

# Arab American University Faculty of Graduate Studies

# Quality Assessment of Bulk Water Provision Service Using SERVQUAL Model in Palestinian Water Authority - West Bank Water Department

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#### Declaration

I hereby declare that this present master's thesis has been written by myself and is my work. All formulas and concepts utilized in this work were quoted in compliance with the good science practice law; either it was taken literally from printed, non-printed contents or the internet. Also, this work has not been submitted, in whole or in part, for any other degree or professional qualification.

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#### Abstract

The water service provision sector is an indispensable service, as it has multi-dimensional effects on economic development, biological diversity, and other various sectors within a civilized world. Few studies raised the water service quality from the perspective of Palestinian Water Authority-West Bank Water Department (PWA-WBWD) subcustomers. The sub-customers' satisfaction plays a central impact on their services provided to the end-users. Therefore, the purpose of this research is to assess the bulk water service quality and the sub-customers' satisfaction level offered by PWA-WBWD using the SERVQUAL model.

In this research, both the quantitative and qualitative methods for collecting the data were used. More specifically, the SERVQUAL model was used as a quantitative data collection tool where 150 electronic SERVQUAL-questionnaires were distributed to a random sample of sub-customers. The response rate was 66%; only 85 of the completed questionnaires were analyzed using Minitab 18. As the collected data was not normally distributed, a set of non-parametric tests, as well as regression modeling, were used to test the problem hypotheses and to answer the research questions. On the other hand, qualitative data analysis was conducted to reinforce the quantitative results. Specifically, ten semi-structured interviews were held and the collected data were analyzed thematically.

The results revealed that the water service providers (sub-customers) perceived high level service quality although all the SERVQUAL dimensions fell short to meet their expectations, where the five dimensions have negative gaps. More specifically, the reliability dimension had the biggest gap followed by responsiveness, empathy, and assurance, respectively. Meanwhile, the tangibility had the narrowest negative gap. The results have also shown some of significant impact due to the difference of organizations' framework on the five SERVQUAL perceptions, expectations or gaps. Moreover, the subcustomers' satisfaction level resulted as moderate and it had a positive correlation with the overall perceived service quality. As well, the five SERVQUAL dimensions had positive correlations with satisfaction, but statistically the reliability and assurance showed a

significant impact on sub-customers satisfaction based on the multiple regression model results.

In light of this research results, a set of recommendations that could help the policy-makers in the bulk water supply sector in Palestine are provided which would help to improve the bulk water provision service quality and hence, sub-customers satisfaction.

**Keywords:** Service Quality, Customer Satisfaction, SERVQUAL Model, Water Service Provision, Bulk Water, Palestine, West Bank.

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### **List of Abbreviations**

SERVQUAL: Service Quality

SQ: Service Quality

**WBWD:** West Bank Water Department

**PWA:** Palestinian Water Authority

**NWC:** National Water Company

WSRC: Water Sector Regulatory Council

**KPI:** Key Performance Indicator

PCBS: Palestinian Central Bureau of Statistics

TQM: Total Quality Management

**ASQ:** American Society for Quality

**PCP:** Pivotal, Core and Peripheral

WUA: Water Uses Associations

**RWU:** Regional Water Utilities

## **Chapter One**

### Introduction

Overview

General Background

Scope of the Study - PWA-WBWD Institution

Problem Statement

Significance of Study

Study Goal and Objectives

**Research Questions** 

Research Hypotheses

**Research Structure** 

#### **Chapter One: Introduction**

#### **1.1 Overview**

This chapter aims to introduce the research topic through several sections, where it starts with a general background and ends with the thesis structure. More specifically, the sections include the research general background, problem, objectives, key questions, hypotheses, and significance. Furthermore, this chapter identifies in what context has the SERVQUAL model been used to assess service quality.

#### **1.2 General Background**

The service sector plays a huge and important role in the worlds' countries economy, where its' importance increased due to the gradually growing customers' standards of living. Meanwhile, 21<sup>st</sup> century is characterized by intense competitiveness and market dynamism, where providing quality service to customers is considered an essential strategy for companies' key objectives achievement, survival, and sustainable growth (Vijayakanth et al., 2014). Moreover, Ahrholdt et al., 2017 stated that service quality and its' specific dimensions act as a preliminary of satisfaction. In fact, to keep the customers satisfied it's obligatory to have an added-value along with good service quality (Boström, 1995).

In the public service sector, service provision is complex because it is not merely concerning to meet the expressed needs, but also to recognize the unexpressed requirements, determine the priorities, allocate the resources, and publicly justify, charge for what has been done (Gowan et al. 2001). In the sequel, organizations in the public sector are working under rising pressure to provide high-quality services to their beneficiaries (Randall and Senior, 1994). Although it is very difficult to assess and define the service

quality, Parasuraman et al. (1988) developed the *SERVQUAL* model as a multidimensional scale to measure the SQ that is delimited as "the degree and direction of difference between customers' expectations and perceptions". Actually, scholars recognized SQ as the most vital determinant that contributes to the credibility establishment and organization reputation in the eyes of the public (Mokhlis et al., 2011). Water service provision is a vital service that supplies a basic good (water) which is vital to life (Morgan, 2006). Water is a necessity for human beings' survival and it is indispensable for economic development and biological diversity (Walter et al., 2011). Also, the water sector is crucial for supporting the viability of other various sectors within a modern society. Securing water for all stakeholders and beneficiaries in the world is a right guaranteed by all international agreements. As water is a precious natural resource, scarcity of water resources, the continuing rate growth in populations in the world, and other factors resulted in prevailing water stress, which represents the greatest risk threatening the future (Rahaman and Varis 2005).

The water industry is confronted by severe increasing requirements for infrastructure investment, and thus the customer support is imperative. Consequently, water utilities should keep pace with customers' needs and expectations. Moreover, overall customer satisfaction and garner support for infrastructure improvement can be increased through better utility understanding of customers' behaviors, attitudes, and preferences with the correct performance initiatives (Power, 2016). With its unique particularity, the water sector in Palestine has been encountering more difficult challenges compared to other countries in the world due to the continuous adverse practices of the Israeli occupation that deprive Palestinians of the usage of their water resources. Such practices include

prohibiting Palestinian water authorities from controlling the pumping and distribution of water from groundwater aquifers existing in the Palestinian occupied territories, polluting the groundwater and surface water sources (poor water quality) via the wastewater generated in Israeli settlements and industrial zones creating obstacles for any infrastructure initiatives and projects aiming to improve the water system in Palestine. In the sequel, each Palestinian governorate should work separately to secure a reliable

service water provider to supply potable water to its beneficiaries. Hence, the Palestinian population is supplied with water through a large number of water supply providers, as each governorate constitutes of several villages, towns and cities. However, the only entity that provides bulk water service in the West Bank is West Bank Water Department (WBWD) working under Palestinian Water Authority (PWA) administration.

Though PWA is a public entity still like all other services sectors and entities, it should track customers' needs and requirements as it runs and directs a vital sector in Palestine. Bulk water provision service quality is one of the crucial priorities of PWA-WBWD in Palestine. Consequently, quality assessment of bulk water provision service is a necessity aiming to recognize the current status of the service quality and to avail the policymakers with reliable information to take the needed actions directed to reach a higher level of quality with minimum costs. On the other hand, continuous improvements in the provided service quality will have a valuable return relative to PWA-WBWD and their subcustomers (i.e. water service providers). Some applied studies show that willingness of customers to pay for water provision is related to customer satisfaction, which would help the utilities to sustain satisfactory services to its customers and to improve on cost recovery (Sualihu et al., 2017).

4

This study is a customer-focused study that aimed to identify the major gaps between customers' expectations and their perception for the bulk water provision service through PWA-WBWD using the SERVQUAL model presented by Parasuraman et al, (1985). Minimizing these gaps in the SERVQUAL dimensions (i.e. Tangibility, Reliability, Assurance, Empathy, and Responsiveness) is expected to result in improving the quality service and increase customer satisfaction.

#### 1.3 Scope of the Study - PWA-WBWD Institution

#### **1.3.1 Palestinian Water Authority**

Palestinian Water Authority (PWA) is a public institution that has legal personality; it was established by presidential decree No. 90 of 1995 where it does not have autonomous financial status as it follows the treasury of Palestinian National Authority. PWA has a total approximate number of 363 employees with various backgrounds and skills, it taken the responsibility of achieving integrated and sustainable management of limited water resources through balancing between the available water quantity and quality and the Palestinian people's need (PWA, 2019). Where, the sustainable management importance of water resources contributes to facing the challenges in the current century (Ellis, 2011). PWA acts as a regulatory body; it executes projects funded by different donors to build, rehabilitates the destroyed infrastructure, and provides water and sanitation services to who is deprived of them from the Palestinian citizens (Badawi, 2018).

Water law No. 2 was endorsed and announced in 1996, aimed to define the PWA objectives, functions and responsibilities. In addition, it involved the National Water Council establishment which had the ministers as members, and it held meetings twice in ten years. Water law No.3 was endorsed in 2002, strived to manage, develop the water

resources, increase its capacity, improve the water quality, and protect them from depletion and pollution. Moreover, this law No.3 determines PWA head responsibilities. Palestinian Government endorsed water law No.14 in the year of 2014, the new law purpose to apply integrated and sustainable water resources management in order to improve and enhance the water services in Palestine. Also, law No. 14 separated the functions of PWA (ministerial functions) and the Water Sector Regulatory Council (WSRC) which are regulatory functions. Furthermore, law No. 14 excluded the National Water Council and imported the National Water Company (NWC), Water Sector Regulatory Council (WSRC), Water Uses Associations (WUA) and Regional Water Utilities (RWU). As well, this law contained water resources licensing systems and unified water and wastewater tariff (PWA, 2015).

Water Law (2014) defined water service providers are the local authorities, joint councils, NWC, RWU, and associations that provide water or wastewater service. Some of PWA responsibilities which were assigned in water law are:

- Water resources management in Palestine by applying the principles of integrated and sustainable management tools.
- General water policies, strategies and plans preparation. Work on their approval and assuring the implementation in coordination with relevant parties.
- Surveying the available water resources, suggesting water allocation for different sectors, and utilization proprieties to ensure the effective water demand management.
- Licensing and development the exploitation of water resources with the relevant authorities' cooperation and coordination.

- Setting the design standards, quality control, and technical specification and monitoring their implementation.
- Set the procedures and the plans for establishing and developing the regional water utilities and NWC in coordination with the relevant authorities.
- Capacity building programs, training and qualification of technical staff working in the water sector.

#### **1.3.2 West Bank Water Department**

West Bank Water Department (WBWD) is the first Palestinian institution in the water sector established in 1958. It manages, produces, and distributes the bulk water supply as water wholesaler in the West Bank, it obtains water from both its' 21 wells (covering 20% of demand), the 75% of remaining demands covered by the purchased water from Israeli Mekorot (another wholesaler), and the last 5% of demands covered by Israeli Gihon Company (PWA and WSRC, 2018). The responsibility of WBWD is to sell and distribute this bulk water to service providers and private users through 600 km of pipelines with diameters ranging from 2" to 36" and 500 water meters, where the service providers supply water to the majority of the inhabitants of the west bank. In addition, WBWD has the technical capacity to drill, operate and maintain its own wells along with transmission pipe mains and associated pumping equipment (Global water partnership Mediterranean, 2015). The Department has a high level of unaccounted-for water (UFW) caused by both technical and administrative losses, billing and collection below acceptable rates which resulted in a huge debt of around 1,3700,000 NIS. Currently, WBWD follows PWA administratively and financially. So, it will be initially subjected to a transitional period of financial and management upgrade to be followed by the establishment of a publicly owned water company to cover the Gaza Strip and the West Bank. The new company will be called the

National Water Company (NWC). Where, the current organization and relationships between the main administrative bodies involved in the sector are designed to result in the establishment of the NWC (water law 2014 item 37) which has not been fully accomplished yet. It is supposed to integrate the current WBWD in charge of managing and operating the bulk supply system in the West Bank (WB).

The reason behind not attaining the NWC as a fully independent institution can be summarized to be: The absence of legal framework needed to apply the water law; The current financial situation of WBWD and the high debts accumulating on retail service providers; The need to perform accurate assets assessment in order to evaluate the market and book value of the establish NWC; The need of generating appropriate institutional framework to accommodate with the new situation; the provision of sufficient technical staff to carry out the tasks listed in item 37 of water law 2014; The political leadership should be willing to perform the integration of WBWD to NWC. Though, a complete road map (prepared by PWA) that explains the methodology and the steps that should be applied be each part to create the NWC still hinged by the aforementioned reasons.

PWA usually discloses the Key Performance Indicators (KPI) report to monitor the quality of the service provided from technical, financial, water quality and institutional perspective only (PWA and WSRC, 2018). But to ensure the best practices and a better bulk water provision service quality is provided, the **SERVQUAL** model is a good model that has been used in this study to assess the level of bulk water provision service quality in Palestine. More specifically, in this model, through customer perception of service quality they experienced compared to customer expectation for that service before they acquire, the gap has been noticed; thus, it is also called the 5 gaps model. Based on the gap analysis results, decision-makers in PWA are able to take the proper corrective actions to meet customer expectations.

#### **1.4 Problem Statement**

In West Bank, there are 245 water service providers served as sub-bulk customers by PWA-WBWD, these sub-bulk (sub-retailer) customers are responsible for supplying water to the end users (citizens) who sum up to around 2.99 million in 2018 (PCBS, 2019). In spite of the importance of bulk water provision service and the vital role of this sector, no study has been conducted so-far to assess the level of bulk water service quality and analyze the gap between PWA-WBWD performance and customer satisfaction.

The annual reports issued by the Water Sector Regulatory Council (WSRC) evaluates the performance and the service quality based on only institutional indicators such as financial, technical and water quality. Also, most of the previous studies focused on evaluating the performance of water service providers. For instance, a study conducted by Murrar (2017) analyzed the relationship between the size and the performance of Palestinian water service providers. He found out that the size of service provider affects its performance. That result matches with what the water law No. (14) 2014 calls for merging the service providers into large independent regional utilities to increase their efficiency. Based on different resources, it was clear that the needs and expectations of sub-customers are ineffectively addressed; they used customer service complaints as an indicator to assess the service quality, which does not work to assess the quality of services. This study aims to apply a tested instrument (SERVQUAL) to find out and the gaps between the sub-bulk water's customers' expectations and perceptions that assess the service quality provided. As far,

the findings of this study are expected to improve the bulk water service quality in West Bank, which in turn enhances the sub-customers' satisfaction.

#### **1.5 Significance of Study**

This study is differentiated due to its unique particularity that arises from the fact that the SERVQUAL model has not been used in assessing bulk water provision service in Palestine, which is a significant sector that must be tackled. Water provision service is a vital service to the Palestinian community, where the water accessibility with a satisfactory level for all areas contributes to the welfare of the region economically, socially and environmentally. Additionally, this study is noteworthy as it assesses bulk water service quality which is provided by the governmental organization, PWA-WBWD, for the first time from the sub-customers' viewpoint. Also, a gap analysis between service quality perception and service quality expectation is conducted. It also identifies the level of service quality in PWA-WBWD as perceived by water providers. In addition, the study defines the dimensions of service quality and the challenges that hinder the improvement of water provision service.

Developed of industries, improved living standards, water scarcity, and the high cost of infrastructure projects collectively increase the pressure on sub-customers to deliver high quality service. Thus, the provided service quality to sub-customers must be assessed to fill the gap through precise information from the primary bulk water customers and reach the intended service quality. Accordingly, the sub-retailers will improve their provided services to the end-customers.

#### **1.6 Study Goal and Objectives**

#### 1.6.1 Goal of the Study

The study's overall goal is to investigate how the sub-customers perceive the quality of service dimensions in terms of Tangibility, Reliability, Responsiveness, Assurance, and Empathy. Furthermore, it aims to investigate if those water service providers (sub-customers) are satisfied. To this end, the quality of bulk water provision service in PWA-WBWD is assessed by the SERVQUAL model. In consequence of this assessment, the gaps are identified and analyzed (by comparing the perceived service quality with the expected), which enables PWA-WBWD to examine the current weaknesses in the service offered, improves them and increase the satisfaction level. From the main goal of the study, the following objectives could be derived.

#### **1.6.2 Study Objectives**

The specific objectives are:

- 1. To find out the overall level of service quality in PWA-WBWD from the subcustomers' viewpoint based on the SERVQUAL model.
- 2. To identify SERVQUAL dimensions that hinder the quality of water provision service offered by PWA-WBWD from the sub-customers' perspective.
- 3. To find out the effect of organizations' framework such as organization type, governorate, number of employees in the water department and water network maintenance department, bulk water sources, prepaid water meter number, active water connections number, the served population number, number of annual complaints and annual percentage of water loss on the perceived, expected, and gap SERVQUAL dimensions responses.

- 4. To discover PWA-WBWD sub-customers' satisfaction level.
- 5. To explore the relationships between the five SERVQUAL dimensions, overall service quality and the overall PWA-WBWD sub-customers' satisfaction.
- 6. To determine the SERVQUAL dimensions that significantly impact on PWA-WBWD sub-customers' satisfaction.

#### **1.7 Research Questions**

In accordance with the research objectives, the following research questions (RQ) could be

derived:

- **RQ1:** How do the sub-customers perceive water provision service quality in PWA-WBWD?
- **RQ2:** Which SERVQUAL dimensions prevent PWA-WBWD from providing high-quality service as perceived by sub-customers?
- **RQ3:** Is there a significant difference on the sub-customers' perception, expectation, gaps of SERVQUAL dimensions according to organizations' framework such as organization type, governorate, number of employees in the water department and water network maintenance department, bulk water sources, prepaid water meter number, active water connections number, the served population number, number of annual complaints and annual percentage of water loss?
- RQ4: What is the level of PWA-WBWD sub-customers' satisfaction?
- **RQ5:** What are the relationships between perceived service quality, the five SERVQUAL dimensions, and PWA-WBWD sub-customers' satisfaction?

**RQ6:** Which SERVQUAL dimensions significantly impact on the sub-customers' satisfaction?

#### **1.8 Research Hypotheses**

Based on the main goal and the objectives of this research, eleven null hypotheses were formulated. Some of these included sub-hypotheses. These were tested to be verified or rejected in order to derive the appropriate results and recommendations. The following figure (1) illustrated the research conceptual framework hypothesis formed in this study to achieve the research goals and objectives are as follows:



Figure (1): The research conceptual framework hypothesis

- **H**<sub>1</sub>: There is a significant difference between service *tangibility expectations* and service *tangibility perceptions* from the sub-customers' viewpoint at a significance level of 5%.
- **H**<sub>2</sub>: There is a significant difference between service *reliability expectations* and service *reliability perceptions* from the sub-customers' viewpoint at a significance level of 5%.

- **H3**: There is a significant difference between service *responsiveness expectations* and service *responsiveness perceptions* from the sub-customers' viewpoint at a significance level of 5%.
- H4: There is a significant difference between service assurance expectations and service assurance perceptions from the sub-customers' viewpoint at a significance level of 5%.
- H5: There is a significant difference between service *empathy expectations* and service *empathy perceptions* from the sub-customers' viewpoint at a significance level of 5%.
- **H**<sub>6</sub>: There is no significant difference in the perceived, expected and gap of SERVQUAL dimensions due to the organizations' framework variables at a significance level 5%.
- **H**<sub>7</sub>: There is no significant correlation between the annual number of complaints and the overall service quality at a significance level 5%.
- **H**<sub>8</sub>: There is no significant correlation between the annual percentage water loss and the overall service quality at a significance level 5%.
- **H9**: There is no significant impact of perceived SERVQUAL dimensions (tangibility, reliability, responsiveness, assurance, and empathy) on sub-customers' satisfaction at a significance level 5%.
- **H**<sub>10</sub>: There is no significant correlation between the perceived service quality dimensions (tangibility, reliability, responsiveness, assurance, and empathy) and the overall subcustomers' satisfaction at a significance level 5%.
- **H**<sub>11</sub>: There is no significant correlation between the perceived service quality and the overall sub-customers' satisfaction at a significance level 5%.

#### **1.9 Research Structure**

This thesis is divided into six chapters, which are as follows:

Chapter One: Outlines an introduction to the research: Subject, problem, aim, questions,

hypotheses and the structure. Also, it includes the scope.

Chapter Two: Reviews the definitions of service quality, besides the relation of service

quality and customers' satisfaction. Moreover, it presents the SERVQUAL model, its

application and brief about PWA and WBWD.

**Chapter Three**: Describes the methodology used in this research, including the approach and strategy. Moreover, the study sample is submitted, also it clarifies the methods used in data collection and the technique of data analysis.

**Chapter Four:** Presents the quantitative and qualitative data analysis using relevant analysis data methods.

Chapter Five: Discusses the quantitative and qualitative data results.

**Chapter Six:** Displays the final chapter, it summarizes the findings and suggests some of recommendation to improve the service quality.

## **Chapter Two**

## Literature review

Overview

Service Concept

**Quality Concept** 

Service Quality Models

SERVQUAL Model

SERVQUAL Criticism

SERVQUAL Significance

Justification for Using the SERVQUAL Model

Previous Studies on Application of SERVQUAL

SERVQUAL Model Applications in Palestine

#### **Chapter Two: Literature Review**

#### **2.1 Overview**

This chapter aims to provide the reader with the relevant previous works connected to this research topic. For this purpose, this chapter initially introduces the concepts of service, quality, service quality, and customer satisfaction. Then, it presents the service quality models and discusses the SERVQUAL model besides its application in different contexts including in the Palestine context. The last section is a brief presentation of the PWA and WBWD.

#### 2.2 Service Concept

The service sector is growing rapidly due to urbanization, public sector expansion and the increased demand of services by the intermediate and end-users (Singh and Kaur 2014). As a result, the service definitions were an area of debate among scholars and researchers; more specifically, Zeithaml et al. (2008); Hoffman et al. (2011) defined the service as deeds, acts, performances, initiatives, or processes, where this definition is based on acts, while Gummesson (2007) stated that services are dynamic processes and actions unlike goods are static things. Gummessons' definition is supported by Lovelock (1991), who defined the service as a process or performance rather than an object. Kotler et al. (2009) realized the service as any act of performance that can be offered by one party to another that is basically intangible and does not result in the ownership of anything. The new modern definition of service created by Sophrer (2010) stated that the service is the interactions of value co-creation commonly with well-defined customer-provider organizations as parties who initiate, front-stage and back-stage activities, directly or

indirectly in hope of value co-creation outcomes. Although the value is treated to be special and phenomenological specified by each participant, stakeholders co-create the context that frames their amazing experience (Akaka and Vargo, 2015; Helkkula 2011). Yamauchi (2018) concluded that the service is inter-subjective with multiple players working together which is an inevitable result of value co-creation. But based on marketing terminology, what businesses are offering to their customers is called *value proposition*, where this term answers the following questions: how the customer utilizes from choosing a particular service?, what is required from the customer to use the service?, and how the suggested approach contributes to the long-term consumer processes? (Payne et al., 2017).

Johnston and Clark (2005) pointed out that the service comprises of four dimensions: service operation which expresses the way the service is delivered, users' direct experience of the service, user's benefits and results from the service and the last element is the value which is the benefits perceived by the user as intrinsic in the service, weighed against the service costs. All these four dimensions should be considered equally. Other researchers (Douglas & Connor, (2003); Parasuraman et al., (1985); Ladhari, (2009)), mentioned that services have inseparability (service is produced and consumed at the same time), perishability (service cannot be stored) and heterogeneity (service is customized) as the service intangible elements which they should be well-determined by the service provider. Chelladurai (2006) disclosed that the presence of these attributes (intangibility, perishability, heterogeneity, and inseparability) of the service could be either high or low based on human or consumer service type, where the difference between the services sectors are based on the service characteristics it consists of (Johns, 1999).

