefficient	Sig. (2-tailed)
The cost of losing reputation is calculated as a result of a company failure	.721**	000.0
The costs of handling customer complaints are measured remarkably and met as required.	.614**	000.0
Litigation costs against the Company (warranties and remedies) are calculated as a result of a customer damage event	.5**	000.0
Losses resulting from the warranty that the distributor returns products that are not sold are calculated during the product's life	.749**	000.0
The cost of discount losses is calculated on defective or damaged goods that the customer Founded	.857**	000.0
The difference between lower sales compared to previous years is determined.	.961**	000.0

The cost of selling products is calculated at the market discount to ensure that they are sold and not returned through distributors.	.848**	000.0
Calculate the cost of repairing the returned units returned by the customer.	.756**	000.0
Calculates the cost of withdrawing the product from the market.	.601**	000.0

** Correlation is statistically significant at the level of significance (0.01) ≥ α

Table No.(D.5): Correlation coefficient of each item of "Continuouse Improvement" and the total of this field.

The impact of quality cost items on continuous improvements paragraph (CIM).	**Spearman correlation coefficient**	**Sig. (2-tailed)**
Optimization of used resources.	.850**	000.0
Increase the matched output.	.828**	000.0
Improving product specifications.	.924**	000.0
Achieve superiority over consumer expectations.	.844**	000.0
Effective use of available equipment, machinery and resources.	.904**	000.0
Implement a "just-in-time warehousing" system that reduces storage costs and reduces inventory spoilage.	.920**	000.0
Increase the satisfaction of the operators (workers).	.791**	000.0
Make operations more effective and efficient.	.905**	000.0

Improve productivity.	.947**	000.0
Increase profitability.	.763**	000.0

** Correlation is statistically significant at the level of significance (0.01) ≥ α.

Appendix (E): Analysis of the financial reports of the selected companies

Appendix No. (e): Analysis of the financial reports of the selected companies according to the years 2016, 2017, 2018, 2019 .

Name company / Data	1-The Arab Company for Paints Industry (APC Paints)	2-Palestine Poultry Co. (AZIZA)	3-Birzeit Pharmaceuticals Company (BPC)	4-Golden wheat mills Company (GWMC)	5-Jerusalem cigarettes Company (JCC)
Total sales	5349395	33376772	33873686	9810691	44508357
Sales cost	3824205	27609730	19616954	8425474	42630774
Net profit (loss)	839772	2425645	9025599	598864	232516
Research and development	0				7276

expenses					
lab expenses	766				
Scrap goods					
Returned Goods		3153006			
Goods stock	1452509	2249905	11146847	2323788	6458651
Expenses for training courses and workshops for employees					
Cases against the company (Complaints)			37728	6125518	
Total quality costs	1453275	5402911	11184575	8499306	6465937
Ratio of quality cost-to-sale	0.27	0.16	0.33	0.86	0.145
Ratio of quality cost to sales cost	0.38	0.2	0.57	1.01	0.15
Ratio of research and development expenses to net profit					0.03
Ratio of laboratory expenses to net profit	0.0009				
Ratio of scrap goods to net profit					
Ratio of returning goods to net profit		1.3			

Ratio of stock goods to net profit	1.7	0.9	1.2	3.9	27.8
Ratio of expenses for training courses and workshops for employees to net profits					
Ratio of Cases against the company (Complaints)to net profits			0.004	10.2	
Ratio of net profit to total sales	0.16	0.07	0.27	0.06	0.005
Name company / Data	6-Jerusalem Pharmaceuticals Company (JPH)	7-Palestine plastic industries Company (PPIC)	8-National Carton Industry (NCI)	9-Vegetable oil industries (VOIC)	10-AL-SHARK Electrode Company
Total sales	33177372	15297	8048109	6113999	1074148
Sales cost	14929687	11731	4013202	4642668	1311588
Net profit (loss)	5086653	(104329)	145953	6343880	65484
Research and development expenses	668594				
lab expenses	445117				
Scrap goods	270324		43442	30311	
Returned Goods	3397563		231733	66824	3572

Goods stock	41974777	60381	590722	1295724	528960
Expenses for training courses and workshops for employees					591
Cases against the company (Complaints)		3209814	10347		
Total quality costs	46756375	3270195	876244	1392859	533123
Ratio of quality cost-to-sale	1.4	213.8	0.11	0.23	0.5
Ratio of quality cost to sales cost	3.1	278.7	0.22	0.3	0.41
Ratio of research and development expenses to net profit	0.13				
Ratio of laboratory expenses to net profit	0.088				
Ratio of scrap goods to net profit	0.053		0.3	0.005	
Ratio of returned goods to net profit	0.67		1.6	0.01	0.055
Ratio of stock goods to net profit	8.3	0.58	4.05	0.2	8.08
Ratio of expenses for training courses and workshops for employees to net profits					0.009