#### **2.3 Quality Concept**

#### **2.3.1 History of Quality**

Over the past few years, several leaders have been influential in creating the quality concept as it is understood today. Axelsson and Bergman (1999) in the quality development timeline explored that the quality topic dates back to 2584 BC. In the pyramids of Giza, the measurement and instruments utilized in accomplishing such a great structure imply that the construction reflects a high-quality system that was applied, also that can be proved by the found drawings of inspectors. Another sign of quality is observed in Hammurabi who was known with his strict rules and laws applied to all life aspects, for example in construction if the building collapsed for any reason and whether the owner or any of his relative dies, consequently the builder (or any of his relatives) must be killed (Edvardsson and Gustafsson, 1999).

With the development of humanity, many eras contributed to quality concept development. At the end of the 13<sup>th</sup>-century, craftsmanship age started, this historical period is characterized by high skilled craftsmen where the guilds are formed as inspectors on quality, this resulted in producing high-quality products (Juran, 1995). The industrial revolution era made use of accomplishment of previous historical periods with the innovation of interchangeability parts in manufacturing muskets (Evans, 2008). This progress continued to 1900 when the Taylorism philosophy was formulated which focused on increasing the productivity and the separation between planning and production functions. This was followed by the creation of the assembly line by Henry Ford (Evans and Lindsay, 2008). Finally, in the early 20<sup>th</sup> century, the process thinking was born, and the gurus such as Shewhart, Deming, Juran, Crosby, Taguchi, Ishikawa and Feigenbaum

had the significant impact on the development of quality based upon scientific principles (Sower, 2010).

#### **2.3.2 Definitions of Quality**

Quality has different meanings to different people, but the first step in the journeys of quality improvement is defining the quality concept (Ghobadian et al., 1994). The quality concept has been contemplated throughout the years, and today this topic sustains to be an intense interest not only for commercial contexts but also the concept has importance to those who provide public services. So, quality integrated into all functions and at all levels of business (Douglas and Judge, 2001). In spite of the familiarity of quality term, it has a variety of definitions. For example, Gravin (1984) identified five key approaches to define quality: Transcendent (excellence), Product-based (attributes to meet a stated purpose), Manufacturing-based (conformance to requirements), Value-based (cost vs. price), and User-based (customer perspective). Some definitions of quality are illustrated in the Table (1).

The quality multiple definitions give a general sense; where the organization with a quality hallmark, is the organization that has been able to achieve the satisfaction for all its' stakeholders. Moreover, these diverse definitions should not operate independently; on the contrary, they all can contribute jointly to improve the organizations' competitive positions. More specifically, manufacturing-based quality influences product-based quality, which in turn affects value and user-based quality so excellence is the result.
Source	Quality Definition	Definition Base
Walter Shewhart (1931)	Objective Quality: quality is independent in Man's Existence	Conformance
	Subjective Quality: quality is relative to how people feel, think or sense	Customer
Feigenbaum (1951)	Best for definite customer conditions	Customer
Edwards (1968)	Quality is the capacity to satisfy wants	Customer
Juran (1970)	Quality is fitness for use	Customer
Gilmore (1974)	Quality is the extent to which a particular product meets the needs of a single consumer.	Customer
Crosby (1979)	Quality means conformity with the requirements	Conformance
Broh (1982)	Quality is the excellence degree at an acceptable price and the variation control at an acceptable cost	Value
Taguchi (1986)	defines the quality in a negative manner as the time the product deviated from the target value, the loss imparted to society	Value
Oakland (1989)	the total quality approach aimed to identify and meet both internal and external customers' requirement	Customer
Oxford English Dictionary (1989)	Superiority or peculiar excellence	Excellence
Kanji (1990)	TQM aims to achieve quality at low cost by everyone's involvement and daily commitment.	Value
Newell and Dale (1991)	Quality in five core areas must be archived to assure customers' needs are met: people, equipment, methods, materials and the environment	Customer
Deming (1993)	Quality is dynamic where needs and expectations of customers are constantly changing hence quality definition also changes	Customer
Wicks & Roethlein (2009)	Quality is defined as the collection of the customers' affective evaluations for each attitude object that creates the satisfaction of the customer	Customer
ASQ (2019)	Service or product characteristics that fulfill the customers' needs	Customer
	product or service is free of deficiencies	Conformance

### Table (1): Quality Definitions

#### **2.3.3 Service Quality**

The fulfillment of customer's satisfaction in the modern competitive environment relies on the firms' overall service quality, and it is considered an essential strategy (Paradise-Tornow, 1991). Providing good service quality to customers has been proven to retain them in addition to gaining new ones, improving the corporate image, positive verbalized recommendation and furthermore, assuring sustainability and profitability (Negi, 2009; Ladhari, 2009). As firms are struggling to survive and strive to improve their positions, the service quality comes as a tactical tool to differentiate themselves (Ladhari, 2009). Although, Monferrer et al. (2019) concluded that the numerous definitions of service quality concept gave rise to debates "what are the particular characteristics that highlight service quality". Ben (2007) has agreed on the significance and the impacts of service quality on customers' satisfaction.

In the 1980s, there were efforts to conceptualize service quality based on proposed services characteristics and cognitive psychology researches field (Oliver, 1980; Churchill & Surprenant, 1982; Hoffman, 1986). Grönroos (1984) defined perceived service quality as the result of an assessment process in which the customers' expectations compared with the service they have received. Parasurman et al. (1985) supported the same view by defining service quality as performance degree of provided service that met or surpassed the customers' expectations along quality dimensions. Also, they disclosed the nature of service is an abstract and delusion characteristic that leads to difficulty in understanding the service quality concept. De Keyser and Lariviere (2014) argue that both technical and functional service quality have positive vital effects on consumer happiness. Also, Ha et al. (2014) describe service quality as a personal and subjective concept where the

customers' perceptions are a critical part of its definition. Asubonteng et al. (1996) argued that the service is supposed to be quality when it conforms to customer expectations consistently; this definition assures the importance of quality stability in the provided service.

Parasurman et al. (1988) stated that the customers' service expectations are formed by the informational activities (word of mouth, experience, and advertising) and personal desires, while perceived quality, as defined by Zeithaml (1988) refers to the excellence judgment of consumer or global superiority of a service or product. But according to Anderson et al. (1994), perceived quality can be considered as the evaluation of the current company's performance from the consumers' viewpoint. Edvardsson (2005) pointed out that service quality perceptions are shaped during the process of production, delivery and consumption. Also, Brady and Cronin (2001) defined the service quality as the totality of three types of basic quality aspects when a financial entity delivers services: outcome (product, price, service and access conditions), service-scape (environment) and personnel qualities (employee's competencies and abilities).

An organization can adopt either passive (reactive) or strategic (proactive) approach to manage the service quality. Specifically, reactive approach does not consider quality as prime source to gain competitive advantage, whereas in the second approach, quality is the heart of organizations' strategies where it utilizes quality to differentiate their provided services (Ghobadian et al., 1994). Satisfied employees have more commitment to improving continuously (Matzler et al., 2004). This view was supported by Yoo and Park (2007), who detected that employees are an integral part of the service process and a critical element in perceived service quality enhancement. Also, a research by Yoon and Suh

(2003) suggested that employees who are satisfied are highly-motivated, have good morale at work, and work more efficiently and effectively. On the other hand, Zeithaml and Bitner (1996) declared that high quality service is not only a responsibility of customer service department but the whole management levels and staffs need to accept and have customer care mindset.

From the above discussion, the great impact of service quality elements on customer satisfaction or dissatisfaction could be highlighted, and how understanding the perceived and the expected service quality can enhance the firm's performance. Based on this, the importance of service quality measurement is spotted.

#### 2.3.4 Service Quality Impact on Customer Satisfaction

Vijayakumar and Hussain (2020) disclosed that the most important metric in the marketing field is customer satisfaction as it is considered a key driver of customer loyalty. Moreover, customer satisfaction is seen as a significant business performance measure. It is one of the most frequently captured customer perceptions indicators (Farris et al., 2016). Syzmanski and David (2001) declared that the repurchase behavior and price sensitivity are influenced by customer satisfaction, which in turn has a vital impact on firms' profitability.

WTO (1985) defined customer satisfaction as a psychological concept drawing in the pleasure feeling that resulted from what is expected and hoped of any service or product. In addition, in the consumption context, Oliver (1980) described customer satisfaction as a psychological status occurring when the emotion encircling disconfirmed expectations is accompanying with the customer's prior feelings in respect to the consumption experience. On the other hand, Giese and Cote (2000) determined three components as a basis of customer's satisfaction definition: satisfaction appears as an emotional response; the

response is relevant to specific focus (i.e. consumption experience, expectations, product,) and; the response occurs at a specific time (i.e. after choice, after consumption).

Accordance to Kotler (2000), customer satisfaction is "a person's feeling of pleasure or disappointment, which is derived from the comparison between a product's perceived outcome or performance against customers' expectations". Satisfaction can be correlated with feelings of acceptance, relief, happiness, excitement, and delight. Additionally, Zeithaml and Bitner (2008) stated that customer satisfaction is the customer reaction to the perceived misalignment between customers' expectations and actual services performance. Later on, Kotler and Armstrong (2012) described the customer satisfaction as a feeling gained by the customer after carrying out an evaluation process on the experienced service. ASQ (2019) defined customer satisfaction as an instrument to gauge the level of customers' happiness with a company's services, products, and capabilities. The information of customer satisfaction involving surveys and ratings, can help a company determine how to improve or modify its products and services.

As a conclusion, the definition of customer satisfaction used in this research is at two levels of aggregation, namely, transactional-specific assessment means service evaluation encounter at an individual point in time (Zhao et al., 2012), and overall assessment where it accredited in all experiences with the organization that is shaped the overall customers' satisfaction or dissatisfaction (Deng et al., 2010). However, it is difficult to define customer satisfaction accurately and this was proven by the past publications which provided several various definitions of the construct without declaring the superiority of one description over another (Ng, 2017). Also, Oliver (1997) noted that everyone knows what satisfaction is, till asked to give a definition.

The previous studies linked the service quality concept and customer satisfaction to each other, even some practitioners used the two concepts as interchangeable word (Amin and Isa, 2008; Arasli et al., 2005; Awan et al., 2011). Lee et al. (2016) proposed that to enhance the customer satisfaction level, firm has to improve its service quality. Numerous studies have been conducted in different contexts to detect the impact of service quality on customers' satisfaction. Their results showed that service quality has a significant positive impact on customers' satisfaction. Some of these studies that explored the relationship between service quality and customer satisfaction included a study in boiler water and cooling tower water treatment chemical industry (Panditharatne and Gamage, 2019); another one has been conducted in the commercial bank of Mauritius (Vencataya et al., 2019); Also, another study has been performed in Umrah travel agents in Malaysia (Othman et al., 2019); and one study has been executed in Bangladesh Tourism Industry (Masrurul, 2019), all the mentioned studies accepted the strong significant positive relationship between the service quality and customer satisfaction. Upadhyaya (2013) confirmed that customer complaints are critical in evaluating the level of customer satisfaction.

#### **2.4 Service Quality Models**

There are different dimensions of service quality due to the various service sectors (Pollack, 2009). Accordingly, many proposed service quality models have arisen, but not all scientists have the same views. Nevertheless, service quality measurement enables executives to identify quality problems, enhance the services efficiency and quality to beat customers' expectations and to achieve customer satisfaction (Ghotbabadi, 2012). Reviewing different scientific articles, it was found that there are several service quality

proposed models, by analyzing them it was possible to classify into the following categories (Seth et al., 2005).

#### **2.4.1 Conceptual Models Category**

This category includes:

• Attribute Service Quality Model (Haywood-Farmer, 1988)

Meeting customers' preferences and expectations consistently is the core of determining whether the service organization has high quality. Mostly, three basic attributes are assigned to service: physical facilities and processes; peoples' behavior; professional judgment.

• Synthesized Model of Service Quality (Brogowicz et al., 1990)

Identifying the dimensions associated with service quality activities in planning, implementation and control that are considered the framework of a traditional management, is the purpose of this model. The synthesized model of service quality takes into account three components company image, external influences and traditional marketing activities as the components affecting technical and functional quality expectations.

#### • PCP Attribute Model (Philip and Hazlett, 1997)

This model suggests a form of a hierarchical structure that is built of mainly three overlapping classes of attributes – pivotal (outputs), core and peripheral (jointly representing inputs and processes), these classes are ordered in terms of increasing weighing importance, so when the service customer reaches the pivotal class it indicates that satisfaction is achieved.

It is worth mentioning that all of the above-mentioned proposed model category are not tested nor validated. As a result, these models are not reliable to be used to measure the service quality.

#### 2.4.2 IT Front-Based Models Category

This category includes:

• IT Alignment Model (Berkley and Gupta, 1994)

This model bonds the organizations' service and the information strategies. It outlines in detail the using of IT to improve specific service quality dimensions, by utilizing some case studies demonstrating the use of IT for quality control such as: collect customer data, monitor operations and facilitate service. The model states that it is vital to tightly coordinate and align service quality and information system (IS) strategies.

• Attribute and Overall Affect Model (Dabholkar, 1996)

Nowadays, self-service based options are becoming more popular due to high labor cost of service delivery. Two alternative service quality models for technology-based self-service options are available: the expectation of consumers for each option comprises *the attribute model* (cognitive approach); the feeling of consumers towards technology usage is the base of the *overall affect model* (affective approach)

• Internet Banking Model (Broderick and Vachirapornpuk, 2002)

Internet banking service quality is tested through this model by taking participants of observations and narrative analysis. This is used to discover the customers' perception of this model which can be assessed by five key elements that are: the image and reputation of the service organization; customer expectations of the service; the actual service encounter; customer participation; aspects of the service setting

• Model of E-Service Quality (Santos, 2003)

It is crucial to assess electronic commerce. This model was developed to evaluate the success or failure of its service quality utilizing e-service (cyberspace service role). It is proposed that quality of e-service has *incubator* (web site design, user friendly and understandable attractive website) and *active* dimensions (supportive, speed, and website maintenance).

From all of the above, it can be concluded that this category of models is developed to assess the impacts of IT and technology on service quality.

#### 2.4.3 Other Models Category

This category includes:

• Nordic Model (Gronroos, 1984)

This is considered to be the primary model that is used in service quality measurement. Technical quality (the actual delivered services which is an outcome of dealing with service provider), functional quality (the method of receiving the technical result) and image (merging of technical and functional quality which can be reflected by word of mouth, pricing, tradition, ideology and public relations) are categorized to be the three components of service quality. Rust et al. (1993) expanded Grönroos' model by adding new dimension: service environment, this model is called the three-component model. The Nordic model does not offer any explanation on how functional and technical quality can be measured.

• Ideal Value Model of Service Quality (Mattsson, 1992)

This value-based model suggests to evaluating service quality through perceived ideal standard against consumer experience, this will result in identifying the implicit negative disconfirmation on a pre-conscious value level which is the key determinant of consumer

satisfaction. Focus must be drawn to cognitive processes as it is the main element formulating consumers' service concepts. Few numbers of items used for value and customer satisfaction limited this model.

• *Model of Perceived Service Quality and Satisfaction (Spreng and Mackoy, 1996)* The model emphasizes the effect of expectations, desired congruency, perceived performance desires and expectation disconfirmation on overall service quality and customers' satisfaction. These are measured through set of ten attributes, list some of these are: convenience in making an appointment, staff friendliness, customers listening, accurate information, advisor knowledge..., the limitations of this model are: dose not explaining how the service quality is operationalized and not providing directions for service quality improvement.

#### • Service Quality, Customer Value and Customer Satisfaction Model (Oh, 1999)

The proposed model assures the significant role of customer value in process of customers' post purchase decision making. Moreover, it shows that perceived price has a negative impact on perceived customer value and no relationship with perceived service quality. It includes key variables such as perceptions, service quality, customer satisfaction, customer value and intentions to repurchase. Also, word of mouth communication intention is conceptualized as a direct, combined function of perceptions, value, satisfaction, and desires to repurchase. These variables measured by relatively fewer items performed this model limited.

#### • Service Quality Model (Saravanan & Rao, 2007)

The author outlined six crucial factors to measure SQ presented as: (1) *human aspects of service delivery*, which includes reliability, responsiveness, assurance, and empathy; (2)

the factor of *core service* consists of content, features; (3) *social responsibility*; (4) *systematization of service delivery* where this factor involves processes, procedures, systems, and technology; (5) *tangibles of service* and (6) *service marketing*. In the result of their study, they disclosed that all these factors lead to improvement of customers' perceived SQ, customer satisfaction and loyalty.

#### 2.4.4 Gap Models Category

The proposed models in this category are built to measure service quality, by using either gap model or its modification as base or scale using SERVQUAL items or its modification. A list of these models includes:

• *Performance Only Model* (Cronin and Taylor, 1992)

It is also called SERVPERF depicting that a better assessing of service quality method can only be by performance measurement.

• *Retail Service Quality and Perceived Value Model* (Sweeney et al., 1997)

It clarifies that service quality impact on value and willingness to buy in a particular service, where the value is a comparison between customers' benefits and sacrifices.

- *IT-Based Model* (Zhu et al., 2002)
- It is a joint customer's perceived IT-based service choices to traditional service dimensions.
- Internal Service Quality Model (Frost and Kumar, 2000)

It is a set service quality within a large service organization, amongst front-line staff and support staff;

• Mittal and Lassars' SERVQUAL-P Model (Bougoure & Lee, 2009)

It is a reduced version of the five RATER dimensions to four: Reliability; Responsiveness; Tangibles; Personalization, where the last dimension refers to the social interaction content between the employees and customers.

In addition to these models, there are other models like *Evaluated Performance and Normed Quality model* (Teas, 1993) and *Antecedents and Mediator model* (Dabholkar et al., 2000).

#### 2.5 SERVQUAL Model

In 1985 the American marketing gurus Parasuraman, Berry and Zeithaml defined service quality as "the function of the differences in the quality dimensions between expectation and performance ". They developed a service quality model, and called it a gap model where it is based on gap analysis. In Figure (2) service quality model highlights the following main five gaps that prevent successful service delivery.



Figure (2) – Service quality model, (Source: Parasuraman et al., 1985)

#### • *Gap 1* (Knowledge Gap)

Gap 1: Is formulated as a result of the variance between customers' expectation and managements' perception. Organization management does not always properly perceive what customers want to consider the provided service or product as high quality (i.e. restaurant management may think customers want nicer decor, but customers may be more concerned with staff responsiveness). Some of the factors may lead to this gap are: inadequate market research, failure to listen to customer complaints and lack of interaction between management and customers.

#### • Gap 2 (Policy Gap)

Gap 2: Is formulated as a result of the variance between managements' perception and service-quality specification. Management might correctly understand what customers

want but not translate them into a proper service standard (i.e. restaurant management may tell the staff to provide "fast" service without specifying speed in minutes).

#### • *Gap 3* (Delivery Gap)

This gap is defined as a difference between service-quality specification and the actual service delivery. Variety of factors such as: poorly trained employees, incapable of or unwilling employees to meet the standard, which could trigger this gap (i.e. taking time to serve the customers).

#### • Gap 4 (Communication Gap)

This gap is caused by the difference between service delivery and external communications. Customers' expectations affected by what the organization promises customers through their statements and advertisements, as well the provided services have to match what has been promised. Otherwise, they will be unsatisfied (i.e. if a restaurant menu shows a kind of dessert as a part of meal offer but the customer does not get it, resulting in destroying the customers' perception).

#### • *Gap 5* (Customer Gap)

When the expected service differs from the perceived service this gap occurs. Sometimes the customers do not understand what actually the service is rendered for them or they misinterpret the service quality (i.e. the waiter may keep asking the customer if he/she need something to show attention, but the customer interprets that as kind of harassment). The customer gap is resulted by the other gaps (1-4) which are associated with the service quality delivery on the marketing side. Moreover, in order to close the customer gap, the management needs to close the remaining gaps.

Consequently, the service quality can be measured according to the following equation:

Where:

 $SQ_i$  = the perceived quality of the service by person i;

k= the number of service attributes;

 $P_{ij}$  = perception of person *i* related to service performance of business *j*; and,

 $E_{ij}$  = expectations of the person *i* related to service performance of business *j*.

From the equation presented above, we can conclude that the customer judges the low or high service quality based on the size and the direction of Gap 5 (customer gap). Three different results that can be obtained as follow:

- E > P: when customers' expectations have not been achieved which indicate perceived quality is less than satisfactory;
- E < P: when customers' expectations were surpassed; and
- E = P: when customers' desired are met.

The service quality determinants that customers used when interpreting the quality were identified by Parasuraman et al. (1985) after the gap modeling. The original ten service quality determinants are: reliability; responsiveness; competence; access; courtesy; communication; credibility; security; understanding the customers and tangibles. Parasuraman et al. (1988), refined and condensed the ten SQ determinants into five broad dimensions to measure the perceived service quality through a subsequent scale named **SERVQUAL**. These dimensions also are abbreviated as (RATER) and their descriptions are explained in Table (2).

Table (2): The definition of service quality dimensions (RATER scale). Source(Parasuraman et al. 1988)

Dimension	Description	
Reliability	Ability to execute the promised service dependably and accurately	
Assurance	Employees' Knowledge, courtesy and their ability to inspire trust and confidence	
Tangibles	The appearance of physical facilities, equipment, staff, and communication materials	
Empathy	The provision of caring, individualized attention the firm provides to its' customers	
Responsiveness	Willingness to provide prompt service and help the customers	

The five dimensions capture facets of all the original ten dimensions as shown in Table (3).

Table (3): The reduction of SERVQUAL dimensions. Source (Parasuraman et al.1988)

Final 5 dimensions*	Original 10 dimensions
Reliability	Reliability
Responsiveness	Responsiveness
Tangibles	Tangibles
Assurance	Competence; Courtesy; Communication; Credibility; Security
Empathy	Understanding the customers and Access

\* The first three dimensions are the same but the last two are the merger of the remaining dimensions

Parasuraman et al. (1988), operationalized the aforementioned instrument to measure the perceived quality service (SERVQUAL), by utilizing the disconfirmation of expectations' paradigm, which suggests the SQ evaluation is based on comparison of service's actual performance to an individual's prior expectations. So, SERVQUAL was developed as a multi-dimensional scale for operationalizing the Gap (5) as shown in Figure (3). This scale initially contains 97 items divided along ten dimensions; those 97 items were reduced to 22 items divided along the final five dimensions due to principal axis factoring and oblique rotation.





#### 2.6 SERVQUAL Criticism

Notwithstanding, the growing popularity of SERVQUAL and its widespread application, there have been several criticisms raised against SERVQUAL in literature. Kasper et al. (2014) described that SERVQUAL disconfirmation nature drives to measure customer satisfaction neglecting its proposed aim of measuring service quality. According to Buttle (1996), the criticism is divided into theoretical and operational criticisms as follows.

#### **2.6.1 Theoretical Criticisms**

• **Paradigmatic Objections**: SERVQUAL fails to extract approved economic, statistical and psychological theory. This is due to that SERVQUAL is based on a disconfirmation paradigm instead of an attitudinal paradigm.

Process Orientation: The service delivery process is the focal point of SERVQUAL, not the service outcome.

 Gaps Model: There is a little clue that customers assess service quality in terms of Perception – Expectation gaps.

• **Dimensionality**: SERVQUAL's five dimensions are not global; the number of attributes constitutes service quality is contextualized; there is a high inter-correlation degree between the five dimensions (RATER), and the items do not always load on to the components which one would a priori expect.

#### **2.6.2 Operational Criticisms**

• **Expectations**: SERVQUAL missed measuring absolute service quality expectation because the expectation term has different definitions.

• **Item composition**: The variability within each service quality dimension cannot be captured by four or five items.

 Moments of Truth (MOT): Quality service assessment by customers may differ from MOT to MOT.

• **Polarity**: The invert polarity of items in the scale leads to respondent error.

• **Two Administrations**: Two instruments administration (expectations and perceptions) create respondent boredom and confusion.

• Scale Points: The seven-point Likert scale is flawed, which was used in some studies. But in this study, five-point Likert scale was used.

• **Variance extracted**: the over SERVQUAL score clarifies a disappointing proportion of item variances.

#### **2.7 SERVQUAL Significance**

Despite of SERVQUAL's deficiencies, as many other models, if SERVQUAL dimensions are correctly defined for the scenario under study, it is still valuable (Mujinga, 2019). According to Lovelock and Wirtz (2014), the criticism clearly shows the sophisticated nature and difficulty in measuring important subject aspects such as service quality and customer satisfaction. Still, the model compiles value to the service quality determining process offered by the organization to its customers. Polyakova and Mirza (2015), mentioned that even though SERVQUALs' criticism, it aimed to understand the general service quality elements which are mutual for different services, also it can be applied within varied industries. Whilst Asunbonteng et al. (1996), declared that SERVQUAL model will predominate as a measuring tool of service quality until a better but evenly simple model engenders. SERVQUAL over the last two decades is still one of the most controversial models of measuring service quality (Ramanathan et al., 2018).

Based on Kotler & Armestrong (2010), SERVQUAL model intended to measure customers' expectations, which is another preference of this model. So, it can be utilized as an initiative instrument in quality improvement programs, where the improvement means services conformance to customers' expectations, also knowledge of customers' needs and

requirements is essential to achieve quality excellence. According to Ershadi et al. (2019), the model was verified in many studies that show it properly assess the customers' comments and measure SQ accurately. In addition, SERVQUAL questionnaire is economic and consists of a few numbers of questions in comparison to other models which makes it easy to answer by the respondent. Also, the authors mentioned that the results of SERVQUAL model can be easily explained due to the standard analysis. All these strengthen SERVQUAL model and makes it suitable to be applied.

#### **2.8 Justification for Using the SERVQUAL Model**

According to Nyeck et al. (2002), the SERVQUAL model (Gap Model) is still the most complete attempt to conceptualize and measure service quality, where it is user-friendliness and adaptability to varied service sectors. So, the SERVQUAL model was found to be a fit in the service quality assessment of the bulk water sector that was due to many reasons. The SERVQUAL statements included in its scale represented attributes that ought to be studied in the bulk water sector. Also, this model identifies the water service providers' perceptions and expectations related to these attributes, where the difference between their perceptions and expectations form gaps if these gaps were negatives that will show the PWA-WBWD fell short to meet their customers' expectations, thus this model provides the needed diagnostic information. Moreover, applying the SERVQUAL model was appropriate for achieving the research objectives and answering its questions mainly concerning how PWA-WBWD customers perceived the provided service and the level of their satisfaction.

#### 2.9 Previous Studies on Application of SERVQUAL

SERVQUAL application covers a wide-ranging of services, which makes it as a broadly accepted method of service quality measuring (Aydemir, 2012). Paul et al. (2016) mentioned that the marketing industry is the main reason why SERVQUAL was developed though its application was extended to include various sectors. According to SERVQUAL literature, the model was applied by many researchers in different areas such as (but not limited to): industry inspection (Liu et al., 2015). Gong (2015) used it in customer satisfaction. Roslan et al. (2015) exploited it to improve the logistics sector in Malaysia. Eservice quality affecting customer's willingness was studied by Kumar and Manoj (2015). Determining information system effectiveness in Kuwait Communications Ministry was conducted by Khalil et al. (2016). Travel agents service quality gaps -based on viewpoints of customers, employees and managers- were provided through a comparative analysis in Tehran city center (Shahin et al. 2017). Teshnizi et al. (2018) applied the model in health services. Basfirinci and Mitra (2015) explored on service quality of airlines employing an integrated model of Kano and SERVQUAL. Maruvada and Bellamkonda (2017) developed a service quality model for railway passengers. Aremu et al. (2018) measure service quality in Nigerian banking industry.

Hizam and Ahmad (2019) established Internet of Things (IOT) SERVQUAL model to conceptualize and gauge service quality for internet of things including four dimensions, which are: privacy, functionality, efficiency and tangibility. This measurement scale formed from SERVQUAL, Self-Service Technology (SSQUAL), and E-SERVQUAL model. The suggested service quality dimensions would support in defining the measurement of customer satisfaction for Industrial Revolution 4.0 based services. Rezaei

et al. (2018) assessed the service perceived quality for the baggage handling system in order to improve it. They employed SERVQUAL to identify the main relevant factors (five dimensions) also they used best worst method (BWM) to weigh the different factors and find the important factors among them. Moreover, a study explored by Salleh and Othman (2019), where they modified the SERVQUAL scale by adding a new dimension (sustainability) to develop sustainable service quality (SUSSERV) which was used to measure sustainable service quality of Malaysian water companies and sewerage companies. Importance-performance analysis (IPA) has also been used to give a better graphical view interpretation on which dimension the company should assign more attention and priority.

SERVQUAL model also adapted by Galeeva (2016), who used it to measure the quality of higher education services in the Russian university context from students' viewpoint. This study concluded that the educational institution position and its' strategy relies on the management's awareness levels as to the areas of strength and weakness. However, the quality difference scores treated as an indicator of performance, the graphical display of expectation and perception was more informative for the decision-makers.

This research focuses on public sector. Some previous studies addressed the usage of SERVQUAL in applications in the public sector. More specifically, Ocampo et al. (2019) evaluates service quality among employment-related five government agencies by integrating SERVQUAL model with (AHP-TOPSIS) method which is an abbreviation of analytic hierarchy process, and technique for order performance by similarity to ideal solution. The outcomes of this study showed that the integration of SERVQUAL and (AHP-TOPSIS) was very benefiting and satisfactory. This is supported in identifying the

most and least important critical dimensions that should be taken into consideration when delivering quality services. Also, it helps them to formulate policies in response to such. A study conducted in Cameroon local municipalities by Mbassi et al. (2019), applied the revisited SERVQUAL model to identify, describe and evaluate the relationship between public service quality and citizen clients' satisfaction, where quantitative research was executed through a questionnaire administered in 21 councils to 1427 local public users' services. Results reveal that the perceived quality of local public services has a significant impact on citizen clients' satisfaction. However, not all service dimensions contribute identically to users' satisfaction. Hence, this study facilitates the efforts of local governments to figure out the populations' needs and expectations to improve their living conditions.

In Malawi's capital, the need of Lilongwe Water Board (LWB) to acquire inputs on how is the delivered water and to explore if its supply meets customer expectations. A study carried out by Gowela et al., 2017, used SERVQUAL model to identify customers' expectation areas that were not being met. Besides, to find out the customers' needs to empower public water utility supplier to improve its services. Sampling was administered from Southern, Central and Northern water supply zones of the city. Overall, results signified that the service quality average gap of the Central zone had the widest service quality gap. Moreover, to increase customers' satisfaction, the quality dimensions gaps in the three zones should be reduced where the customers viewed them as very necessary attributes.

Kansal and Cole (2019) conducted research in Kailahun District of Sierra Leone to assess water, sanitation, and hygiene (WASH) services sustainability as well as the customer's satisfaction with the related services, where the customers' satisfaction measured by a modified SERVQUAL model, whilst, wash sustainability index (WASH\_SI) is evaluated using the financial, institutional, management, and technological indicators. A questionnaire was executed to collect data, it consists of 31 questions (22 of 31 are SERVQUAL scale). The negative SERVQUAL gap result revealed unsatisfied customers. This requires the government to focus on improving the quality of WASH services, which affects positively on good health, education, and decent life that in turn will enhance the human development index (HDI) in the country.

Various experiences related to applying SERVQUAL model have been thoroughly discussed; some of them summarized the model utilization in public sector. All of these reflected that using SERVQUAL is a success in achieving the purpose efficiently. That is why that model is used to assess the service quality of bulk water provision in Palestine in this study.

#### 2.10 SERVQUAL Model Applications in Palestine

In the Palestinian context, several studies applied SERVQUAL model in different vital economic sectors. In the banking sector, Okal (2018) conducted a study to assess the service quality provided by the Palestinian conventional banks and their customers' satisfaction levels. The author merged the qualitative and quantitative techniques to collect data, SERVQUAL scale was utilized as quantitative method also he supported the result by performing eight semi-structured interviews, where the qualitative data analyzed by codifying common sense approach. The study disclosed that the empathy dimension has the biggest gap among customers' perceptions and expectations. Also, the results showed that only the gender variable affect service quality. A managerial model that can help the

Palestinian conventional banks to improve the quality of banks' services which in turn enhance their customers' satisfaction. Almaser et al. (2017) used SERVQUAL to assess the service quality in the Islamic Palestinian banks and its role in customer's satisfaction and loyalty.

SERVQUAL also has been applied in the health care field, where it was used to assess the patients' satisfaction in accredited and non-accredited Palestinian hospitals through a comparative study in two Palestinian hospitals conducted by Barghouthi and Imam (2018). The study concluded that there no significant differences between the means of patient satisfaction related to the accreditation case. Moreover, this study highlights the importance to take into consideration the patient perspective to assure the quality service in healthcare organizations. Another study in the same sector was executed by Atweh (2016) implemented SERVQUAL to improve the medical services quality for thalassemia patients.

Kharroub and Mustafa (2019) took advantage of the SERVQUAL model in Palestinian Municipalities. The purpose of their study is to examine the strategic planning (i.e. vision, mission, objective and strategic choices) impact on the quality of service provided by Jenin municipality to their citizens. The quality was measured by a questionnaire distributed to the municipality employees. The results exhibited that the degree of strategic planning factors is moderate from the view respondents' point, which means the employees have little details about the reality of their organization strategy. In addition, the study revealed there is a significant impact of strategic planning on the service quality. The researchers suggested the Palestinian municipalities to enhance the quality culture and engage employees in continuous improvement programs.

Another study applied SERVQUAL in the hospitality sector by Sharar and Yousef (2017). They aimed to measure and evaluate the hotels' service quality in the Gaza Strip, in order to provide solutions that develop the quality level. This study summarized that there are gaps between expectation and perception by varying degrees. The authors recommended the SERVQUAL model as a valuable tool to measure the quality level. The importance of the SERVQUAL application extends to educational services. Alabadlah (2016) intended to measure the level of educational services' quality that provided to the department of administrative and financial sciences students at the University College of Applied Sciences in the Gaza strip through the SERVQUAL scale. It worth mentioning that the negative gap between students' expectations and perceptions, led the researcher to recommend more attention should be provided to the students.

After reviewing the previous studies that applied the SERVQUAL model in the Palestinian context, it is noticed that there is no study that applied the SERVQUAL model in water sector, specifically in bulk water provision sector to assess the quality of provided services by PWA-WBWD.

# **Chapter Three**

## Methodology

Overview

Research Approach

Research Strategy

Research Design

Population and Sample Study

Data Analysis Technique

Reliability and Validity

Ethical Considerations

### **Chapter Three: Methodology**

#### **3.1 Overview**

This chapter gives the research methods outline that was followed to achieve this study objective. More specifically, the chosen research design for this study is described, as well as the reasons for this choice. The used instrument for data collection also is described. The study population and sample size are defined. The methods and tools used to analyze the data also are discussed. Too, the used instrument validation and reliability are verified. Lastly, the ethical issues followed in the research conducting process closed this chapter.

#### **3.2 Research Approach**

This research endeavored to assess the overall service quality perceived by sub-customers of PWA-WBWD and thus its' bulk water provision service performance can be evaluated. Furthermore, this study tried to identify the dimensions either that bring the satisfaction to the sub-customers or that considered as weakness gaps of PWA-WBWD. Based on the results of service quality assessment, supported recommendations was given that assigns effective techniques for closing the service quality gaps and adopting which gaps to focus on. It is worth to mention that the research methodology according to Blumberg et al., (2008), is truly essential for researches due to its enormous contribution regarding to knowledge and skills provided to explore the research questions answers. Besides, the methodology plays a vital role in achieving the study's planned objectives.

To fulfill the research purpose successfully, inevitably one from the main two different approaches was picked: the inductive approach and the deductive approach (Saunders et al., 2009). Applying the inductive approach is typically entangled with qualitative data

collection and analyzing methods, whilst the quantitative methods usually are related to deductive approach (Neuman, 2003). However, some forms of scientific reasoning do not fit in the previous general two research approaches (deductive and inductive), the need for a third approach called the abductive is required. In this approach, the research process starts with some initial puzzling fact and ends to some theoretical hypothesis which can explain the phenomenon.

In this case, the investigations' approach used is a mixed research approach. The deductive approach (quantitative) used as a theory from the SERVQUAL model, where the questionnaire gave answers for the research questions like: how sub-customers perceive SQ and what dimensions the sub-customers are satisfied/unsatisfied with. Also, the inductive approach (qualitative) is used by applying interviews with some professionals in water sector as an attempt to interpret the results obtained from the questionnaire.

#### **3.3 Research Strategy**

Johannesson and Perjons (2014) defined research strategy is an integrated plan for carrying out a research study; it guides a researcher in the study planning, executing, and monitoring. Meanwhile, the research method gives instructions on how to collect and analyze data. Thus, the research strategy provides a high-level guidance, but the research method is as technique or tool which works on the specific task (detailed-level). Figure (4) illustrates the steps in the sequences under which this research strategy conducted. Goertz & Mahoney (2012) stated that the research process usually consists of the following phases defining research questions, collecting data, data processing, answering the research questions and presenting the findings.



**Figure (4): Research strategy framework** 

#### **3.4 Research Design**

The research designs include two kinds of data collection: primary and secondary. The primary data (raw materials) are immediate, first-hand accounts of a topic from people closely linked to it. Examples on primary data are text of law, survey data and original research (Appraisal institute, 2002). While, the secondary data defined as one step removed from primary source, which are attempts to describe or analyze primary sources and can use them to argue a dispute or persuade the reader to grasp a certain opinion. The secondary sources are textbooks and journal articles (Appraisal institute, 2001).

#### **3.4.1 Quantitative Method – Questionnaire**

Quantitative research usually consists of a systematic and empirical study of phenomena by statistics, mathematics and numerical data processing (Basias and Pollalis, 2018). Also, Gerrish and Lacey (2010) defined quantitative research as the broad concept used to denote research designs and procedures that generate numerical data. According to Dudwick et al. (2006), the quantitative methods peculiarly refer to standardized questionnaires that are conducted to individuals or households, which are pinpointed through various sampling forms generally random sampling. Further, quantitative researchers highlight measuring variables precisely and testing hypotheses that are related to general causal explanation (Nueman, 2006).

The international SERVQUAL model and its five dimensions (Tangibility, Assurance, Reliability, Responsiveness, Empathy) which were originally developed by Parasurman et al, 1988, was translated into Arabic language and used in this research as a quantitative tool to collect data and to measure how the water service providers (the sub-customers) perceive the water provision service provided by PWA-WBWD. Consequently, PWA-WBWD customers' satisfaction is assessed. Figure (5) illustrates the questionnaire structure.

The questionnaire started with an introduction to familiarize the respondent with the aim of its content and the expected outcomes of this study. Besides, it the questionnaire consists of three main parts (as shown in Appendix (A)), however, the following summarizes these parts:

**Part 1:** This part represents the organizations' framework information that provides water service. It is formed form ten questions which are the independent variables namely: organization type, governorate, water department employees' number, water network maintenance department employees' department, the served population number, active water connections number, the bulk water sources, prepaid water meters number, the annual complaints number, and annual water loss percentage.

**Part 2:** This part is divided into two sections with 22 questions for expectations and 22 for perceptions. More specifically, the statements are sub-categorized to address the five dimensions of the SERVQUAL model. The tangibility dimension is measured by statements 1 to 4, statements 5 to 9 seeks to measure the reliability dimension, while the responsiveness and assurance dimensions are measured in statements 10 to 13 and 14 to 17 respectively. The empathy dimension is measured in statements 18 to 22.

Generally, researchers favor the closed-ended format of survey questions due to its simple to code and help clarify the meaning of the question. But others used open-ended format where the respondents formulate their answers. Tourangeau et al. (2000) declared that different survey question formats serve many various purposes. Thus, some of these research questions were closed-ended (the respondents were given all the possible answers). On the other hand, some of the questions were open-ended, partially close-ended and closed-ended with an implied continuum. A 5-point Likert scale has been adopted in this study, in which alternative 1 is for "Strongly disagree", 2 is for "Disagree", 3 is for "Neither Disagree nor Agree", 4 is "Agree" and 5 is for "Strongly Agree".



Figure (5): Questionnaire Structure.

**Part 3:** The third part consists of seven questions to assess the overall satisfaction of the water service providers regarding the water provision service offered by PWA-WBWD.

#### **3.4.2 Qualitative Method – Interview**

Qualitative data are fundamentally meaningful, but they display great diversity. Also, they don't include counts and measures but they include almost every form of human communication-written, audio or visual- behavior, symbols or cultural artefacts (Gibbs, 2018). Bryman (2012) described qualitative research as a type of research method which in general is expressed mostly in words and it is inductive in nature. As stated by Goertz

and Mahoney (2012), the basic qualitative research advantage is to support in-depth research. Qualitative research is a scientific knowledge base that requires an inquisitive approach to convert primary data attained from field to straight-thinking explanation on a specific research project work (Altinay & Paraskevas, 2008). Sliverman (2016) wrote regarding the needs of lay people for qualitative social research: the general public requires ideas for reform, suggestions on how to handle better and achieve quality services and assurance that others have similar experiences and concerns to their own. King and Hugh-Jones (2018) mentioned that interviews are the most pervasive method of data collection in qualitative psychology- and more broadly in qualitative research. But King et al. (2018) highlighted that appropriate compatibility to analysis techniques, sensitivity to context and co-construction awareness should be taken into consideration to generate useful data from the interviews that answer a multitude of research questions.

According to Robson (2002), there are several types of research interviews, spanning from highly structured (researcher controlled), and passing through semi-structured to highly unstructured (uncontrolled):

- ✓ Structured interviews: involve asking the same set of standardized questions and in the same order for each interviewee
- ✓ Semi-structured interviews: offer interviewees scope for flexibility in response, also give them opportunity to expand their answers.
- ✓ **Unstructured (open) interviews**: the interviewer asked questions with minimal structure, maybe it is like a conversation.

Semi-structure interviews have been used in this study through directing verbal questions to ten interviewees who work and have experience in the water sector.

#### 3.5 Population and Sample Study

#### **3.5.1 The Study Population**

The study aims to draw entirety conclusions about the quality level of water provision service in PWA-WBWD from a representative small subset of the study population. In this case, all the bulk water buyers in West Bank from PWA-WBWD are the whole population of this research, such as municipalities, village councils and Joint Services Council and Water Undertaking.

The study population number is in state of instability due to the merger of some councils and local communities or vice versa. Therefore, the number of the study population was approved based on the latest updated PWA-WBWD 2019 records, which were 245 water service providers (PWA-WBWD sub-customers) in all of West Bank areas.

#### 3.5.2 The Study Sample

A process of representing population by selecting a subset (sample) of them is called sampling (Sekaran and Bougie, 2010). Sampling is one of the most important factors that determine the accuracy of the survey result. Also, the sampling process is critical due to its responsibility to select the right research participants. The purpose of this technique is to draw conclusions without the time-consuming task of measuring the whole population; in addition, it saves money (Hayes, 2008).

True to the research and statistics science, the sampling procedures must be implemented in consideration of some important factors such as the population size and variance, the study objectives, the precision in results desired, the homogeneity or heterogeneity nature of the population, the study financial implications, the techniques of the sampling employed, and the accuracy looked-for in making inference about the population being studied (Sharma, 2017).

According to the WBWD documents, the total active sub-customers (target population) was 245. And by using Steven Thompson, 2012 formula to calculate the sample size at 5% confidence interval and 95% confidence level, the sample size needed was 150. The formula that was used is shown below:

Where:

n =sample size;

N = population size which is 245;

p = probability of picking a choice, which equals 0.5.

d = error population which equals to 0.05

z =confidence level at 95%, which gives z = 1.96

On other hand, semi-structured interviews were carried out with ten water sector professionals, who have a long experience and key sources of information in the services water sector. Also, those ten professionals are from different backgrounds and working in various related positions. This diversity of experience enriched the research with the valuable related information through two stages of interviews. The first is pre the questionnaire validation to verify the accurate data collection process; hence they suggested some of key questions to ensure the questions sufficiency and to customize the questionnaire especially in the organizations' framework part. The second stage of interviews was after receiving the responses to clarify the vagueness of some results. In addition, these interviews were conducted to consolidate and validate the primary data which were collected by the questionnaire.
#### 3.6 Data Analysis Technique

An online questionnaire was developed, checked and printed, and then it was distributed via Google form to those who were selected randomly. The participants were one hundred and fifty from all the eleventh West Bank governorates. Those who were selected randomly, purchase bulk water from PWA-WBWD as service providers in their regions. 100 responses were received (66% was the response rate); 15 questionnaires included incomplete data, and hence were deleted to create the main sample (85 questionnaires - 56% of the sample) for statistical analysis. Usually, many service providers suffer a lack of staff, who are working only on operation and maintenance. So, they cannot provide data continuously. In the current situation of coronavirus outbreak, these employees are on emergency status. Moreover, in most of the questionnaire distribution period days, there was a complete closure of the areas. Thus, there was a low response rate.

For quality control reasons and to facilitate the data transfer, all of the eighty-five responses were printed out, numbered and checked for outliers, missed or blank questions. So as to analyze the collected data, the questions in the questionnaire were coded, and then the entered cleaned data on the excel sheet was transferred to the Minitab datasheet. Minitab Statistical Software version 18 which was adopted, gives a comprehensive and broad range of statistical techniques that satisfies these research data analysis requirements.

Many statistical analysis tools were used by to illustrate the statistical difference between the responding organizations. But first, Kolmogorov-Smirnov test was performed to check the data normality, and based on this test result the proper tests could be determined. Table (4) summarized all the normality tests for the five expected and perceived dimensions as well as the satisfaction scale. The following null and alternative hypothesis was developed to test the normality of data:

**H**<sub>0</sub>: The sample data are not significantly different than a normal population. (At significant level of 5%)

 $H_a$ : The sample data are significantly different than a normal population. (At significant level of 5%)

The results revealed that the Sig. values are less than 0.05 which means the null hypothesis is rejected (data not normally distributed). As a consequence, non-parametric tests were used.

Descriptive statistics include means, standard deviation, frequency tables, percentage distributions, minimum, and maximum for the organizations' framework variables and other items. Wilcoxon signed-rank test was used to examine if there is a significant difference between the expected and the perceived services among the responding organizations. Whereas, Kruskal-Wallis test was used to inspect the difference between the dependent variable responses (i.e. perceived, expected, and gaps SERVQUAL dimensions) based on the independent variables (i.e. organizations' framework).

Spearman rank correlations test another non-parametric test, was conducted to investigate the strength and the direction of monotonic relationship between the number of annual complaints, annual water loss and the overall service quality and satisfaction.

Dimension	Statistic	D.F	Sig.	Result		
Expected service quality						
Tangibility	0.121	85	0.004	Not normal		
Reliability	0.174	85	0.000	Not normal		
Responsiveness	0.161	85	0.000	Not normal		
Assurance	0.132	85	0.001	Not normal		
Empathy	0.130	85	0.001	Not normal		
	Perceived service quality					
Tangibility	0.163	85	0.000	Not normal		
Reliability	0.115	85	0.007	Not normal		
Responsiveness	0.126	85	0.002	Not normal		
Assurance	0.155	85	0.000	Not normal		
Empathy	0.134	85	0.001	Not normal		
	Customer Satisfaction					
Satisfaction	0.134	85	0.001	Not normal		

### Table (4): Kolmogorov-Smirnov Test

In addition it was applied to test the relationships between the perceived SERVQUAL dimensions and the overall satisfaction. Spearman correlations coefficients values ranging between -1 and 1, where the negative value means negatively correlated, zero means uncorrelated, while the positive value means positively correlated. Table (5) was used in interpretation the correlation coefficients values (Mukaka, (2012).