Ratio of Cases against the company (Complaints)to net profits		30.8	0.07		
Ratio of net profit to total sales	0.15	-6.8	0.018	1.04	0.05
Name company / Data	11-National Company for the manufacture of aluminum and profiles (NAPCO)	12-Beit Jala pharmaceutical Company (BJP)	13- Dar AL-Shifaa pharmaceutical company (GSC)		
Total sales	16744993	7841226	20187879		
Sales cost	13691735	5059153	10823341		
Net profit (loss)	493777	1485995	10263746		
Research and development expenses		62160	39566		
lab expenses		75047	119703		
Scrap goods		11662	41712		
Returned Goods	362006	66263	543609		
Goods stock	5001966	1879063	6326930		
Expenses for training courses and workshops for employees		123093	8156		
Cases against the company (Complaints)	40146	61250			

Total quality costs	5404118	2278538	7079676		
Ratio of quality cost-to-sale	0.32	0.3	0.35		
Ratio of quality cost to sales cost	0.39	0.45	0.65		
Ratio of research and development expenses to net profit		0.04	0.004		
Ratio of laboratory expenses to net profit		0.05	0.012		
Ratio of scrap goods to net profit		0.008	0.004		
Ratio of returned goods to net profit	0.73	0.044	0.05		
Ratio of stock goods to net profit	10.13	1.3	0.62		
Ratio of expenses for training courses and workshops for employees to net profits		0.08	0.001		
Ratio of Cases against the company (Complaints)to net profits	0.081	0.04			
Ratio of net profit to total sales	0.03	0.19	0.51		

الملخص

تهدف هذه الدراسة إلى اقتراح وبناء نموذج لقياس تكلفة الجودة في شركات التصنيع في فلسطين بهدف تعزيز التحسين المستمر. على وجه التحديد، يتم تقييم قطاع التصنيع لاعتماد الأنواع الأربعة لتكلفة الجودة: وهي الوقاية والتقييم والفشل الداخلي وتكاليف الفشل الخارجية.

تم استخدام إستراتيجية كمية ونوعية لتحقيق هدف البحث. وبشكل أكثر تحديدًا، تم إتباع طريقة كمية للحصول على بيانات كمية من خلال تصميم استبيان وتوزيعه على عينة تم اختيارها عشوائيًا من الموظفين العاملين في الصناعات التحويلية الفلسطينية لفحص مدى اهتمامهم بتطبيق تكلفة الجودة في أقسامهم. كما تم تحليل التقارير المالية للأعوام (2018, 2019, 2016, 2017) للصناعات المستهدفة. من ناحية أخرى، أجريت مقابلات غير منظمة للحصول على بيانات نوعية. اعتمدت الدراسة على منهج التحليل الإحصائي الوصفي لوصف وتحليل متغيرات الدراسة باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية (SPSS).

وكشفت النتائج عن وجود علاقة ارتباط (إيجابية) ذات دلالة إحصائية بين تكلفة الجودة ومكوناتها الأربعة، بالإضافة إلى التحسين المستمر. وعند تفسير المتغير التابع باستخدام جميع المتغيرات المستقلة أظهرت أن معظم التأثير على التباين في التحسينات المستمرة تفسره تكاليف الوقاية والفشل الداخلي والفشل الخارجي بشكل إيجابي، أما عند تفسير المتغير التابع باستخدام متغير مستقل واحد كشفت النتائج أن التباين في التحسينات المستمرة تفسره تكاليف الوقاية والتقييم والفشل الداخلي والفشل الخارجي. كما أظهرت النتائج أن اهتمام الموظفين بقياس تكلفة الجودة كان على مستوى عالٍ لتعزيز التحسينات المستمرة. ومع ذلك، كشف تحليل التقارير المالية أن القياس المنهجي لتكلفة الجودة لا يزال غير ناضج إذ يتم حساب تكاليف لها صلة بعناصر تكاليف الجودة دون الاعتماد على تقارير تكلفة الجودة وعدم إدراج هذه التكاليف بالتقارير المالية السنوية وذلك بسبب نقص الدعم الإداري بالإضافة نقص المعلومات والبيانات الخاصة بتكاليف الجودة وصعوبة الحصول على هذه التكاليف لذلك يحتاج إلى مزيد من الجهود لتطويرها وإضفاء الطابع المؤسسي عليها. تحقيقا لهذه الغاية، يوصى بشدة بتطبيق نموذج PAF المعروف بشأن تكاليف الجودة في قطاع التصنيع الفلسطيني لأنه وثيق الصلة بمبادرات التحسين المستمر.