Table (5): Rule of Thumb for Interpreting the Size of a Correlation Coefficient

Size of Correlation	Interpretation
0.90 to 1.00 (-0.90 to -1.00)	Very high positive (negative) correlation

0.70 to 0.90 (-0.70 to -0.90)	High positive (negative) correlation
0.50 to 0.70 (-0.50 to -0.70)	Moderate positive (negative) correlation
0.30 to 0.50 (-0.30 to -0.50)	Low positive (negative) correlation
0.00 to 0.30 (0.00 to -0.30)	Little if any correlation

Finally, multiple regression analysis was run to build a model that crystalizes the change impact of SERVQUAL dimensions on customers' satisfaction.

In this thesis, it is worth to mention that the significance level is defined to be alpha 0.05; which implies that the null hypothesis will be fail to reject if the probability (P-value) of the relevant statistical test is higher than 0.05. Besides, mean interval range was assumed to evaluate the questionnaires' items response as clarified in Table (6), while the questionnaire responses of SERVQUAL dimensions and satisfaction based on 5-point Likert scale, the range was (5-1=4) and each category length was (4/5=0.8).

Rating	Interval
Very low	1.00 - 1.80
Low	1.81 - 2.60
Moderate	2.61 - 3.40
High	3.41 - 4.20
Very High	4.21 - 5.00

 Table (6): Degrees of Evaluations of the Questionnaire Statements

#### **3.7 Reliability and Validity**

In modern research, reliability and validity are the two most critical concepts and basic features in measurement instrument assessment for a good research (Mohajan, 2017).

Where, the measurement means assigning numbers to the observations to measure a construct. Validity and reliability aimed to verify that the obtained information is trustworthiness and relevant hence enhancing the study quality. Moreover, these two prerequisites decrease the potential for imposing prejudice among researchers (Singh, 2014).

#### **3.7.1 Reliability**

Reliability is a scientific investigation that refers to consistency or reproducibility of attribute measure, or it is the test ability to produce the same response under the same circumstances (Blumberg et al., 2005). There are numerous different reliability methods to estimate the reliability coefficients as test-retest, parallel forms, split-half. However, Cronbach's Alpha is one of the most commonly used methods; it tells us how the research questionnaire items are interrelated. Hinton et al. (2004) suggested four reliability cut-off rates, which comprises excellent reliability (0.90 and above), high reliability (0.70 - 0.90), moderate reliability (0.50 - 0.70) and poor reliability (0.50 and below). Although, the reliability is crucial for research, it's not enough unless combined with validity (Wilson, 2010). The validity is discussed in the next subsection.

As shown in Table (7), the resulted reliability values in this research ranges between 0.731 and 0.936. According to Hinton et al. (2004)'s scale, the values point out excellent or high levels of reliability. Subsequently, these results ensure that the administrated questionnaire is considered a reliable instrument for this research.

Variables	No. of Items	Cronbach's alpha	
		Expected	Perceived
Tangibility	4	0.753	0.731
Reliability	5	0854	0.861
Responsiveness	4	0.895	0.855
Assurance	4	0.904	0.829
Empathy	5	0.897	0.824
Total Scores	22	0.936 0.930	
Satisfaction	7	0.90	

Table (7): The Cronbach's Alpha reliability test results

#### 3.7.2 Validity

Research validity is an instrument that assesses the extent to which the data collection method (questionnaire) measures what it is designed to measure (Robson, 2011). Also, it used to confirm that the dimensions are valid for measuring the predefined dependents variables. The validity main types are content-related, criterion-related, construct, and face validity (Creswell, 2005). In this research, the validity of the used questionnaire was confirmed by the feedback on the research questionnaire that was obtained from two academic experts before administrating it (see Appendix (B)), where they refereed it. Thus, the necessary modifications were made upon their recommendations such as omitting, rephrasing some words and clarifying the highlighted items/paragraphs. Moreover, this research questionnaire is identical to the universal SERVQUAL model questionnaire was

translated into Arabic language, it was checked that it provides the same meaning in both languages Appendix (C)

#### **3.8 Ethical Considerations**

The attention level on conducting researches ethically (personal and professional acts, and during the research activity), has both increasing and broadening in response to society's requirements of greater accountability (Zegwaard et al., 2017). So in this research, the respondents' identity had not been revealed. Moreover, all the collected information from the responding organizations were confirmed will be handle confidentially. As well as this information is presented without any change or modification. According to Denzin and Lincoln (2011), informed consent is an ethical research cornerstone. Therefore, the responding organizations and the interviewed people were informed about the objective of this research and they approved their participation. The researcher was thankful for all the literature which has led to this work in some way.

### **Chapter Four**

### **Data Analysis and Findings**

Overview

Organizations' Framework Information

Expectations and perceptions Discussion of SERVQUAL Dimensions

PWA-WBWD Customers' Satisfaction

Hypotheses testing

Multiple Regression Analysis (MRA)

Qualitative Data Analysis

#### **Chapter Four: Data Analysis and Findings**

#### 4.1 Overview

This chapters' objective is to analyze the primary data which are collected from the survey respondents.

#### **4.2 Organizations' Framework Information**

The research questionnaire consisted of ten questions to provide the organizations' framework information about the sample; this information was presented through three subsections: types, structure, and operational information of responding organizations'.

#### **4.2.1 Types of Responding Organization**

This research covered all organizations in West Bank that buy bulk water from WBWD. The organizations that responded to this research's questionnaire were: municipalities, village councils and Joint Services Council and Water Undertaking (JSCW), where the majority of responses (64.7%) which represents slightly less than two-thirds of all the responses were from village councils, followed by municipalities (28.2%) and JSCW (7.1%). This result is reasonable, as Palestine is divided according to the Ministry of Local Government into several villages and towns, many of which provide water services. These organizations are located in ten different governorates as it is shown in Table (8), and it was noticed that the lowest two responses rate was in Tubas governorate (1.2%). This value is justified because this district has only one provider which is Tubas-Tamon JSCW, Tulkarem governorate (3.5%) due to many organizations' reliance on water produced from self-owned and private wells in that region. However, the highest rate was from Jenin governorate share (28.2%).

Governorate name	Frequency	Percent
Jenin	24	28.2
Qalqaliyia	7	8.2
Tulkarem	3	3.5
Nablus	9	10.6
Ramallah & Al Bierh	8	9.4
Jerusalem	5	6.0
Salfit	7	8.2
Bethlehem	17	20.0
Hebron	4	4.7
Tubas	1	1.2
Total	85	100

Table (8): The Frequency Distribution of Responses among DifferentGovernorates- n=85

#### 4.2.2 Structure of Responding Organization

This subsection presents the variables which indicate the responding organizations' structure in terms of the sources of water that are provided to the citizens, number of employees in the water department, number of employees in the water network maintenance department. Table (9) summarizes the distribution of samples for these variables. In addition, it displays the complaints number variable that was received by the organization through the last year and the annual percentage of water loss variable.

Logically, all the responding organizations' purchase water from WBWD. In addition to the water they purchase from WBWD, they obtain water from other sources as self-owned wells and private wells in order to fulfill the shortage in quantities that is provided from WBWD. The analysis indicated that most of the responding organizations have from 1 to 10 employees working in the water department representing (89.4%) from the total numbers of responses. Moreover, 91.8% of these organizations have less than 4 employees working in the water network maintenance department, 4.7% have from 4 to 6 employees, and 3.5% have more than 10 employees. The reason why the high rate of responding organizations that have a small number of staff in the water and maintenance departments is that most of these organizations are small and served no more than 5000 people, as disclosed in the next subsection.

water sources	Frequency	Percent
WBWD	66	77.6
Private wells + WBWD	11	13.0
Self-owned wells + WBWD	7	8.2
Self-owned wells +private wells +	1	1.2
WBWD		
Total	85	100
Number of employees in the water department	Fraguancy	Dercent
Number of employees in the water department	76	
1-10	/6	89.4
11-30	8	9.4
51-100	1	1.2
Total	85	100
Number of employees in the water network		
maintenance department	Frequency	Percent
Less than 4	78	91.8
4-6	4	4.7
More than 10	3	3.5
Total	85	100

Table (9): The Frequencies of Responding Organizations' Structure Variables n=85

Although the mean of the annual percentage loss of water is 28.72%, the mean of annual complaints number was approximately 13 per 1000 of persons- the number of complaints was calculated per 1000 of persons, which helped in comparing the percentage of complaints among different organizations structures. Also the mean value was calculated after excluding one extreme value (600 complaints per 1000 of persons). By interviewing

the extreme respondent, s/he stated that this value is recorded based on complaints made through phone, and most of which could be for unjustified technical reasons. In addition, 72.9% of the responding organizations' received less than 100 complaints annually, 12.9% of the total responses had not received any complaint. Based on phone interviews, it was found that these figures do not reflect the absence of complaints, but rather the absence of effective documented complaints system in many of the responding organizations', especially in the village councils. The descriptive statistics of both variables (annual complaints and annual water loss) are summarized in Table (10).

Table (10): The descriptive statistics of annual complaints and annual percentage of water loss -n=85

Variables	Minimum	Maximum	Mean	Std. Deviation
Annual percentage of water loss	2	72	28.72	13.28
Annual complaints per 1000 of persons	.00	600.00	20.4024	69.6

#### **4.2.3 Respondents Operational Information**

Some of the responding organization operational information disclosed by three variables: the number of served population, the number of active water connections, and the number of prepaid water meters. Table (11) shows the frequencies distribution for the three variables. About 67.1% of the sample served less than 5000 persons, as mentioned in the first subsection, there are many village councils that manage and serve areas with fewer number of the population. Besides, it is recorded that 64.7% of the responding organizations have less than 1000 active water connections, where the rationality says this percentage should be to (1001-5000) category, because the majority of responses are serving less than 5000 persons. Actually, many Palestinian families share one water

connection, which is the reason behind this result. Last of all, 44.7% of all the responding organizations did not have any prepaid meter. Based on personal interviews, this percentage is attributed to the installation of prepaid water meter system (operation and maintenance) is too expensive compared to the available organizations' budget. Also, the public unacceptance for application of prepaid water meters, especially in the poor areas as these meters cut off the service in case not being recharged after the credit is consumed.

Variable	Frequency	Percent
Number of the served population	1	
Less than 5000	57	67.1
5001-15000	17	20.0
15001-30000	6	7.0
30001-80000	4	4.7
80001-150000	1	1.2
Total	85	100
Number of active water connecti	ons	
Less than 1000	55	64.7
1001-5000	25	29.4
5001-10000	4	4.7
10001-20000	1	1.2
Total	85	100
Number of prepaid water meters		
0	38	44.7
1-100	5	5.9
101-500	24	28.2
501-1000	8	9.4
More than 1000	10	11.8
Total	85	100

 Table (11): The frequency distribution of operational information variables

#### 4.3 Expectations and Perceptions Discussion of SERVQUAL Dimensions

As previously was described the fifth gap (customer gap) in Section 2.5, where this gap results from the discrepancy between customers' expectations for a service offering and their perceptions for services received. With this in mind, the negative gap signifies that there is a need for improvement. PWA-WBWD customers' expectations and perceptions were measured by answering 22 statements using a 5-point Likert scale rank. In the following five subsections, every dimension of the SERVQUAL model i.e. tangibility, reliability, responsiveness, assurance, and empathy is presented separately. The findings with the SERVQUAL scale are reviewed in the last subsection.

#### **4.3.1 The Tangibility Dimension**

The questionnaire statements that reflected the tangibility dimension were from 1- 4, the first statement is "PWA-WBWD has modern tools and equipment" denoted by Tangibility 1; the second statement is "the overall PWA-WBWD appearance is attractive" denoted by Tangibility 2; the third statement is "PWA-WBWD employees having a neat and good-looking appearance" denoted by Tangibility 3; the fourth statement is "PWA-WBWD publications appearance related to its services look attractive" denoted by Tangibility 4. Table (12) summarizes the means of expectations and perceptions for each statement. Moreover, it shows the gap between the two means.

No.	Statement	Expectation (E) Mean	Perception (P) Mean	Gap= P- E
1	Tangibility1	3.79	3.49	-0.30

Table (12): Tangibility dimension Means, n=85

2	Tangibility2	3.96	3.88	-0.08
3	Tangibility3	4.15	4.08	-0.07
4	Tangibility4	3.68	3.54	-0.14
	Total scores	3.90	3.75	-0.15

As is clear from the above table, all the statements have a negative gap, which means that the customers' means expectations of the provided service by PWA-WBWD are exceeding their means of perceptions. The total score of the expected tangibility dimension was 3.9, while the total score of the perceived tangibility dimension was 3.75. Hence, the dimension gap was -0.15. However, the statement related to (PWA-WBWD has modern tools and equipment) has the biggest gap (-0.30) in the tangibility domain.

#### **4.3.2 The Reliability Dimension**

The questionnaire statements that represented the reliability dimension were from 5 - 9; Reliability1, Reliability2, Reliability3, Reliability4, and Reliability5 were used to express these five statements, respectively. The fifth statement is "When PWA-WBWD management promises to do an action by a certain time, they commit themselves", the sixth statement is "When you have a certain problem PWA-WBWD employees show sincere concern in solving it", the seventh statement is "PWA-WBWD performs the right service in the right manner from the first time", the eighth statement is "PWA-WBWD employees provide the services at the time they promise to do so", and the ninth statement in this domain is "PWA-WBWD insists on customers error-free records". Table (13) shows the means of expectations and perceptions for each statement. Moreover, it shows the gap between the two means.

No	Statement	Expectation (E)	Perception (P)	Can-P.F
110.	Statement	Mean	Mean	Gap-1-E
1	Reliability1	3.78	3.14	-0.64
2	Reliability2	4.08	3.27	-0.81
3	Reliability3	3.82	3.34	-0.48
4	Reliability4	3.72	3.25	-0.47
5	Reliability5	3.98	3.66	-0.32
	Total scores	3.88	3.33	-0.55

Table (13): Reliability dimension Means, n=85

The results articulated that the total score for responding organizations' expectation of reliability dimension was 3.88, while the perception was 3.33. The reliability gap was - 0.55, where the reliability expectations are higher than perceptions in all reliability statements but the main gap (-0.81) was associated with the sixth statement.

#### **4.3.3** The Responsiveness Dimension

Responsiveness statements were from 10 - 13, the tenth statement (Reponsivness1) is "PWA-WBWD employees inform you exactly when a particular service will be performed", the eleventh statement (Responsivness2) is "PWA-WBWD employees are motivated and willing to provide services immediately", the twelfth statement (Responsivness3) is "PWA-WBWD employees are ready and willing to assist the customers", the thirteenth statement (Responsivness4) is "PWA-WBWD employees are never busy with their internal work to respond promptly to customers' requests". Table (14) shows the means of expectations and perceptions for each statement. Moreover, it shows the gap between the two means.

No.	Statement	Expectation (E)	Perception (P)	Gap= P- E
		Mean	Mean	
1	Responsiveness1	3.78	3.36	-0.42
2	Responsiveness2	3.91	3.51	-0.40
3	Responsiveness3	3.98	3.61	-0.37
4	Responsiveness4	3.82	3.26	-0.56
	Total scores	3.87	3.43	-0.44

Table (14): Responsiveness dimension Means, n=85

Results reveal that responsiveness customers' means expectations of the provided service by PWA-WBWD are higher than their means perceptions. The total score of the expected responsiveness dimension was 3.87, while the total score of the perceived responsiveness dimension was 3.43. Hence, the dimension gap was -0.44. However, the biggest gap (-0.56) in the responsiveness scale appeared in the statement (PWA-WBWD employees are never busy with their internal work to respond promptly to customers' requests).

#### **4.3.4 The Assurance Dimension**

The questionnaire statements that formed the assurance dimension were from 14 - 17, these statements were coded as Assurance1, Assurance2, Assurance3, and Assurance4. The fourteenth statement is "PWA-WBWD employees' behavior instills confidence of PWA-WBWD services in customers", the fifteenth statement is "PWA-WBWD customers feel

secure in their transaction with PWA-WBWD", the sixteenth statement is "PWA-WBWD employees are courteous when they are dealing with the customers", the seventeenth statement is "PWA-WBWD employees have the full knowledge to answer the customers' questions and inquiries". Table (15) shows the means of expectations and perceptions for each statement. Moreover, it shows the gap between the two means.

No.	Statement	Expectation (E)	Perception (P)	Gap= P- E
1.00		Mean	Mean	
1	Assurance1	4.08	3.80	-0.28
2	Assurance2	4.05	3.65	-0.40
3	Assurance3	4.25	3.95	-0.30
4	Assurance4	4.12	3.68	-0.44
	Total scores	4.12	3.77	-0.35

Table (15): Assurance dimension means, n=85

Outcomes uncover the means of assurance expectations dimension are surpassing the means perceptions, which lead to negative gap ranging between -0.28 to -0.44, where the greatest gap is for the statement "PWA-WBWD employees have the full knowledge to answer the customers' questions and inquiries". The total score of the assurance expectation dimension was 4.12, while the total score of the assurance perception dimension was 3.77. Hence, the dimension gap was -0.35.

#### **4.3.5 The Empathy Dimension**

The statements that shaped the last dimension were from 18 – 22; the eighteenth statement (Empathy1) is "PWA-WBWD pay individual attention to its customers", the nineteenth statement (Empathy2) is "PWA-WBWD operating hours are convenient to all categories of its customers", the twentieth statement (Empathy3) is "PWA-WBWD employees give its customers personal attention", the twenty-first statement (Empathy4) is "PWA-WBWD puts its customers' interest at the forefront of its concerns", the twenty-second statement (Empathy5) is "PWA-WBWD employees understand the special needs of their customers". Table (16) shows the means of expectations and perceptions for each statement. Moreover, it shows the gap between the two means.

No	Statement	Expectation (E)	Perception (P)	Gap= P- E	
110.	Statement	Mean	Mean		
1	Empathy1	3.91	3.56	-0.35	
2	Empathy2	3.88	3.61	-0.27	
3	Empathy3	3.86	3.44	-0.42	
4	Empathy4	3.91	3.53	-0.38	
5	Empathy5	4.05	3.59	-0.46	
	Total scores	3.92	3.55	-0.37	

Table (16): Empathy dimension means, n=85

Results disclose that empathy customers' means expectations of the provided service by PWA-WBWD are higher than their mean perceptions, which leads to negative gap ranging between -0.27 to -0.46, where the statement "PWA-WBWD employees understand the

special needs of their customers" has the main gap (-0.46). The total score of the expected empathy dimension was 3.92, while the total score of the perceived empathy dimension was 3.55. Hence, the dimension gap was -0.37.

#### 4.3.6 Overall SERVQUAL Scale Findings

The overall service quality is measured by finding the mean gap score of all SERVQUAL dimensions. Besides, the gap score analysis had enabled to find out how PWA-WBWD customers perceive service quality and which of service quality dimensions the customers are satisfied with. According to Parasuraman et al. (1985), the more positive score (perception (P) minus expectation (E)) means higher service quality perception and thereby leading to a higher customers' satisfaction level.

In this regard, Table (17) summarizes the mean of PWA-WBWD customers' expectations and perceptions for each dimension of the SERVQUAL model as well as the average overall SERVQUAL score based on 85 responding organizations'. As shown, the reliability dimension reported the largest gap (-0.55), followed by responsiveness dimension (-0.44). On the other hand, the smallest gap obtained from the tangibility dimension. The gaps of assurance and empathy were close to each other (-0.35) and (-0.37) respectively. Moreover, the total PWA-WBWD customers' expectations were SERVQUAL model (3.94), while their total perceptions were (3.57). Thus, the average unweighted gap of overall SERVQUAL model score was (-0.37). It is clear from the negative gaps that the customers' expectations from the service provided by PWA-WBWD exceed their perceptions of service quality.

Ν	Dimension	Expectation (E)	Perception (P)	Gan=P-E	
0.		Mean	Mean		
1	Tangibility	3.90	3.75	-0.15	
2	Reliability	3.88	3.33	-0.55	
3	Responsiveness	3.87	3.43	-0.44	
4	Assurance	4.12	3.77	-0.35	
5	Empathy	3.92	3.55	-0.37	
Ave SEI	erage overall unweighted RVQUAL model score	3.94	3.57	-0.37	

Table (17): Means and the average unweighted overall SERVQUAL model score, n=85

In the previous table, the SERVQUAL model score was calculated with an assumption of same relative importance for all of the five dimensions. On the other hand, the relative importance for each of SERVQUAL dimension presented by Zeithaml et al. (1990), they disclosed the importance as the following: tangibility (11%), reliability (32%), responsiveness (22%), assurance (19%), and empathy (16%). Overall, the total weighted SERVQUAL model score was (-0.42), the figures are shown in Table (18) besides to the weighted gap for each dimension.

 Table (18): Weighted gap for the overall SERVQUAL model, n=85

Dimension	Gap	Zeithaml et al. source	
		Weight	Weighted Gap
Tangibility	-0.15	11%	-0.017

Reliability	-0.55	32%	-0.176
Responsiveness	-0.44	22%	-0.097
Assurance	-0.35	19%	-0.067
Empathy	-0.37	16%	-0.059
Overall average weighted SERVQUAL model score		100%	-0.42

#### 4.4 PWA-WBWD Customers' Satisfaction

Perception of service quality level is merged with the customers' satisfaction level. As mentioned previously, many of researchers confirmed the fact that to increase the customers' satisfaction, the perceived of service quality should be high and close to customers' expectation. PWA-WBWD customers' satisfaction level was measured by seven items. The seven items asked the respondents about their satisfaction level of some particular attributes of service quality.

Table (19) summarizes the means of each satisfaction item. The overall level of PWA-WBWD customers' satisfaction was moderate (3.34). However, two of items namely: "I am satisfied with the staff performance" and "I am speaking positively about PWA-WBWD performance" have high scores. While the remaining five items as: "I am satisfied with the level of provided service quality", "the provided service met the customers' expectation", "I am satisfied with PWA-WBWD mechanism of providing service", "I am satisfied with how PWA-WBWD handling the complaints" and "I am satisfied with the followed policies by PWA-WBWD" have moderate customers' satisfaction level.

### Table (19): Mean of satisfaction items

No	Item	Mean	Satisfaction Level
•			

1	Quality of provided service	3.38	Moderate
2	Staff performance	3.79	High
3	Provided service met the expectation	3.04	Moderate
4	Speaking positively about the performance	3.55	High
5	Mechanism of providing the service	3.21	Moderate
6	Handling the complaints	3.06	Moderate
7	The policies followed to execute its activities	3.36	Moderate
Ove	erall Satisfaction Score	3.34	Moderate

#### **4.5 Hypotheses Testing**

The main hypotheses are tested in the following subsections. As was mentioned in Chapter

Three, the data distribution was not normal, so the non-parametric tests used to verify the

hypotheses. The first six null hypotheses are:

- H1: There is a significant difference between service *tangibility expectations* and service *tangibility perceptions* from the sub-customers' viewpoint at significance level of 5%.
- H<sub>2</sub>: There is a significant difference between service *reliability expectations* and service *reliability perceptions* from the sub-customers' viewpoint at significance level of 5%.
- H<sub>3</sub>: There is a significant difference between service *responsiveness expectations* and service *responsiveness perceptions* from the sub-customers' viewpoint at significance level of 5%.
- H4: There is a significant difference between service *assurance expectations* and service *assurance perceptions* from the sub-customers' viewpoint at significance level of 5%.
- H<sub>5</sub>: There is a significant difference between service *empathy expectations* and service *empathy perceptions* from the sub-customers' viewpoint at significance level of 5%.
- H<sub>6</sub>: There is no significant difference in the perceived, expected, and gap SERVQUAL dimensions due to the organizations' framework variables at significance level 5%.

# **4.5.1 First Hypothesis: Testing the Difference between Service Tangibility Expectations, and Perceptions.**

Two hypotheses were formulated to test this subsection. The null hypothesis  $(H_0)$  and the alternative hypothesis  $(H_1)$  are:

 $H_0$ : There is no significant difference between PWA-WBWD customers' expectations, and their perception of the tangibility dimension at significance level 5%.

 $H_1$ : There is a significant difference between PWA-WBWD customers' expectations, and their perception of the tangibility dimension at significance level 5%.

The Wilcoxon signed-rank test was conducted at a significant level  $\alpha$ =0.05, to examine the difference between expected and perceived scores of the tangibility dimension. The results are listed inside Table (20), shows the P-value=0.023 which is less than 0.05 and that induces to reject the null hypothesis. Expressly, there is a significant difference between PWA-WBWD customers' tangibility expectations, and their perceptions. Where, the tangibility expectations median is (4) while the tangibility perceptions median is (3.75).

 Table (20): Wilcoxon Signed Ranks Test for the Tangibility Dimension

Dimension	Median	Wilcoxon Statistic	N for Test	P- Value
Tangibility Expectation	4.000			
Tangibility Perception	3.750			
Tangibility Gap	0.000	477.50	54	0.023*
Negati	34			
Positiv	20			
Т	lies		31	

# **4.5.2 Second Hypothesis: Testing the Difference between Service Reliability Expectations, and Perceptions.**

Two hypotheses were formulated to test this subsection. The null hypothesis  $(H_0)$  and the

alternative hypothesis (H<sub>1</sub>) are:

H<sub>0</sub>: There is no significant difference between PWA-WBWD customers' expectations, and their perception of the reliability dimension at significance level 5%.

H<sub>1</sub>: There is a significant difference between PWA-WBWD customers' expectations, and their perception of the reliability dimension at significance level 5%.

The Wilcoxon signed-rank test was conducted at a significant level  $\alpha$ =0.05, to examine the difference between expected and perceived scores of the reliability dimension. The results are listed inside Table (21), shows the P-value=0.000 which is less than 0.05 and that induces to reject the null hypothesis. Expressly, there is a significant difference between PWA-WBWD customers' reliability expectations, and their perceptions. Where, the reliability expectations median is (4) while the reliability perceptions median is (3.4).

 Table (21): Wilcoxon Signed Ranks Test for the Reliability Dimension

Dimension	Median	Wilcoxon Statistic	N for Test	P-Value
Reliability Expectation	4.000			
<b>Reliability Perception</b>	3.400			
Reliability Gap	-0.400	122.5	62	0.000*
Negative Rank			55	
Positive Rank			7	
Ties			23	

## **4.5.3 Third Hypothesis: Testing the Difference between Service Responsiveness Expectations, and Perceptions**

Two hypotheses were formulated to test this subsection. The null hypothesis (H<sub>0</sub>) and the alternative hypothesis (H<sub>1</sub>) are:

H<sub>0</sub>: There is no significant difference between PWA-WBWD customers' expectations, and their perception of the responsiveness dimension at significance level 5%.

H<sub>1</sub>: There is a significant difference between PWA-WBWD customers' expectations, and their perception of the responsiveness dimension at significance level 5%.

The Wilcoxon signed-rank test was conducted at a significant level  $\alpha$ =0.05, to examine the difference between expected and perceived scores of the responsiveness dimension. The results are listed inside Table (22), shows the P-value=0.000 which is less than 0.05 and that induces to reject the null hypothesis. Expressly, there is a significant difference between PWA-WBWD customers' responsiveness expectations, and their perceptions. Where, the responsiveness expectations median is (4) while the responsiveness perceptions median is (3.5).

Dimension	Median	Wilcoxon Statistic	N for Test	P-Value
<b>Responsiveness Expectation</b>	4.000			
<b>Responsiveness Perception</b>	3.500			
<b>Responsiveness Gap</b>	-0.250	129	51	0.000*
Negative Ra	44			
Positive Ra	7			
Ties			34	

 Table (22): Wilcoxon Signed Ranks Test for the Responsiveness Dimension

# **4.5.4** Fourth Hypothesis: Testing the Difference between Service Assurance Expectations, and Perceptions.

Two hypotheses were formulated to test this subsection. The null hypothesis  $(H_0)$  and the

alternative hypothesis (H<sub>1</sub>) are:

H<sub>0</sub>: There is no significant difference between PWA-WBWD customers' expectations, and their perception of the assurance dimension at significance level 5%.

H<sub>1</sub>: There is a significant difference between PWA-WBWD customers' expectations, and their perception of the assurance dimension at significance level 5%.

The Wilcoxon signed-rank test was conducted at a significant level  $\alpha$ =0.05, to examine the difference between expected and perceived scores of the assurance dimension. The results are listed inside Table (23), shows the P-value=0.000 which is less than 0.05 and that induces to reject the null hypothesis. Expressly, there is a significant difference between PWA-WBWD customers' assurance expectations and their perceptions although the median of assurance expectations and perceptions have the same value (4).

 Table (23): Wilcoxon Signed Ranks Test for the Assurance Dimension

Dimension	Median	Wilcoxon Statistic	N for Test	P-Value
Assurance Expectation	4.000			
Assurance Perception	4.000			
Assurance Gap	0.000	126	45	0.000*
Negativ	39			
Positive	6			
Ti	es		40	

# **4.5.5 Fifth Hypothesis: Testing the Difference between Service Empathy Expectations, and Perceptions.**

Two hypotheses were formulated to test this subsection. The null hypothesis (H<sub>0</sub>) and the

alternative hypothesis (H<sub>1</sub>) are:

H<sub>0</sub>: There is no significant difference between PWA-WBWD customers' expectations, and their perception of the empathy dimension at significance level 5%.

 $H_1$ : There is a significant difference between PWA-WBWD customers' expectations, and their perception of the empathy dimension at significance level 5%.

The Wilcoxon signed-rank test was conducted at a significant level  $\alpha$ =0.05, to examine the difference between expected and perceived scores of the empathy dimension. The results are listed inside Table (24), shows the P-value=0.000 which is less than 0.05 and that induces to reject the null hypothesis. Expressly, there is a significant difference between PWA-WBWD customers' empathy expectations, and their perceptions. Where, the empathy expectations median is (4) while the empathy perceptions median is (3.6).

Dimension	Median	Wilcoxon Statistic	N for Test	P-Value
Empathy Expectation	4.000			
Empathy Perception	3.600			
Empathy Gap	0.000	111	48	0.000*
Negativ	40			
Positiv	8			
Ti	ies		37	

Table (24): Wilcoxon Signed Ranks Test for the Empathy Dimension

### 4.5.6 Sixth Hypothesis: Testing the Difference of Perceived, Expected and Gap SERVQUAL Dimensions based on Organizations' Framework Variables

**4.5.6.1** First sub-hypothesis: Testing with regard to organizations' type.

Kruskal-Wallis was used to test the means difference of perceived service, expected service, and dimension gap with respect to the organizations' type. In order to test this sub-hypothesis, three additional sub-hypotheses were derived:

I.  $H_0$ : There is no significant difference in the perceived SERVQUAL dimensions due to the organization' type at significance level 5%.

 $H_1$ : There is a significant difference in the perceived SERVQUAL dimensions due to the organization' type at significance level 5%.

As shown in Table (25) all the p-values for the perceived SERVQUAL dimensions are higher than 0.05. As a result, the null hypothesis cannot be rejected. Therefore, the organizations' type had no effect on all the perceived SERVQUAL dimensions. Moreover, the higher absolute Z- value indicates the higher groups' mean from the overall mean. While the negative and positive signs, indicate the group mean rank is greater or less than the overall mean rank.

Dimension	Z – valu	e	P- value	Result
Perceived Tangibility	Municipality	0.37	_	Fail to reject H <sub>0</sub>
	JSCW	-1.07	0.544	
	Village Council	0.23	_	
Perceived Reliability	Municipality	1	_	Fail to reject H <sub>0</sub>
	JSCW	1.18	0.235	
	Village Council	-1.57	_	
Perceived	Municipality	0.39	_	Fail to reject H <sub>0</sub>
Responsiveness	JSCW	0.22	0.886	
Responsiveness	Village Council	-0.49	-	
Perceived Assurance	Municipality	0.64	_	Fail to reject H <sub>0</sub>
	JSCW	0.55	0.643	
	Village Council	-0.90	_	
Perceived Empathy	Municipality	0.19	_	Fail to reject H <sub>0</sub>
	JSCW	0.86	0.649	
	Village Council	-0.64	_	

 Table (25): Kruskal-Wallis Test to compare the difference in perceived service due to organizations' type

**II.** H<sub>0</sub>: There is no significant difference in the expected SERVQUAL dimensions due to the organization' type at significance level 5%.

H1: There is a significant difference in the expected SERVQUAL dimensions due

to the organization' type at significance level 5%.

 Table (26): Kruskal-Wallis Test to compare the difference in expected service due to organizations' type

Dimension	Z – valu	e	P- value	Result
Expected Tangibility	Municipality	-0.39	_	Fail to reject H <sub>0</sub>
	JSCW	0.24	0.912	
	Village Council	0.23	-	
Expected Reliability	Municipality	0.45	_	Fail to reject H <sub>0</sub>
	JSCW	1.26	0.353	
	Village Council	-1.10	-	
Expected	Municipality	-0.72		Fail to reject H <sub>0</sub>
Responsiveness	JSCW	0.55	0.699	
Responsiveness	Village Council	0.38	-	
Expected Assurance	Municipality	-0.39	_	Fail to reject H <sub>0</sub>
	JSCW	1	0.581	
	Village Council	-0.17	-	
Expected Empathy	Municipality	-0.88	_	Fail to reject H <sub>0</sub>
	JSCW	1.42	0.292	
	Village Council	0.07	_	

As shown in Table (26) all the resulted p-values are higher than the significant level  $\alpha$ = 0.05, thus the null hypothesis cannot be rejected, and the outputs concluded that the organizations' type has no effect on all the expected SERVQUAL dimensions.

**III. H**<sub>0</sub>: There is no significant difference in the dimensions gap due to the organization'

type at significance level 5%.

H1: There is a significant difference in the dimensions gap due to the organization'

type at significance level 5%.

Table (27): Kruskal-Wallis	Test to compare the differen	nce in dimensions gap due to
	organizations' type	

Dimension	Z – valu	Z – value		Result
Tangibility Gap	Municipality	-0.03		Fail to reject H <sub>0</sub>
	JSCW	-1.02	0.562	
	Village Council	0.58		

Reliability Gap	Municipality	0.45	_	Fail to reject H <sub>0</sub>
	JSCW	-0.46	0.834	
	Village Council	-0.17	-	
<b>Responsiveness Gap</b>	Municipality	0.06	_	Fail to reject H <sub>0</sub>
	JSCW	-0.67	0.785	
	Village Council	0.30	-	
Assurance Gap	Municipality	0.34	_	Fail to reject H <sub>0</sub>
	JSCW	-1.36	0.355	
	Village Council	0.41	-	
Empathy Gap	Municipality	0.72	_	Fail to reject H <sub>0</sub>
	JSCW	-1.08	0.449	
	Village Council	010		

As shown in Table (27) the p-values for the SERVQUAL gaps are higher than 0.05. Consequently, the null hypothesis cannot be rejected. Therefore, the SERVQUAL dimensions gaps are not affected by the organizations' type.

#### **4.5.6.2 Second sub-hypothesis: Testing with regard to governorates.**

Kruskal-Wallis was used to test the means difference of perceived service, expected service, and dimension gap with respect to the governorate in which the responding organization is located. In order to test this sub-hypothesis, three additional sub-hypotheses were derived:

**I. Ho:** There is no significant difference in the perceived SERVQUAL dimensions due to which governorate the organization is located in at significance level 5%.

H<sub>1</sub>: There is a significant difference in the perceived SERVQUAL dimensions due

The test results in Table (28) detected that there are no significant differences in the perceived dimensions of responding organizations according to their location in different governorates for four dimensions: reliability with p- value = 0.102 > 0.05, responsiveness with p-value = 0.217 > 0.05, assurance with p-value = 0.07 > 0.05, and empathy with p-

to which governorate the organization is located in at significance level 5%.

value = 0.085 > 0.05. However, tangibility dimension shows a significant difference with p- value = .025 < 0.05. Therefore, the null hypothesis cannot be rejected the perceived dimensions of reliability, responsiveness, assurance, and empathy. On the other hand, the null hypothesis is rejected for the perceived tangibility dimension. This means the perceived tangibility is affected by the governorate which the organization is located in.

 Table (28): Kruskal-Wallis Test to compare the difference in perceived service due to governorate

Dimension	Perceived	Perceived	Perceived	Perceived	Perceived
	Tangibility	Reliability	Responsiveness	Assurance	Empathy
P-value	0.025*	0.102	0.217	0.07	0.085

**II. H**<sub>0</sub>: There is no significant difference in the expected SERVQUAL dimensions due to the governorate at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the expected SERVQUAL dimensions due to the governorate at significance level 5%.

The effect of the responding organization location in different governorates on the SERVQUAL expected dimensions responses were analyzed. The Kruskal-Wallis test results in Table (29) revealed that the p-values of SERVQUAL dimensions are: 0.074, 0.278, 0.261, 0.349, and 0.218 all of them are higher than the significant level 5%, so the null hypotheses cannot be rejected. Thus, the responding organization location had no impact on responses.

Dimension	Expected	Expected	Expected	Expected	Expected
	Tangibility	Reliability	Responsiveness	Assurance	Empathy
P-value	0.074	0.278	0.261	0.349	0.218

 Table (29): Kruskal-Wallis Test to compare the difference in expected service due to governorate

**III. H**<sub>0</sub>: There is no significant difference in the SERVQUAL dimensions gaps due to the governorate at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the SERVQUAL dimensions gaps due to the governorate at significance level 5%.

The Kruskal- Wallis results are listed Table (30). All the p-values of SERVQUAL dimensions are above the significant level of 0.05. To be specific, the null hypotheses failed to be rejected. Furthermore, there is no effect on SERVQUAL gaps by the location of the responding organization.

 Table (30): Kruskal-Wallis Test to compare the difference in SERVQUAL dimensions gaps due to governorate

Dimension	Tangibility	Reliability	Responsiveness	Assurance	Empathy
	Gap	Gap	Gap	Gap	Gap
P-value	0.548	0.311	0.571	0.332	0.329

**4.5.6.3** Third sub-hypothesis: Testing with regard to the number of employees in water department.

The dependent variable of number of employees in water department formed from five categories, they coded as 1 (1-10 employees), 2 (11-30 employees), 3 (31-50 employees), 4 (51-100 employees), and 5 (more than 100 employees). To test the difference of

perceived service, expected service, and dimension gap with respect to the water department employees' number in the responding organization Kruskal-Wallis was applied. This sub-hypothesis was divided into three additional sub-hypotheses:

**I. H**<sub>0</sub>: There is no significant difference in the perceived SERVQUAL dimensions due to the employees' number in water department at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the perceived SERVQUAL dimensions due to the employees' number in water department at significance level 5%.

As shown in Table (31) all the p-values for the perceived tangibility dimension, reliability dimension, responsiveness dimension, assurance dimension, and empathy dimension are: 0.371, 0.432, 0.774, 0.326, and 0.122 respectively, all are higher than 0.05. As a result, the null hypotheses cannot be rejected. Therefore, there is no significant difference in the responses due to the different five categories of employees' number.

 Table (31): Kruskal-Wallis Test to compare the difference in perceived service due to employees' number in water department

Dimension	Z – valı	16	P- value	Result
Perceived Tangibility	1	0.35		Fail to reject H <sub>0</sub>
	2	0.14	0.371	
	4	-1.39		
Perceived Reliability	1	-1.18		Fail to reject H <sub>0</sub>
	2	0.92	0.432	
	4	0.88		
Perceived	1	-0.64		Fail to reject H <sub>0</sub>
Responsiveness	2	0.71	0.774	
Responsiveness	4	-0.08		
Perceived Assurance	1	-1.36		Fail to reject H <sub>0</sub>
	2	1.07	0.326	
	4	0.98		
Perceived Empathy	1	-1.78		Fail to reject H <sub>0</sub>
	2	1.32	0.122	
	4	1.51		

**II. H**<sub>0</sub>: There is no significant difference in the expected SERVQUAL dimensions due to the employees' number in water department at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the expected SERVQUAL dimensions due to the employees' number in water department at significance level 5%.

After Kruskal-Wallis test was conducted as shown in Table (32), the outputs indicated that there is no significant difference in the expected SERVQUAL dimensions responses due to the employees' water department number. While, the p-values are higher than 0.05 (expected tangibility=0.204, expected reliability=0.224, expected responsiveness=0.759, expected assurance=0.342, and expected empathy=0.108).

Dimension	Z – valı	ıe	P- value	Result
Expected Tangibility	1	-1.75		Fail to reject H <sub>0</sub>
	2	1.56	0.204	
	4	0.77		
Expected Reliability	1	-1.16		Fail to reject H <sub>0</sub>
	2	0.64	0.224	
	4	1.57		
Expected	1	-0.71		Fail to reject H <sub>0</sub>
Responsiveness	2	0.73	0.759	
Responsiveness	4	0.06		
Expected Assurance	1	-1.04		Fail to reject H <sub>0</sub>
	2	0.62	0.342	
	4	1.28		
Expected Empathy	1	-1.86		Fail to reject H <sub>0</sub>
	2	1.4	0.108	
	4	1.51		

 Table (32): Kruskal-Wallis Test to compare the difference in expected service due to employees' number in water department

III. Ho: There is no significant difference in the dimensions gap due to the employees' number in water department at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the dimensions gap due to the employees' number in water department at significance level 5%.

The test results in Table (33) detected that there are no significant differences in the SERVQUAL dimensions gap according to the water department employees' number for four dimensions: reliability, responsiveness, assurance, and empathy where their p-values are higher than 0.05. However, tangibility dimension shows a significant difference with p- value = 0.028 < 0.05. Therefore, the null hypotheses failed cannot be rejected for the dimensions gaps of reliability, responsiveness, assurance, and empathy. On the other hand, the null hypothesis is rejected for the tangibility dimension. This means the tangibility gap is affected by the number of employees in water department.

Dimension	Z – valı	ue	P- value	Result
Tangibility Gap	1	2.46		
	2	-2.01	0.028*	Reject H <sub>0</sub>
	4	-1.57		
Reliability Gap	1	0.26		Fail to reject H <sub>0</sub>
	2	0.07	0.649	
	4	-0.92		
<b>Responsiveness Gap</b>	1	0.57	0.829	Fail to reject H <sub>0</sub>
	2	-0.48		
	4	-0.33		
Assurance Gap	1	-0.02		Fail to reject H <sub>0</sub>
	2	0.36	0.588	
	4	-0.92		
Empathy Gap	1	0.50		Fail to reject H <sub>0</sub>
	2	-0.32	0.787	
	4	-0.57		

 Table (33): Kruskal-Wallis Test to compare the difference in SERVQUAL dimensions gaps due to employees' number in water department

### **4.5.6.4** Fourth sub-hypothesis: Testing with regard to the number of employees in water network maintenance department.

To test the difference of perceived service, expected service, and dimension gap with respect to the employees' number of network water maintenance department in the responding organization Kruskal-Wallis was conducted. This sub-hypothesis was divided into three additional sub-hypotheses:
I. H<sub>0</sub>: There is no significant difference in the perceived SERVQUAL dimensions due to the employees' number of network water maintenance department at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the perceived SERVQUAL dimensions due to the employees' number of network water maintenance department at significance level 5%.

As shown in Table (34) all the p-values for the perceived tangibility dimension, reliability dimension, responsiveness dimension, assurance dimension, and empathy dimension are: 0.932, 0.074, 0.412, 0.204 and 0.114 respectively, all are higher than 0.05. As a result, the null hypotheses cannot be rejected. Therefore, there is no significant difference in the responses due to the employees' number in network water maintenance department.

 Table (34): Kruskal-Wallis Test to compare the difference in perceived service due to employees' number of network water maintenance department

Dimonsion	7	- 0	Duralura	Degral4
Dimension	L - van	le	P- value	Result
Perceived Tangibility	Less than 4	0.00		Fail to reject H <sub>0</sub>
	employees			
	4 - 6	0.25	0.932	
	employees		_	
	More than 10	-0.29	_	
	employees			
Perceived Reliability	Less than 4	-2.20		Fail to reject H <sub>0</sub>
	employees			
	4 - 6	1.23	0.074	
	employees		_	
	More than 10	1.86	_	
	employees			
Perceived	Less than 4	-1.31		Fail to reject H <sub>0</sub>
Dosponsivonoss	employees		_	
Responsiveness	4 - 6	1.09	0.412	
	employees			
	More than 10	0.70	_	
	employees			
	Less than 4	-1.64	0.204	Fail to reject H <sub>0</sub>
	employees			

Perceived Assurance	4-6	0.79		
	employees		_	
	More than 10 employees	1.54	-	
Perceived Empathy	Less than 4 employees	-1.89	_	Fail to reject H <sub>0</sub>
	4 – 6 employees	0.84	0.114	
	More than 10 employees	1.86		

II. Ho: There is no significant difference in the expected SERVQUAL dimensions due to the employees' number of network water maintenance department at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the expected SERVQUAL dimensions due to the employees' number of network water maintenance department at significance level 5%.

The Kruskal-Wallis test results in Table (35) revealed that there are no significant differences in the expected SERVQUAL dimensions due to the employees' number of network water maintenance department for four dimensions: tangibility, reliability, responsiveness, and assurance, where their p-values are higher than 0.05.

 Table (35):Kruskal-Wallis Test to compare the difference in expected service due to employees' number of network water maintenance department

Dimension	Z – valı	16	P- value	Result
Expected Tangibility	Less than 4	-2.06		Fail to reject H <sub>0</sub>
	employees		0.069	
	4 - 6	0.86	_	
	employees		_	
	More than 10	2.08	-	
	employees			
Expected Reliability	Less than 4	-2.37		Fail to reject H <sub>0</sub>
	employees		0.052	
	4-6	1.48	-	
	employees			

	More than 10 employees	1.83		
Expected	Less than 4	-1.77		Fail to reject H <sub>0</sub>
Responsiveness	employees		0.127	
Responsiveness	4 - 6	1.95		
	employees		_	
	More than 10 employees	0.40		
Expected Assurance	Less than 4	-2.05		Fail to reject H <sub>0</sub>
r	employees		0.116	jere o
	4 - 6	1.51	-	
	employees			
	More than 10	1.31	-	
	employees			
Expected Empathy	Less than 4	-2.51		Reject H <sub>0</sub>
	employees		0.033*	
	4-6	1.42		
	employees		_	
	More than 10	2.11	_	
	employees			

However, empathy dimension shows a significant difference with p- value = 0.033 < 0.05. Therefore, the null hypotheses failed to be rejected for the dimensions gaps of tangibility, reliability, responsiveness, and assurance. On the other hand, the null hypothesis is rejected for the empathy dimension. This means the expected empathy responses is affected by the employees' number of network water maintenance department.

III. H<sub>0</sub>: There is no significant difference in the dimensions gap due to the employees' number of network water maintenance department at significance level 5%.
H<sub>1</sub>: There is a significant difference in the dimensions gap due to the employees' number of network water maintenance department at significance level 5%.

The Kruskal-Wallis test results in Table (36) detected that there are no significant differences in the SERVQUAL dimensions gap with respect to the employees' number network water maintenance department for four dimensions: reliability, responsiveness,

assurance, and empathy where their p-values are higher than 0.05. However, tangibility dimension shows a significant difference with p- value = 0.030 < 0.05. Therefore, the null hypotheses failed to be rejected for the dimensions gaps of reliability, responsiveness, assurance, and empathy. On the other hand, the null hypothesis is rejected for the tangibility dimension. This means the tangibility gap is affected by the employees' number network water maintenance department

# Table (36): Kruskal-Wallis Test to compare the difference in SERVQUAL dimensions gaps due to employees' number of network water maintenance department

Dimension	Z – valu	ie	P- value	Result
Tangibility Gap	Less than 4	2.22		
	employees		_	Reject H <sub>0</sub>
	4 - 6	-0.78	0.030*	
	employees		_	
	More than 10	-2.42	_	
	employees			
Reliability Gap	Less than 4	0.34		Fail to reject H <sub>0</sub>
	employees		_	
	4 - 6	-0.27	0.941	
	employees		_	
	More than 10	-0.20	-	
	employees			
<b>Responsiveness Gap</b>	Less than 4	1.28		Fail to reject H <sub>0</sub>
	employees		_	
	4 - 6	-1.51	0.283	
	employees		_	
	More than 10	0.17		
	employees			
Assurance Gap	Less than 4	1.37		Fail to reject H <sub>0</sub>
	employees		_	
	4-6	-1.35	0.305	
	employees		_	
	More than 10	-0.49		
	employees			
Empathy Gap	Less than 4	1.96		Fail to reject H <sub>0</sub>
	employees		_	
	4 - 6	-1.53	0.122	
	employees		_	
	More than 10	-1.17		
	employees			

**4.5.6.5** Fifth sub-hypothesis: Testing with regard to the number of the served population.

The difference of perceived service responses, expected service responses, and dimension gap with respect to the served population number by the responding organization was tested through Kruskal-Wallis test. This sub-hypothesis was divided into three additional subhypotheses:

**I. H**<sub>0</sub>: There is no significant difference in the perceived SERVQUAL dimensions due to the served population number at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the perceived SERVQUAL dimensions due to the served population number at significance level 5%.

As shown in Table (37) all the p-values for the perceived tangibility dimension, reliability dimension, responsiveness dimension, assurance dimension, and empathy dimension are: 0.650, 0.389, 0.824, 0.628 and 0.499 respectively, all are higher than 0.05. As a result, the null hypotheses failed to be rejected. Therefore, there is no significant difference in the responses due to the number of the served population.

Dimension	Z – value		P- value	Result
Perceived Tangibility	Less than 5000	0.34		Fail to reject H <sub>0</sub>
	5001 - 15,000	0.36		
	15,001 - 30,000	-0.09	0.650	
	30,001 - 80,000	-0.61		
	80,001 - 150,000	-1.39		
Perceived Reliability	Less than 5000	-1.89		Fail to reject H <sub>0</sub>
	5001 - 15,000	1.43		
	15,001 - 30,000	0.75	0.389	
	30,001 - 80,000	0.15		
	80,001 - 150,000	0.88		
	Less than 5000	-0.91		Fail to reject H <sub>0</sub>
	5001 - 15,000	1.13		
	15,001 - 30,000	0.26	0.824	

 Table (37): Kruskal-Wallis Test to compare the difference in perceived service due to the served population number

Perceived	30,001 - 80,000	-0.38		
Responsiveness	80,001 - 150,000	-0.08		
Perceived Assurance	Less than 5000	-0.46		Fail to reject H <sub>0</sub>
	5001 - 15,000	0.08		
	15,001 - 30,000	0.98	0.628	
	30,001 - 80,000	-0.80		
	80,001 - 150,000	0.98		
Perceived Empathy	Less than 5000	-0.83		Fail to reject H <sub>0</sub>
	5001 - 15,000	0.40	0.499	
	15,001 - 30,000	0.70		
	30,001 - 80,000	-0.53		
	80,001 - 150,000	1.51		

II. Ho: There is no significant difference in the expected SERVQUAL dimensions due to the served population number at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the expected SERVQUAL dimensions due to the served population number at significance level 5%.

The Kruskal Wallis Test is used. The test results listed in Table (38) presented that all dimensions p-value are greater than the significant level  $\alpha$ = 0.05. Therefore, the null hypotheses failed to be rejected. This means, there is no effect of the served population number on the expected SERVQUAL dimensions responses.

 

 Table (38): Kruskal-Wallis Test to compare the difference in expected service due to the served population number

Dimension	Z – value		P- value	Result
Expected Tangibility	Less than 5000	0.35		Fail to reject H <sub>0</sub>
	5001 - 15,000	-1.05		
	15,001 - 30,000	-0.16	0.635	
	30,001 - 80,000	1.01		
	80,001 - 150,000	0.77		
Expected Reliability	Less than 5000	-1.10		Fail to reject H <sub>0</sub>
	5001 - 15,000	-0.11		
	15,001 - 30,000	1.24	0.348	
	30,001 - 80,000	0.34		
	80,001 - 150,000	1.57		
	Less than 5000	0.37		Fail to reject H <sub>0</sub>

Expected	5001 - 15,000	-0.88		
Responsiveness	15,001 - 30,000	0.88	0.829	
Responsiveness	30,001 - 80,000	-0.26		
	80,001 - 150,000	0.06		
Expected Assurance	Less than 5000	0.41		Fail to reject H <sub>0</sub>
	5001 - 15,000	-1.25		
	15,001 - 30,000	1.11	0.346	
	30,001 - 80,000	-0.53		
	80,001 - 150,000	1.28		
Expected Empathy	Less than 5000	0.19		Fail to reject H <sub>0</sub>
	5001 - 15,000	-1.18		
	15,001 - 30,000	0.81	0.402	
	30,001 - 80,000	0.06		
	80,001 - 150,000	1.51		

III. H<sub>0</sub>: There is no significant difference in the SERVQUAL dimensions gaps due to the served population number at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the SERVQUAL dimensions gaps due to the served population number at significance level 5%.

The Kruskal Wallis Test is used. The test results listed in Table (39) presented that all dimensions p-value are greater than the significant level  $\alpha$ = 0.05. Therefore, the null hypotheses failed to be rejected. This means, there is no effect of the served population number on the SERVQUAL dimensions gap.

Dimension	Z – value		P- value	Result
Tangibility Gap	Less than 5000	0.60		Fail to reject H <sub>0</sub>
	5001 - 15,000	0.68		
	15,001 - 30,000	0.09	0.148	
	30,001 - 80,000	-1.91		
	80,001 - 150,000	-1.57		
Reliability Gap	Less than 5000	-0.69		Fail to reject H <sub>0</sub>
	5001 - 15,000	1.94		
	15,001 - 30,000	-1.16	0.243	
	30,001 - 80,000	-0.27		
	80,001 - 150,000	-0.92		
	Less than 5000	-0.08		Fail to reject H <sub>0</sub>
	5001 - 15,000	0.80		

 Table (39): Kruskal-Wallis Test to compare the difference in the SERVQUAL dimension gap due to the served population number

Responsiveness Gap	15,001 - 30,000	-0.83	0.847	
	30,001 - 80,000	-0.16		
	80,001 - 150,000	-0.33		
Assurance Gap	Less than 5000	0.00		Fail to reject H <sub>0</sub>
	5001 - 15,000	0.88		
	15,001 - 30,000	-0.81	0.671	
	30,001 - 80,000	-0.23		
	80,001 - 150,000	-0.92		
Empathy Gap	Less than 5000	-0.56	0.594	Fail to reject H <sub>0</sub>
	5001 - 15,000	1.35		
	15,001 - 30,000	-0.15		
	30,001 - 80,000	-0.83		
	80,001 - 150,000	-0.57		

**4.5.6.6** Sixth sub-hypothesis: Testing with regard to the number of active water connections.

Kruskal-Wallis was used to test the means difference of perceived service, expected service, and dimension gap with respect to the active water connections numbers. In order to test this sub-hypothesis, it was divided into three additional sub-hypotheses:

**I. H**<sub>0</sub>: There is no significant difference in the perceived SERVQUAL dimensions due to the active water connections number at significance level 5%.

H1: There is a significant difference in the perceived SERVQUAL dimensions due

to the active water connections number at significance level 5%.

As shown in Table (40) all the p-values for the perceived tangibility dimension (0.467),

reliability dimension (0.352), responsiveness dimension (0.988), assurance dimension

(0.782), and empathy dimension (0.512), are higher than the significance level of 0.05.

Table (40):Kruskal-Wallis Test to compare the difference in perceived service due
to the active water connections number

Dimension	Z – value		P- value	Result
Perceived Tangibility	Less than 1000	0.86		Fail to reject H <sub>0</sub>
	1001 - 5000	-0.35	0.467	
	5,001 - 10,000	-0.49		
	10,001 - 20,000	-1.39		
	Less than 1000	-1.45		Fail to reject H <sub>0</sub>
	1001 - 5000	0.77		

Perceived Reliability	5,001 - 10,000	1.18	0.352	
	10,001 - 20,000	0.88		
Perceived	Less than 1000	-0.16		Fail to reject H <sub>0</sub>
Rosponsivonoss	1001 - 5000	0.03		
Responsiveness	5,001 - 10,000	0.34	0.988	
	10,001 - 20,000	-0.08		
Perceived Assurance	Less than 1000	-0.10		Fail to reject H <sub>0</sub>
	1001 - 5000	-0.25		
	5,001 - 10,000	0.25	0.782	
	10,001 - 20,000	0.98		
Perceived Empathy	Less than 1000	-0.21		Fail to reject H <sub>0</sub>
	1001 - 5000	-0.13		
	5,001 - 10,000	-0.01	0.512	
	10,001 - 20,000	1.51		

As a result, the null hypotheses were failed to be rejected. Therefore, there is no significant difference in the perceived dimensions responses due to the active water connections number.

**II. H**<sub>0</sub>: There is no significant difference in the expected SERVQUAL dimensions due to the active water connections number at significance level 5%.

H<sub>1</sub>: There is a significant difference in the expected SERVQUAL dimensions due

to the active water connections number at significance level 5%.

As shown in Table (41), Kruskal-Wallis test revealed that all the p-values for the expected tangibility dimension (0.167), reliability dimension (0.389), responsiveness dimension (0.288), assurance dimension (0.183), and empathy dimension (0.111), all are higher than the significant level of 0.05.

Table (41):Kruskal-Wallis test to compare the difference in expected service due to
the active water connections number

Dimension	Z – value		P- value	Result
Expected Tangibility	Less than 1000	1.18		Fail to reject H <sub>0</sub>
	1001 - 5000	-1.94		
	5,001 - 10,000	1.13	0.167	
	10,001 - 20,000	0.77		
	Less than 1000	-0.41		Fail to reject H <sub>0</sub>
	1001 - 5000	-0.63		

Expected Reliability	5,001 - 10,000	1.48	0.176	
	10,001 - 20,000	1.57		
<b>Expected Responsiveness</b>	Less than 1000	1.09		Fail to reject H <sub>0</sub>
	1001 - 5000	-1.69	0.288	
	5,001 - 10,000	1.15		
	10,001 - 20,000	0.06		
Expected Assurance	Less than 1000	0.85	_	Fail to reject H <sub>0</sub>
	1001 - 5000	-1.65		
	5,001 - 10,000	0.98	0.183	
	10,001 - 20,000	1.28		
Expected Empathy	Less than 1000	0.60		Fail to reject H <sub>0</sub>
	1001 - 5000	-1.61		
	5,001 - 10,000	1.34	0.111	
	10,001 - 20,000	1.51		

As a result, the null hypotheses were failed to reject. Therefore, there is no significant difference in the expected dimensions responses due to the active water connections number.

**III. H**<sub>0</sub>: There is no significant difference in the SERVQUAL dimensions gaps due to the active water connections number at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the SERVQUAL dimensions gaps due to the active water connections number at significance level 5%.

As shown in Table (42), Kruskal-Wallis test revealed that all the p-values are higher than 0.05 for the tangibility dimension gap (0.070), reliability dimension gap (0.176), responsiveness dimension gap (0.498), assurance dimension gap (0.356), and empathy dimension gap (0.170).

Table (42): Kruskal-Wallis test to compare the difference in the SERVQU	JAL
dimensions gaps due to the active water connections number	

Dimension	Z – value		P- value	Result
Tangibility Gap	Less than 1000	0.34		Fail to reject H <sub>0</sub>
	1001 - 5000	0.91	0.075	
	5,001 - 10,000	-1.91		
	10,001 - 20,000	-1.57		
	Less than 1000	-1.01		Fail to reject H <sub>0</sub>

Reliability Gap	1001 - 5000	1.49		
	5,001 - 10,000	-0.46	0.389	
	10,001 - 20,000	-0.92		
<b>Responsiveness Gap</b>	Less than 1000	-0.30		Fail to reject H <sub>0</sub>
	1001 - 5000	0.96	0.498	
	5,001 - 10,000	-1.22		
	10,001 - 20,000	-0.33		
Assurance Gap	Less than 1000	-0.23		Fail to reject H <sub>0</sub>
	1001 - 5000	1.00		
	5,001 - 10,000	-1.18	0.356	
	10,001 - 20,000	-0.92		
Empathy Gap	Less than 1000	-0.17		Fail to reject H <sub>0</sub>
	1001 - 5000	1.18		
	5,001 - 10,000	1.86	0.170	
	10,001 - 20,000	-0.57		

As a result, the null hypotheses were failed to reject. Therefore, there is no significant difference in the SERVQUAL dimensions gaps due to the active water connections number.

### 4.5.6.7 Seventh sub-hypothesis: Testing with regard to the sources of water.

Kruskal-Wallis was used to test the means difference of perceived service, expected service, and dimension gap with respect to the bulk water sources the responding organization used to provide the water services. The sources from which the bulk water is obtained were coded as 1(from WBWD), 2(from private well + WBWD), 3(self-owned + WBWD), and 4 (WBWD+ private wells + self-owned wells). In order to test this sub-hypothesis, it was divided into three additional sub-hypotheses:

 H<sub>0</sub>: There is no significant difference in the perceived SERVQUAL dimensions due to the bulk water sources at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the perceived SERVQUAL dimensions due to the bulk water sources at significance level 5%.

Dimension	Z – value		P- value	Result
Perceived Tangibility	1	-0.45		Fail to reject H <sub>0</sub>
	2	0.22	0.691	
	3	-0.05		
	4	1.16		
Perceived Reliability	1	-0.10		Fail to reject H <sub>0</sub>
	2	-0.16	0.959	-
	3	0.46		
	4	-0.29		
Perceived	1	0.38		Fail to reject H <sub>0</sub>
Responsiveness	2	-0.58	0.867	
	3	0.34		
	4	-0.53		
Perceived Assurance	1	-0.39		Fail to reject H <sub>0</sub>
	2	0.30	0.625	
	3	-0.26		
	4	1.24		
Perceived Empathy	1	-0.28		Fail to reject H <sub>0</sub>
	2	0.33	0.825	-
	3	-0.30		
	4	0.84		

### Table (43): Kruskal-Wallis Test to compare the difference in perceived service due to the bulk water sources

As shown in the above table (43) Kruskal-Wallis test revealed that all the p-values are higher than 0.05 for the perceived tangibility dimension (0.691), reliability dimension (0.959), responsiveness dimension (0.867), assurance dimension (0.625), and empathy dimension (0.825). As a result, the null hypotheses were failed to be rejected. Therefore, there is no significant difference in the perceived SERVQUAL responses due to the sources of bulk water.

II. H<sub>0</sub>: There is no significant difference in the expected SERVQUAL dimensions due to the bulk water sources at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the expected SERVQUAL dimensions due to the bulk water sources at significance level 5%.

There is no significant difference in the expected SERVQUAL responses due to the sources of bulk water. The results of Kruskal-Wallis test in Table (44) indicated that all the p-values are higher than 0.05 for the expected SERVQUAL dimensions. Thus, the null hypotheses failed to be rejected.

Dimension	Z – value		P- value	Result
Expected Tangibility	1	-2.14		Fail to reject H <sub>0</sub>
	2	1.72	0.178	
	3	0.84		
	4	0.77		
Expected Reliability	1	-1.64		Fail to reject H <sub>0</sub>
	2	2.06	0.143	
	3	0.36		
	4	-0.98		
Expected	1	-1.51	0.227	Fail to reject H <sub>0</sub>
Bosnonsivonoss	2	1.58		
Responsiveness	3	0.76		
	4	-1.02		
Expected Assurance	1	-1.59		Fail to reject H <sub>0</sub>
	2	1.60	0.367	
	3	0.28		
	4	0.47		
Expected Empathy	1	-1.01		Fail to reject H <sub>0</sub>
	2	1.75	0.343	
	3	-0.64		
	4	0.06		

 

 Table (44): Kruskal-Wallis test to compare the difference in expected service due to the bulk water sources

III. H<sub>0</sub>: There is no significant difference in the SERVQUAL dimensions gaps due to the bulk water sources at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the SERVQUAL dimensions gaps due to the bulk water sources at significance level 5%.

The Kruskal-Wallis test results in Table (45) detected that there are no significant differences in the SERVQUAL dimensions gap with respect to the bulk water sources for three dimensions: tangibility, reliability, and assurance, where their p-values are higher

than 0.05. However, responsiveness and empathy dimensions show a significant difference with p- value = 0.023 < 0.05, and 0.044 < 0.05 respectively. Therefore, the null hypotheses failed to be rejected for the dimensions gaps of tangibility, reliability, and assurance. On the other hand, the null hypothesis is rejected for the responsiveness and empathy dimensions. This means the responsiveness and empathy gaps are affected by the bulk water sources.

Dimension	Z – value		P- value	Result
Tangibility Gap	1	2.26		Fail to reject H <sub>0</sub>
	2	-2.13	0.097	
	3	-0.93		
	4	0.29		
Reliability Gap	1	1.90		Fail to reject H <sub>0</sub>
	2	-2.24	0.140	
	3	-0.27		
	4	0.33		
<b>Responsiveness Gap</b>	1	2.51	0.023*	Reject H <sub>0</sub>
	2	-2.71		
	3	-0.78		
	4	0.75		
Assurance Gap	1	1.99		Fail to reject H <sub>0</sub>
	2	-2.16	0.091	
	3	-0.65		
	4	0.67		
Empathy Gap	1	1.69		Reject H <sub>0</sub>
	2	-2.66	0.044*	
	3	0.43		
	4	0.65		

 Table (45): Kruskal-Wallis test to compare the difference in the SERVQUAL dimensions gaps due to the bulk water sources

**4.5.6.8** Eighth sub-hypothesis: Testing with regard to the number of prepaid water meters.

Kruskal-Wallis was used to test the means difference of perceived service, expected service, and dimension gap with respect to the prepaid water meters number. In order to test this sub-hypothesis, it was divided into three additional sub-hypotheses:

**I. H**<sub>0</sub>: There is no significant difference in the perceived SERVQUAL dimensions due to the number of prepaid water meters at significance level 5%.

**H**<sub>1</sub>: There is a significant difference in the perceived SERVQUAL dimensions due to the number of prepaid water meters at significance level 5%.

As shown in Table (46), Kruskal-Wallis test revealed that all the p-values are higher than 0.05 for the perceived tangibility dimension (0.327), reliability dimension (0.087), responsiveness dimension (0.221), assurance dimension (0.359), and empathy dimension (0.246). As a result, the null hypotheses were failed to be rejected. Therefore, there is no significant difference in the perceived SERVQUAL responses due to the number of prepaid water meters.

Dimension	Z – value		P- value	Result
Perceived Tangibility	No prepaid water	-1.43		Fail to reject H <sub>0</sub>
	meter			
	1 - 100	0.00	0.327	
	101 - 500	1.78		
	501 - 1000	-0.95		
	More than 1000	0.57		
Perceived Reliability	No prepaid water	0.04		Fail to reject H <sub>0</sub>
	meter		0.087	
	1 - 100	-2.19		
	101 - 500	1.32		
	501 - 1000	-1.34		
	More than 1000	0.90		
Perceived	No prepaid water	-0.11		Fail to reject H <sub>0</sub>
Responsiveness	meter		0.221	
Responsiveness	1 - 100	-1.29		
	101 - 500	1.72		
	501 - 1000	-1.47		
	More than 1000	0.03		
<b>Perceived Assurance</b>	No prepaid water	0.94		Fail to reject H <sub>0</sub>
	meter		0.359	
	1 - 100	-0.48		
	101 - 500	0.74		
	501 - 1000	-1.79		
	More than 1000	-0.52		

 Table (46): Kruskal-Wallis Test to compare the difference in perceived service due to the number of prepaid water meters

Perceived Empathy	rceived Empathy No prepaid water meter			Fail to reject H <sub>0</sub>
	1 - 100	-0.90		
	101 - 500	0.91	-	
	501 - 1000	-1.98		
	More than 1000	-0.18		

**II. H**<sub>0</sub>: There is no significant difference in the expected SERVQUAL dimensions due to the number of prepaid water meters at significance level 5%.

H1: There is a significant difference in the expected SERVQUAL dimensions due

to the number of prepaid water meters at significance level 5%.

There is no significant difference in the expected SERVQUAL responses due to the number of prepaid water meters. The results of Kruskal-Wallis test in Table (47) indicated that all the p-values are higher than 0.05 for the expected SERVQUAL dimensions. Thus, the null hypotheses failed to be rejected.

 

 Table (47): Kruskal-Wallis Test to compare the difference in expected service due to the number of prepaid water meters

Dimension	Z – value		P- value	Result
Expected Tangibility	No prepaid water	-1.55		Fail to reject H <sub>0</sub>
	meter			
	1 - 100	-0.94	0.176	
	101 - 500	101 – 500 2.31		
	501 - 1000	-0.41		
	More than 1000	0.22		
Expected Reliability	No prepaid water meter	-1.23		Fail to reject H <sub>0</sub>
	1 - 100	0.39	0.793	
	101 - 500	0.86		
	501 - 1000	0.01		
	More than 1000	0.41		
Expected	No prepaid water	-1.78		Fail to reject H <sub>0</sub>
Responsiveness	meter			
Responsiveness	1 - 100	0.61	0.364	
	101 - 500	1.33		
	501 - 1000	0.91		
	More than 1000	-0.38		
	No prepaid water meter	-1.24		Fail to reject H <sub>0</sub>

Expected Assurance	1 - 100	0.26	0.785	
	101 - 500	0.95		
	501 - 1000	0.36		
	More than 1000	0.08		
Expected Empathy	No prepaid water	-1.49		Fail to reject H <sub>0</sub>
	meter		0.575	
	1 - 100	0.32		
	101 - 500	1.45		
	501 1000	014		
	301 - 1000	.014		

**III. H**<sub>0</sub>: There is no significant difference in the SERVQUAL dimensions gaps due to the number of prepaid water meters at significance level 5%.

H1: There is a significant difference in the SERVQUAL dimensions gaps due to

the number of prepaid water meters at significance level 5%.

Table (48) detected that there are no significant differences in the SERVQUAL dimensions

gap with respect to the number of prepaid water meters for the dimensions: tangibility,

responsiveness, assurance, and empathy where their p-values are higher than 0.05.

Dimension	Z – value		P- value	Result
Tangibility Gap	No prepaid water	0.09		Fail to reject H <sub>0</sub>
	meter			
	1 – 100	1.18	0.698	
	101 - 500	-0.98		
	501 - 1000	0.09		
	More than 1000	0.29		
Reliability Gap	No prepaid water	0.51		Reject H <sub>0</sub>
	meter			
	1 - 100	-2.80	0.040*	
	101 - 500	0.66		
	501 - 1000	-0.91		
	More than 1000	1.17		
<b>Responsiveness Gap</b>	No prepaid water	0.84		Fail to reject H <sub>0</sub>
	meter		0.249	
	1 - 100	-1.68		
	101 - 500	0.63		
	501 - 1000	-1.34		
	More than 1000	0.26		
	No prepaid water	1.26		Fail to reject H <sub>0</sub>
	meter		0.281	

Table (48): Kruskal-Wallis Test to compare the difference in SERVQUAL
dimensions gaps due to the number of prepaid water meters

Assurance Gap	1 - 100	-1.20		
	101 - 500	0.66		
	501 - 1000	-1.14		
	More than 1000	-0.94		
Empathy Gap	No prepaid water	2.19		Fail to reject H <sub>0</sub>
	meter			
	1 - 100	-1.35	0.146	
	101 - 500	-0.36		
	501 - 1000	-0.96		
	More than 1000	-1.02		

However, reliability dimension shows a significant difference with p- value = 0.040 < 0.05. Therefore, the null hypotheses failed to be rejected for the dimensions gaps of tangibility, responsiveness, assurance, and empathy. On the other hand, the null hypothesis is rejected for the reliability dimension. This means the reliability gap are affected by the number of prepaid water meters.

### 4.5.7 Correlations

This subsection discussed the last two independents variables: the number on annual complaints and the annual percentage of water loss. Spearman's rank correlation was applied to test the seventh and eighth null hypotheses and to identify the relationship direction and strength:

**H7:** There is no significant correlation between annual complaints number and overall service quality at significance level 5%.

**H**<sub>8</sub>: There is no significant correlation between annual percentage of water loss and overall service quality at significance level 5%.

Table (49) represents the correlation results, which indicates a significant relationship with p-values less than 0.05 between the annual complaints number and the overall service quality (-0.249). The relation is little negative correlation; which means if the number of

received complaints increased, the overall level of perceived SERVQUAL dimensions, will decrease. On the other hand, there is no significant relationship with the variable of annual water loss percentage.

 Table (49): Correlations between the service quality, and annual complaints number, annual water loss percentage

			Overall Service Quality
Spearman's rho	Complaints	Correlation Coefficient	249 <sup>*</sup>
	per 1000	Sig. (2-tailed)	.021
		Ν	85
	Annual % of	Correlation Coefficient	.018
	water loss	Sig. (2-tailed)	.869
		Ν	85

### 4.6 Multiple Regression Analysis (MRA)

### 4.6.1 Testing Assumption for Regression

This sub-section dedicated to building a statistical predictive model (Multiple Regression Model) that shows how the dependent variable (i.e. PWA-WBWD customers' satisfaction) is triggered and affected by the change of the multiple independent variables (i.e. Perceived SERVQUAL dimensions). Moreover, Multiple Regression Model signposts that the high independent variables are all required and adequate for high dependent variable value and vice-versa (Woodside, 2013). There are four key assumptions of regression analysis namely: linearity, normality, homoscedasticity, and no multicollinearity. In order to generalize the sample model to the entire population, it is worth mentioning when one of the assumptions or more is/are violated, the model is no longer reliable, nor it is appropriate to predict the population parameter. Next, these assumptions and the application to verify them will be discussed in detail.

The linearity is the first assumption, which requires linear relationship between variables. In this research, this assumption tested through a scatter plot matrix. The matrix showed the relationships between each of perceived SERVQUAL dimensions (i.e. Tangibility, Reliability, Responsiveness, Assurance, and Empathy) and customers' satisfaction. The Figure (6) revealed a clear linear association between the mentioned variables. Where, APT stands for perceived tangibility, APR stands for perceived reliability, APRS stands for perceived responsiveness, ASS stands for perceived assurance, APE stands for perceived empathy, and ASAT stands for customer satisfaction.



Figure (6): Scatter plot matrix for regression linearity.

The normality is the second assumption, which states the residual regression (error between the actual value and predicted value) is normally distributed. As shown in Figure (7) the residual normality is approved.



Figure (7): The normal probability plot for the residual regression

✓ The homoscedasticity is the third assumption, which requires the residual variance to be constant. In other words, the error value is the same across all the independent variables values. This assumption tested through a scatter plot of residuals and predicted (fitted) values. Figure (8) clarified the results, where there is no clear pattern. As a consequence, the data is homoscedasticity.



Figure (8): Pattern of Residuals

✓ No multicollinearity is the fourth and the last key assumption, which assumes the independent variables are uncorrelated to each other. Variance inflation factor (VIF) is used to test this assumption. If correlation occurs among the independent variables, the standard error of predictors' coefficients will rise and hence the predictor's coefficients variance are inflated, this inflation measured by VIF. Various thumb rules for VIF values have published in the literature; however a commonly known thumb rule is that VIF value equal 10 or higher may be reason for serious concern. Table (50) revealed all the VIF values are less than 10 which indicated the multicollinearity assumption is verified, the highest value equals 5.32 but it is not enough to worry about.

Dimension	Tolerance	VIF
Perceived tangibility	0.488	2.05
Perceived reliability	0.270	3.70
Perceived responsiveness	0.248	4.02
Perceived assurance	0.188	5.32
Perceived empathy	0.247	4.06

Table (50): Variance Inflation Factor (VIF) of perceived SERVQUAL dimensions

4.6.2 The Overall Relation of perceived SERVQUAL dimensions and customers' satisfaction

The regression analysis passed all the four assumptions as exhibited in the previous subsection. Accordingly, the multiple regression model was conducted to test the following hypotheses:

**Ho:** There is no significant prediction of the dependent variable (customer satisfaction) by the selected independent variables (perceived of tangibility, reliability, responsiveness, assurance, and empathy) at significance level 0.05.

**H**<sub>1</sub>: At least one of the independent variables is useful in the prediction of the dependent variable at significance level 0.05.

As shown in Table (51), p-value is 0.000 which is less than 0.05 and that leads to reject the null hypothesis. In other words, at least there is one of the perceived SERVQUAL dimensions (independents variables) explained the variance in PWA-WBWD customers' satisfaction (dependent variable). As a result, the regression model is significant.

Model	Sum of Squares	Degrees of Freedom	Mean Square	F- Statistic	Sig.
Regression	32.712	5	6.542	32.751	0.000*
Residual	15.781	79	0.200		
Total	48.494	84			

Table (51): ANOVA test for Overall Significance of Regression Model

#### 4.6.3 Single Perceived SERVQUAL Dimension Contribution

In this subsection, which of perceived SERVQUAL dimensions impacts and contributes in explaining the variance in the variable of customer satisfaction was tested, that was applied through the ninth null hypothesis:

**H**<sub>9</sub>: There is no significant impact of perceived SERVQUAL dimensions (tangibility, reliability, responsiveness, assurance, and empathy) on sub-customers' satisfaction at significance level 5%.

The regression output of the five perceived SERVQUAL dimensions Table (52), indicates that two of the dimensions namely reliability and assurance are meaningful to add them in the regression model to predict PWA-WBWD customers' satisfaction.

	Coefficient	Std.	Coefficient			Result
Term	В	Error	В	T- value	P- value	
Constant	0.195	0.329		0.59	0.555	
Tangibility	0.024	0.122	0.017	0.20	0.844	Fail to reject H <sub>0</sub>
Reliability	0.249	0.108	0.318	2.58	0.012	Reject H <sub>0</sub>
Responsiveness	0.021	0.123	0.022	0.17	0.863	Fail to reject H <sub>0</sub>
Assurance	0.336	0.154	0.324	2.18	0.032	Reject H <sub>0</sub>
Empathy	0.222	0.139	0.207	1.59	0.115	Fail to reject H <sub>0</sub>

Table (52): Single perceived SERVQUAL dimensions regression results

On the other hand, the tangibility, responsiveness and empathy dimensions with large pvalues are not statistically significant nor they are associated with the changes of PWA-WBWD customers' satisfaction. To illustrate, if PWA-WBWD improves the perceived reliability and assurance levels, their customers' satisfaction level will be increased. The standardized coefficient beta ( $\beta$ ) ranges from 0 to1 or 0 to -1 and it works as a correlation coefficient. Moreover, it determines the direction of the relationship between the SERVQUAL dimensions and the dependent variable, as shown in Table (52) all the relations are positive. Also, it ranks the relationship strength of dimensions variables with the customer satisfaction variable. The assurance and reliability dimensions have the strongest relationship with  $\beta$  values 0.324 and 0.318 respectively.

The unstandardized coefficient beta (B) displays the line slope between the SERVQUAL dimensions variables and the customers' satisfaction variable. The values of (B) for each of the SERVQUAL dimensions represent the change magnitude in customers' satisfaction variable when each of the five selected independents variables shifts one unit.

### 4.6.4 The Multiple Regression Model Equation

The multiple regression model equation of this research, which aimed to assess the impact of SERVQUAL dimensions on customers' satisfaction, is as resulted from the above subsection:

### Customer Satisfaction = 0.195 + (0.249) Reliability + (0.336) Assurance.

According to the multiple regression equation, if PWA-WBWD improves the reliability by one unit PWA-WBWD sub-customers' satisfaction will increase by (0.249) plus the constant value (0.195), meanwhile if PWA-WBWD improve assurance by one unit their sub-customers' satisfaction will increase by (0.336) plus the constant value (0.195).

Coefficient determination measures the overall data goodness of fit for this model, where R- square indicates that 67.4% of the variation in the customers' satisfaction is explained by the model-independent variables. However, the R –square may be misleading when adjust the number of independent variables, so R- square adjusted controls this by it is just increased if the new independent variable actually affects the dependent variable. In this model, R square adjusted value is 65.3%. Finally, the R square predicted indicates that

(61.3%) this model will predict the customer satisfaction variable in the future for new observation. Table (53) summarizes all the coefficient determinations.

Table (53): Coefficient of Multiple Determination						
S	<b>R-square</b>	R-square(adjusted)	R-square(predicted)			
0.447288	67.41%	65.34%	61.34%			

Table (53): Coefficient of Multiple Determination

### 4.6.5 Perceived SERVQUAL Dimensions and Customer Satisfaction

This sub-section measures the degree of relationships between perceived SERVQUAL dimensions (tangibility, reliability, responsiveness, assurance, and empathy) and PWA-WBWD sub-customers' satisfaction. As it showed through Spearman's rank correlation coefficient in Table (54), all the SERVQUAL dimensions have p-value <0.05, which lead to reject the tenth null hypotheses (**H**<sub>10</sub>: There is no significant relationships between the two variables at significance level 5%). Accordingly, perceived dimensions of reliability and assurance have a high positive correlation with overall satisfaction. Meanwhile, a moderate positive correlation was found between the perceived tangibility, responsiveness, empathy and the overall satisfaction.

	Saustaction								
		Perceived tangibility	Perceived reliability	Perceived responsiveness	Perceived assurance	Perceived empathy			
l on	Spearman's	.542**	.724**	.667**	.762**	.695**			
acti	rho								
Ove tisf	Sig. (2-tailed)	.000	.000	.000	.000	.000			
Sa	Ν	85	85	85	85	85			

 

 Table (54): The correlations between the Perceived SERVQUAL dimensions and Satisfaction

### 4.6.6 Overall Service quality and Customer Satisfaction

Finally, to shape the relationship between the perceived service quality (mean of all SERVQUAL perceived dimensions) correlation test was conducted to verify the eleventh

null hypothesis (**H**<sub>11</sub>). Table (55) stated that there is no significant correlation between the two variables at significance level of 0.05 (perceived service quality and customers' satisfaction). The result was that the null hypothesis is rejected. Moreover, Spearman's correlation value is 0.780 which indicates high positive correlation (Mukaka, (2012).

		Service Quality	<b>Overall Satisfaction</b>
Service Quality	Spearman's rho	1	.780**
	Sig. (2-tailed)		.000
	Ν	85	85
Overall	Spearman's rho	.780**	1
Satisfaction	Sig. (2-tailed)	.000	
	Ν	85	85

Table (55): Correlations between the service quality and customer satisfaction

#### **4.7 Qualitative Data Analysis**

Within this section, semi-structured interviews' questions that are rooted from the quantitative data analysis results were used as an attempt to justify the reasons behind the SERVQUAL dimensions gaps that are found based on the responses from the collected sample (see Appendix (D)). Ten interviews were made; these targeted the most related personnel to this research topic. These include the following job titles: Technical Advisor, General Director of Training and Development, General Director of WBWD Well Sites, Finance Department Director, Data Bank Department Director, Policies and Technical Support Director, Microbiology Lab Section Head, Revenues Section Head, Water Quality and Sterilization Specialist Head and Consumer Affairs Section Head (see Appendix (E)). Each have been asked questions related to the tasks they performed, that would support, strengthen and make clear the information that was collected, in addition the thematic

analysis method was used to interpret their answers to serve the objectives of this research, as it shown in Table (56).

Codes	Fable (56): Thematic Analysis Results         Issue of discussion	Central Theme
Availability of Resources on Time	<ul> <li>Lack of using up-to-date technologies</li> <li>Using of depreciated equipment</li> <li>Financial Budget deficit</li> <li>Insufficient water resources</li> <li>Most of water network are worn out</li> <li>Conditional Donors funds</li> <li>Spare parts and tools shortage</li> <li>Inability to provide professional specialized staff in different fields.</li> <li>High cost of lab devices or equipment maintenance</li> <li>Public- Private partnership are not</li> </ul>	Preparing of a comprehensive plan to guarantee availability of resources on time
Employees' Skills, Knowledge and Experiences	<ul> <li>Lack of capacity building and training programs</li> <li>Knowledge transfer failure</li> <li>Unavailability of cadre to work on specialized equipment</li> <li>High turnover related to the contracts employees</li> <li>Unified data base are not used</li> </ul>	Providing appropriate capacity building programs and incentives system
PWA-WBWD Regulations,	<ul> <li>✓ Lack of two-way communication between PWA-WBWD and sub- customers</li> <li>✓ Procurement procedures are complicated</li> </ul>	Regular upgrading and adapting of

Procedures,	$\checkmark$	Complaints handling procedures are	necessary
Management, Laws		sophisticated	regulations,
	$\checkmark$	Centralization and bureaucracy	8,
and By-Laws	$\checkmark$	Reporting procedures snags	procedures and
	$\checkmark$	Endorsement delay of related laws, by-	laws
		laws and manual procedures	
	$\checkmark$	Poor planning of storing spare parts.	

It should be mentioned that all codes that can be improved by PWA-WBWD were listed above. Nonetheless, the Israeli occupation plays a significant role in the negative dimension gaps which is beyond the capacity of PWA-WBWD to improve this role is shown clearly in the followings obstacles: employees locomotion approvals in some areas, discriminatory water policies and practices, delay of imported equipment and spare parts delivery, prohibited some of materials from Palestinian market entry, and water cutoffs.

## **4.7.1** First Theme: Preparing of a comprehensive plan to guarantee availability of resources on time

The first theme had the highest number of issues; it can be solved by preparing a comprehensive plan to guarantee the availability of all resources types that could be utilized on time. By applying this plan all the issues can be positively tackled, and leads to meet the sub-customers' expectations and increase the level of their satisfaction. The usage of worn-out infrastructure which deepens the water shortage problem, the depreciated equipment used (ex. Pumps in some wells, generators, and turbines), the not using of developed technologies such as: building Geographic Information system (GIS), applying prepaid water meter system, and installation and utilization of SCADA system which are

attributed to lack of needed funds all these increases the sub-customers' dissatisfaction, which affects negatively effort (increases), efficiency, and quality of the provided services by PWA-WBWD (decrease).

# **4.7.2 Second Theme: Providing appropriate capacity building programs and incentives system**

The second theme has a special priority due to the crucial role the staff plays in running the sector, the presence of untrained, inexperienced, and non-confident personnel increases the sub-customers' dissatisfaction. The tendency should be given to maintaining a skilled staff within the sub-customers' and PWA-WBWD institutions, through providing an orientation related to the contracted tasks, up-to-date capacity building programs, supply the modernized equipment, and tempting salary and incentives system. This might help in cutting down the seepage of experienced contracted employees.

## **4.7.3 Third Theme: Regular upgrading and adapting of necessary regulations, procedures and laws**

The last theme is the dynamo that controls the first two. Without this theme, there is no way to control and monitor neither the resources nor the staff. The interviewees' stated that this theme resulted from two reasons. The first is internal due PWA-WBWD is a centralized organization structure that consume extra time to make the decisions, solving the complaints, and responding to inquiries. On the other hand, the external reason is due to the delay in enacting legislation and regulatory laws, such as the connections fee and tariff law, and the sector reform approval. Ultimately, both reasons shaped the complications of the procedures that took a long time to complete the workflow.

Thus the regular assessments of the current procedures, regulations, management, laws, and by-Laws are required. Where this theme had shown the degree to which it contributes to negative dimension gaps and reflected where the update has to be made. If applied, this would lead to sub-customers and the whole water sector satisfaction.

### **Chapter Five**

### Discussion

Overview

Research Overall Results

Tangibility Dimension

**Reliability Dimension** 

Responsiveness Dimension

Assurance Dimension

Empathy Dimension

Independent Variables

Satisfaction Scale

### **Chapter Five: Discussion**

#### **5.1 Overview**

This chapter provides the main quantitative and qualitative findings discussion. The overall result of this research was compared with conducted studies from the literature. In addition, each dimension outcome is linked with the previous related literature. Next, the results related to the independent variables are discussed. Finally, the results associated to the sub-customers' satisfaction are presented.

### **5.2 Research Overall Results**

The research results revealed that the service providers in West Bank have expectations of the water services provided by PWA-WBWD higher than they perceived. These findings were approved to all of SERVQUAL dimensions (i.e. tangibility, reliability, responsiveness, assurance, and empathy). Thus, there were negative gaps in scores of all five dimensions. This overall result of the research is confirmed with Mukokoma and Van Dijk (2011) study conducted to assess the water service delivery in Uganda and Tanzania. Another study result to improve the public water service delivery agrees with this research result is Gowela et al. (2017). In addition, the negative gaps results of all SERVQUAL dimensions coincide with the results reached by Ojo (2011), Ching (2004), Martinović et al. (2017), Kansal et al. (2017), Raina (2018), Salleh and Othman (2019), and Kansara (2020).

### **5.3 Tangibility Dimension**

The first dimension in the SERVQUAL model is the tangibility dimension, which describes several elements of the company's structure appearance as physical facilities, equipment,

staff, technology, tools and communication materials. According to Davis et al. (2003) outlined the tangibles as service physical affirmation. Moreover, a clear and appealing appearance of physical environmental conditions resulted from the service providers' care of details and their given information (Fitzsimmons and Fitzsimmons, 2001).

The tangibility dimension gap was the smallest one between all the SERVQUAL dimensions (-0.15), which is approved by the hypothesis testing as it indicated a significant difference between the responding organizations' expectations and their perceptions related to the tangibility dimension. These findings are in parallel to the study result of Kassim and Bojei (2002). Moreover, Badruldin et al. (2012), Chand (2010) and Mujinga (2019) in their studies concluded that the least critical SREVQUAL dimension is the tangible who achieved the least gap score. Therefore, the tangibility dimension was closer to meeting customer expectations in terms of the physical structure in these studies.

The tangibility dimension is the least important among SERVQUAL dimensions, its' weighted gap equals (-0.017) according to the dimensions relative importance of Zeithaml et al. (1988). In spite of this importance ranking result, there is a negative gap related to the tangibility dimension revealed that PWA-WBWD sub-customers' expectations' are higher than their perceptions. Besides, based on the interviews' results, there is a consensus that this dimension which related to the physical appearance is not meeting the sub-customers' expectations due to the light of the challenges and difficulties faced by the water sector in Palestine. According to Nour and Al-Saidi (2018), the water sector has been suffering from inefficient water infrastructure, and severe water scarcity because of the discriminatory water policies and practices adopted by Israel. The Palestinian Water Authority would rather to focus on fieldwork such as digging wells, extending water

networks, installing water connections, working sanitation projects and water providing to the remote villages, which is the most important requirement for life that preserves the Palestinian identity and presence. Where the "sumud" (steadfastness) ideological and political strategy was adopted by Palestinians to remain alive given the challenges and insecurities they are facing (Rudolph, 2020).

Another reason for not paying attention to the tangibility dimension is the sub-customers visits to PWA-WBWD building or facilities are not frequent or may not be for long hours as the case in most other services sectors that require modern facilities and furniture for the customers' convenience. However, the interviewees suggest to pay this dimension some of attention especially in the statement with the largest gap (-0.30) in the tangibility domain "*PWA-WBWD has modern tools and equipment*".

There are several main reasons hindering the upgrading and renewing easily the tools, equipment, technologies and facilities, which are used by PWA-WBWD to execute its activities. As the general governmental budget allocates a few amounts for the equipment, tools, furniture and new technologies purchasing and installation. The procurement process is subject to the public law through tenders that require procedures and takes long of a time. According to Gatobu (2020), although the procurement process supports the fairness, transparency, competition and public participation, it will be a successful competition procurement process if it is carried out in a timely and responsive manner. Moreover, the donors' funds are conditional on the work of the water-related projects, and it is not permitted to use the funds in buying or improving PWA-WBWD physical appearance.

#### **5.4 Reliability Dimension**

The reliability dimension is related to the ability to perform the promised service dependably and accurately. According to Al Muala (2016), reliability is shaped by the right order completion from the first time and on time, accurate records; precise quotations, accurate billing, precise reports and credibility in the services. While Gronroos (2007) declared that reliability is associated with performance.

The reliability dimension gap was (-0.55), it has the largest gap among all the SERVQUAL dimensions. The hypothesis testing showed a significant difference between the responding organizations' expectations and their perceptions related to the reliability dimension. Additionally, the weighted gap was calculated, it equals (-0.176). Therefore, the reliability dimension is the most important and critical dimension in assessing the perceived service quality. This research result confirmed with other studies results (Kaushik and Vakeel (2020), Akilimalissiga et al. (2017), Kakouris and Finos (2016), Ilhaamie (2010), and Gregory (2019)).

The quantitative and qualitative data analysis detected a negative gap score with respect to sub-customers' dependency on PWA-WBWD. To be specific, sometimes the service providers (PWA-WBWD customers) rely on themselves and their resources instead of PWA-WBWD promises when asking for something. Also, the true reasons were investigated deeply to sense what is behind this unsatisfied dimension (reliability). The finding was that the communication procedures in reporting a specific problem or requesting a particular service are complicated due to the centralization of making the decision process and the high level of bureaucracy. These practices have a great role in wastage of time and slow down the ability to provide a service to the public thus reflects
on the reliability image of PWA-WBWD. According to Tummers et al. (2015), government bureaucracies are known as red tapes, which have a strong influence on citizen satisfaction.

Any of the solutions proposed should be based on accurate data records, but there are mistakes that happen during the phases of data collection, data entry. Also, a unified database exists yet it is still not used by everyone in PWA-WBWD; consequently, the data is not updated. As for the errors that may occur during the billing process, they are caused by human errors whether from the water meter reader where some of water meters still have not been changed to install the SCADA application (Supervisory Control and Data Acquisition) which has the ability of remote distance reading of water meter, which in turn, helps effectively to obtain accurate data. The role of SCADA in providing improvement in water utility is confirmed by Brueck et al. (2018). The errors made by the accountant who prepare the invoice are observed and controlled by frequent checking by several people. Moreover, some of the water meter readings are provided by Mekorot Israeli Company, those readings are not technically detailed and when then bills review meetings are held, most of the time it is in vain.

Again the Israeli occupation is the main reason in some cases of water interruption and solving raised issues related to the vital product (water) on time. Where, somewhat of supply and maintenance of equipment or spare parts cannot be made through the local market, thus the occupation procedures on importing cause the delays in the delivery process. In addition, the technical staff locomotion in certain areas is tied up with security approvals that must be provided by the occupation authority. This result is confirmed by Judeh et al. (2017), who revealed that one of the most restrictive dimensions in the water governance matrix was the political status.

Ultimately, all the above reasons justify the negative gap of reliability dimension which affect adversely on PWA-WBWD customers' satisfaction. With this in mind, the statement "When you have a certain problem PWA-WBWD employees show sincere concern in solving it" has the highest score (-0.81).

## **5.5 Responsiveness Dimension**

Another dimension of the SERVQUAL model is the responsiveness that depicts PWA-WBWD's willingness to help their customers and provide timely service. According to Kumar et al. (2009), it comprises of identifying the customers' needs and demands, quick processing time, individualized customer service, solving problems (complaints) and customers' security. Meanwhile, Johnston (1997) described responsiveness as service provision quickness and timeliness.

The difference between PWA-WBWD customers' perception and expectations related to responsiveness dimension is (-0.44), and its weighted gap equals (-0.097), this places it in the second rank of importance after the reliability dimension. In addition, a significant difference between the responding organizations' expectations and perceptions of responsiveness dimension. Mujinga (2019), Haming et al. (2019), Melinda et al. (2019), and Qolipour, et al. (2018) all these studies' results ties-in-well with the negative gap of responsiveness dimension.

The results highlighted that PWA-WBWD customers were dissatisfied with employees' readiness and availability to provide timely service. In fact, this negative gap occurred as a result of the lack of regular two-way communications between the sub-customers and PWA management or representative people to identify the sub customers' individual needs

and meeting them, where these communications are held only for emergencies issues and with the related party. In spite of the weekly field visits of his Excellency with specialized staff to explore the problems of different organizations (sub-customers) they are suffering from, but these visits concerned about unfavorable conditions thus the service providers' wants and needs cannot be recorded systematically and formally. Moreover, the large number of service providers (245) compared to these weekly visits is not sufficient. Also, there is a lack of sub-customers responses in the quarterly survey to update their information that provides the knowledge of their individual status. Ultimately, those sub-customers are the link between the end-users (citizens) expectations and the decision-makers in the water sector, so the meetings should behold regularly. According to Bovaird et al., (2015), the public sector organizations understand that they are dealing with multi-context which requires inputs from both the experts and users to be fully successful. Meanwhile, Bovaird and Loeffler, (2012) stated that the aim of creating communications is to improve the public sector and to reinforce the use of resources effectively.

Another reason for negative responsiveness gap, there are two points: from the technical side, the lack of sufficient professional staff requested to perform their tasks on time, especially at night shift which is organized with minimum staffing to operate and monitor the automated systems. On the other hand (the managerial side), the sub-customers' requests are being met promptly based on the ability of employees to perform them soon as possible such as their inquires about bills and debts, but the service providers have not recognized that some of the requests need top management approval or they are not within the employees' authorities, as mentioned in pervious sub-section (centralized organization). One of the main reasons that make the employees retard the customers'

requirements according to Ocampo et al. (2017) is the inconsistency between the number of employees and customers' requests.

The lack of resources either the financial resources to increase the technical staff thus increase the responsiveness level of sub-customers' requirements, or the lack of water resources which resulted in a gap between the demand and supply, therefore water provision is usually less than the service provider needed and that leads to failure to meet the responsiveness dimension. The increase in water demand is due to the increase in the Palestinian population size in cities and towns, also the political conditions, reduction in rainfall, and temperature increasing formed obstacles to supply of the required amount of water (Al-Ali et al., 2019).

Based on cabinet complaint by-law no.8/2016, the computerized governmental centralized system of complaints was initiated. The complaint is submitted through the web page (cs.pmo.gov.ps), PWA receives a complaint notification. Then, the complaint is screened to be sent to the related department in case the complaint was accepted; this process takes three weeks between receiving the complaint on the centralized complaint system and solving it. Besides, the complainant is notified of the time required to handle the complaint. These procedures consume time and contribute to increasing the negative responsiveness gap. Moreover, some of the complaints are not handled because the of late of law's enactment related to these complaints. According to Nel et al. (2000), a study of the relationship between the procedural justice of the complaints handling process in the public sector and the customers' satisfaction, concluded that flexibility, speed, timing and accessibility are the most critical determinants of satisfaction with the process. Also, Brewer (2007) stated that for effective service delivery and integral feature of good

governance, the public service complaints should be handled effectively and the rights of redress are protected.

Time is the common factor in justifying negative responsiveness gap, as it is one of the important factors for the socio-economic perspective of the communities served in terms of consumption and water provision especially in the following cases: cutoff or supply problems. For example, the water tankers who serve many communities are forced to go to unreliable resources mainly on Fridays and Saturdays, as PWA-WBWD staff is on holiday in these two days.

## **5.6 Assurance Dimension**

Assurance domain is related to the feelings that reflect the expertise and knowledge of PWA-WBWD employees, and their capability not only to be self-confident but also to inspire the trust and confidence in the sub-customers themselves. Assurance is evolved by the level of employees' knowledge, information, and kind treatment Blery et al., (2009). Meanwhile, the assurance to Gronroos (2007) is related to functional quality. Moreover, the assurance in PWA-WBWD formed by the safety of water quality they delivered.

The calculated assurance gap was (-0.35), while the negative weighted gap was (-0.067). In addition, a significant difference between the sub-customers' expectations and perceptions related to the assurance dimension was verified by the testing hypothesis. The negative gap supported by other studies such as Behdioğlu et al. (2019), Kumar and Sharma (2020), Misaii et al. (2019), and Anastasiadou and Zirinoglou (2020).

Many types of employees in the water sector: the ones that are temporarily contracted (with different specialization) and categorized as having a high experience and they work very

efficiently. When their contract period ends they leave permanently, taking all the expertise and knowledge they acquired it which weakens the institution. Though many trails to transfer them into permanent water sector public employees still they refuse due to the lack of incentives. The continuous changes of staff lead to minimizing the knowledge hence a negative assurance gap. Parboteeah et al. (2016) concluded in their study, that utilization of a temporary or contract staff is combined with the knowledge loss risk, and recommended the contractors not be employed for a long period to become irreplaceable.

The second type of employees in the public water sector is: employees who have an unendorsed job description on the new institutional framework, as the water sector reform process is not over yet. Moreover, they have a limited salary scale with no regular incentives and promotions. Thus, this category is divided into two styles: the first one is employees that want to develop and perform their job description, but yet they are hindered by the lack of resources, no appropriate capacity building programs, and no enactment of the procedures manual, in addition to the lack of incentives and promotions. Due to this situation, these don't get the chance to gain the skills and knowledge needed to serve their customers and bridge the assurance gap. This result is confirmed with De Massis et al, (2018) study, suggested that the requisite capabilities are important for accessing key resources, but these capabilities must be compatible with critical inputs to generate a competitive advantage.

The second style is employees that have no ambition; they want to do the requested job description with no additives, which means they are not willing to acquire the needed knowledge and skills. This leads to restricting their capacity, decreasing their self-confidence, and dereliction of the task performance. Besides, they will be failing to meet

the customers' needs which increase the lack of trust and widen the assurance gap. The reason maybe is a mentality in PWA-WBWD of there is no audit, monitoring, or punishment system. As the unit mandated to do so is inactive because the job description and manual procedures are not endorsed that leads to freezing of the audit unit work. Ramli (2020) concluded that punishment has a significant effect on employee work productivity and suggest that the employees should know the sanctions system in order to achieve the organizational goal.

Another reason contributes to a negative assurance gap, and m employees who attend capacity building programs and obtain any kind of information and knowledge do tend not to share it as there is no way to enforce them causing the knowledge and information to be monopolized by them. Lin et al., (2014) stated that knowledge sharing involves providing task information, learn how to help people solve problems, create new ideas. On the other hand, some of the barriers to sharing knowledge that the employees lack time, self-confidence, and restricted knowledge flow in the organization Bloice and Burnett (2016).

Finally, water quality assurance tests face obstacles and difficulties. Initially, the laboratory staff is insufficient according to the general laboratory safety protocols. Also, some of the laboratory materials are unavailable on a regular basis, such as acids and others, which delay the laboratory tests on water samples, and thus these samples are damaged. In addition, some of the required tests according to the national and international specifications are not applied due to the Israeli disapproval of entering these laboratory materials to the Palestinian market or the lack of funds to purchase and install specialized laboratory devices to do these required tests, taking into consideration, the maintenance of

some devices is difficult due to the high costs and lack of manufactures companies agents in Palestine.

#### **5.7 Empathy Dimension**

The last SERVQUAL dimension is empathy; it is associated with PWA-WBWD employees' caring and personal attention they provide to their sub-customers. Moreover, the empathy dimension is related to the conveniences provided by PWA-WBWD. According to Gronroos (2007), empathy is a functional quality dimension, which present the way the service is provided.

The difference between PWA-WBWD customers' perception and expectations related to the empathy dimension is (-0.37), and its weighted gap equals (-0.059). In addition, a significant difference between the responding organizations' expectations and perceptions of empathy dimension was verified by testing hypothesis. The following studies results tie-in-well with the negative gap of empathy dimension: Hasan et al. (2016), Maisuroh et al. (2020), and Sarsale (2020).

PWA-WBWD fell short to meet the expectations of their sub-customers regarding the empathy dimension. The reason is attributed to the water service interruption which occurs either for preventive maintenance where the sub-customers are notified with the period of service cut-off before three days. Or a sudden service interruption may occur for corrective maintenance as a result of the operators malfunctions; here the role of PWA-WBWD appears in the negative empathy gap due to the following: the poor planning of storing spare parts and essential equipment because of not allocating part of the budget in a systematic and continuous manner to purchase these, leading to deficiency of them, thus a

lag in repairing the malfunctions. Moreover, the private companies that own specialized equipment refuse to cooperate with the PWA-WBWD as they fear delaying financial obligations payment. Besides, the lacks of experienced cadres in operating such equipment if these are available.

The location and the source of bulk water plays a vital role on how PWA-WBWD handles the interruption problem where the northern regions of West Bank are provided by bulk water through 25% from PWA-WBWD and 75% from Mekorot Israeli Company that cutsoff the water service for unreasonable reasons and is difficult to deal with the Israeli side. According to Komives et al. (2005), the frequent service interruptions one of the attributes of receiving low-quality water service.

Another reason that broadens the negative gap of empathy is linking the implementation of the different projects in the councils and communities regions, and the approval of their budgets with the periodic bills payments and the ability to schedule the debts. The subcustomers also feel unfair as a result of transferring their dues from road transport fees, trade licenses, and property tax instead of the water debts even if they are not included in the debts scheduling system. As stated by article one from the cabinet decree no. 17/215/17 of 2018 (Regulating and controlling the revenues and expenditures of the water sector decree).

## **5.8 Independent Variables**

In this section, the influences of the organizations' framework information such as: (organization type, governorate, water department employees' number, water network maintenance department employees' number, the served population number, active water connections number, bulk water sources, prepaid water meters number, annual complaints number, and annual water loss percentage) on the expected, perceived, and gap SERVQUAL dimensions. The significant difference in the SERVQUAL dimensions expectations, perceptions, and gaps respect to the different independents variables are discussed in the following sub-sections.

## **5.8.1 Sub-customers' SERVQUAL Perceptions Dimensions**

The results of testing the sub-hypotheses revealed only a significant difference at level of 0.05 in PWA-WBWD sub-customers tangibility perceptions due to the different governorates the responding organization is located in. According to terrain of each area different types of equipment, specifications and pipes materials, and pressures zoning systems are using by PWA-WBWD affect the tangibility perception

#### **5.8.2 Sub-customers' SERVQUAL Expectations Dimensions**

Sub-hypotheses testing resulted in a significant difference at 5% level only in PWA-WBWD sub-customers empathy expectations due to the number of water network maintenance department employees'. The empathy and caring expectations the subcustomers' feel from PWA-WBWD is high, this result owed to the vitality need for water provision service continuously, especially if they have less number of maintenance employees.

#### **5.8.3 SERVQUAL Gap Dimensions**

It was found that there is a significant difference in the tangibility gap dimension due to the number of employees in the water department and the water network maintenance department. The result interpretation is related to the availability of modern tangibles resources that can be utilized by PWA-WBWD to carry out its tasks, so it affects the smoothness of processes and minimizes the required time, staff, and funds needed by subcustomers to provide their services. Based on pairwise comparisons test (Appendix (F-Figure 4)), it was found that there is significant difference in tangibility gap between the responding organization that has less than four water network maintenance employees and the ones that have more than ten. As the organizations that had less than four got a higher tangibility gap.

Another significant difference was found in empathy and responsiveness gaps dimensions with regard to the bulk water sources that the sub-customers obtain the bulk water through. As water is crucial for all aspects of life, thus the water service should be continuously available on time with accepted quality and quantity (with no frequent interruption). The empathy and responsiveness gaps are affected by the bulk water sources which the sub-customers are relying on, where they need for quick responsiveness service and showing more empathy if they provided the bulk water by only PWA-WBWD. In addition, the empathy gap had shown significant difference based on the change of bulk water source, that is: the organizations who got bulk water supply from PWA-WBWD as a sole source expressed higher empathy gap than the organizations that were supplied by PWA-WBWD plus private wells (Appendix (F- Figure 5)).

In conclusion, a significant difference was found at the reliability gap dimension due to the number of prepaid water meters, where the more transformed from conventional meters to prepaid water meters affect positively the reliability gap and improve the quality of water service provision (Hanjahanja and Omuto 2018). The prepaid water meters contributed effectively to collecting the water revenues by sub-customers that are used to pay in charge

of the provided services costs by PWA-WBWD. The commitment of pay bills obliges PWA-WBWD to provide accurate and dependent services. Moreover, the prepaid meter helps in building the trust with the water billing system thus this explains the relationship between the reliability gap and the number of prepaid water meters. Moreover, reliability gap illustrated significant difference between the organizations that operated more than 1000 prepaid water meters in comparison to the ones who operated (1-100) prepaid water meters. Where the ones who held more than 1000 had higher reliability gap (Appendix (F-Figure 6)).

### **5.8.4 Number of Annual Complaints**

The annual number of complaints received to the sub-customers from the end-consumers is correlated negatively with the overall level of perceived service quality provided by PWA-WBWD and the sub-customers' satisfaction. The complaint is defined as deficiencies related to the safety, quality, reliability, or performance of a provided service. It is obvious that the sub-customers' fail to meet their end-consumers' requirements as a result of a poor service provided by PWA-WBWD, which is reflected by the negative relationships between the service quality, satisfaction and the increasing number of received complaints.

#### **5.8.5 Annual Percentage of Water Loss**

The annual percentage of water loss has no correlation either with overall perceived quality or sub-customers' satisfaction. Based on the interviewees results, it was clarified that there is a misunderstanding of how to calculate this variable, where the sub-customers calculate the non-revenue water by subtracting the invoice provided by PWA-WBWD from the invoices issued by them without paying attention to the fact that the non-revenue water is included within from technical causes, water thefts, and water distributed to the public places such as mosques, parks and schools.

## **5.9 Satisfaction Scale**

#### **5.9.1 Correlation Results**

PWA-WBWD customers' satisfaction is described as an overview of psychological state, perception outcome, and evaluation, it as a disconfirmation function formed by the discrepancies between the earlier expectations and the actual performance experienced by PWA-WBWD customers (Davras and Caber, 2019). The results of this research revealed moderate (tangibility; responsiveness; empathy) and high (reliability and assurance) positive relationships between the all of perceived SERVQUAL dimensions and the overall level of PWA-WBWD customers' satisfaction, which is parallel to the results of those studies Pakurár et al. (2019), Seyoum (2017) and (Khooand McGregor, 2017). Besides, the overall service quality has a high positive correlation with the sub-customers' satisfaction Murali et al. (2016), and Alemseged (2019).

The positive relationship between the perceived tangibility dimension and satisfaction is explained as the tangibility is all the resources necessary to provide a service (i.e. equipment, materials, technologies, and the appearance of staff); also it is the only tangible and visible part of the provided service. So, as PWA-WBWD utilized better resources to execute its' tasks their customers' satisfaction is increased.

The positive relationship between the perceived reliability dimension and satisfaction is illustrated by the capability of PWA-WBWD to tool up the promised service accurately,

dependably, and on time, in addition to error-free records, where all these considered as the paradigm of reliability that increase the sub-customers satisfaction.

The positive relationship between the perceived responsiveness dimension and satisfaction is construed as PWA-WBWD responds quickly to the individual requirements of their subcustomers without any inconvenience and bias, these attributes are a radical shift occasion in the sub-customers' satisfaction.

The positive relationship between the perceived assurance dimension and satisfaction is accounted for PWA-WBWD's ability to build bridges with their sub-customers by employing staff with experience, knowledge, and information that enable them to fulfill the assistance of the sub-customers; this will strongly affect their satisfaction level.

The empathy dimension shaped by PWA-WBWD caring of their sub-customers, being individualized attention, and understanding their specific needs this will positively influence the sub-customers satisfaction.

## **5.9.2 Regression Model Results**

The multiple regression model of (67.4%) R-square indicated that only the reliability and assurance dimensions have statistically contributed to the sub-customers' satisfaction, which they considered good predictors. On the other hand, the tangibility, responsiveness and empathy although they have a positive correlation with the sub-customers' satisfaction they have insignificant impact on the satisfaction variable. On the contrary of this research result, the study's results for Setyawan et al. 2019 and Alemseged (2019), where all the five dimensions affect the patients' and customers' satisfaction, respectively.

Vencataya et al. (2019), Sitinjak et al. (2020) and Saad et al. (2020) study's results confirmed with the result of this study. Where, if the organization has qualified and occupational skilled employees who have the ability to inspire trust, safety and security (assurance), consequently the organization could perform reliable and accurate services on time and solving the customers' problems (reliability).

# **Chapter Six**

## **Conclusions and Recommendations**

Overview

Conclusions

Recommendation

Limitation of the Study

Future Research Directions

## **Chapter Six: Conclusions and Recommendations**

#### **6.1 Overview**

This chapter presents the conclusions of this thesis, the recommendations to correct the dimensions of negative gaps and the limitations that constrained this research. Finally, suggestions for future research are presented.

## **6.2 Conclusions**

The research questions were answered through carrying out the quantitative analysis while the qualitative analysis worked to explain the results were found, hence fulfilled the main purpose of this research; empirically, it was aimed to assess how PWA-WBWD subcustomers perceive the water service quality. This was administrated through applying SERVQUAL to calculate the gap between the sub-customers' perceptions and expectations. As well as, the influence of each of the perceived service dimensions on the sub-customers' satisfaction level was targeted. Accordingly, five service quality dimensions (tangibility, reliability, responsiveness, assurance, and empathy) were hypothesized to gauge service quality and customer satisfaction. Also, ten independent variables were surveyed to check their effect on the perceived, expected and gap service quality dimensions. The following key conclusions could be induced:

- 1. The overall perceived water service quality was found to be in the high level, though the sub-customers' perceptions didn't meet their expectations, where the entire SERVQUAL dimensions gap were negative.
- 2. PWA-WBWD do not use developed tools and equipment in executing their tasks.

- 3. PWA-WBWD employees do not show concern in timely solving the sub-customers problems as they might be busy or not interested.
- 4. PWA-WBWD employees do not acquire the related skills and information to perform their task professionally or to address the sub-customers' problems.
- 5. PWA-WBWD do not regularly identify the individual sub-customers' needs.
- 6. The independent variable has no effect on the perceived, expected, and gap SERVQUAL dimensions expect for: perceived tangibility vs. governorate, tangibility gap vs. water department employees' number, expected empathy and tangibility gap vs. water network maintenance department employees number, responsiveness gap vs. bulk water sources, and reliability gap vs. water prepaid meters number.
- 7. The overall sub-customers' satisfaction level is calculated as moderate (66.8%), yet the sub-customers assessed the staff performance in high satisfaction level.
- 8. All the SERVQUAL dimensions have a positive correlation with the overall satisfaction level.
- 9. Statistically according to the regression model, only reliability and assurance dimensions have significant impact on the sub-customers' satisfaction.
- 10. The multiple regression model is found to equal 67.41% which presented the model ability to explain the satisfaction variance.
- 11. In spite of what was mentioned above, PWA-WBWD adopted a financial policy in cooperation with related parties to reschedule the water services debts for their subcustomers which is considered one step of the path to improve and gain higher satisfaction.

12. Allocating a percent of PWA public budget yearly to purchase and store the necessary spare parts was adopted newly by PWA as a strategic plan.

#### **6.3 Reccomendation**

Post to conducting this study research and summarizing specific conclusions, the key solution that can solve this complicated situation is by dividing roles based on water law, such that PWA plays the regulator issuing policies, strategies, and laws. While WBWD is transformed into the national water company that provides water in bulk to its' sub-customers. But until this ideal situation implementation, these following recommendations were drawn up:

- 1. Creating a fund basket, budget support, and project funding through enhancing the role of the international coordination unit / PWA as several mechanisms for financing that aim to improve donor support harmonization and alignment.
- Designing suitable, consistent, and comprehensive institutional and technical capacity building programs that target PWA-WBWD staff to raise their skills, knowledge, and experience.
- 3. Designing suitable technical, financial, and managerial capacity building programs for service providers (sub-customers) to plan for, achieve, and continually provide safe drinking water to the end-users that ensure long-term sustainability services.
- 4. Establishing an electronic system that will support the reporting, data collection, exchange knowledge, water bills, debts, and handling complaints as a reliable source of information that adopts archiving and accurate storge of these to be utilized for future strategic planning and conducting projects.

- 5. Developing a centralized, modernized, and comprehensive SCADA system that will serve in minimizing the effect of water theft, water loss, pipes, and network breakage. In addition to the easement of operation and monitoring.
- 6. Utilizing the latest technologies in developing non-traditional water resources that would help in increasing the available potable water quantities such as:
  - Coordination between water and agriculture sectors to reduce the pressure on potable water used in irrigation by replacing it with treated wastewater where available. This will lead to increasing quantities for drinking water
  - Coordination between water and energy sectors to utilize water resources (when possible) to generate energy that can be used to desalinate water and treat the wastewater. PWA-WBWD is currently running a pilot project that applies this principle in Tubas Tamoun area.
- 7. Exchanging and sharing experiences and resources with peers locally and internationally. As a consequence quoting the innovative best practices as no cost can be incurred which will develop many aspects in the water sector.
- 8. Organizing more competitions and hackathons aiming at realization innovative solutions that lead to improving the sector.
- 9. Increasing the public awareness campaigns that include the sub-customers too, to describe and explain the Palestinian water case and context highlighting the needs and the methods to help leverage the sector through well-designed and properly resourced dialogue process and advocacy.

#### **6.4. Limitation of the Study**

The study was carried out and faced limitations. The first one was obtaining a contact list for the expected respondents. The second was reaching the respondents and convincing them to fill the electronic questionnaire specifically with the prevailing of Coronavirus that lead to using a smaller sample.

#### **6.5 Future Research Directions**

The results found through this research study are considered to be the first of its type in the water sector in Palestine. With remarkable analysis and identifications, the difference between the perceptions and expectations of service in the responses received resulted in the SERVQUAL dimension gaps. Consequently, a conclusion that contained the key weaknesses were driven. Then innovative sustainable solutions were presented in form of recommendations, these recommendations should enlighten the decision-makers to apply appropriate remedies and procedures that could improve the current situation and increase the water service quality satisfaction.

It was mentioned in the limitation section, that the studies in the related subject are scarce thus this research study can be counted as a significant reference that might pave the road to carry out more analysis and studies from different perspectives. Assessing the water service quality by additional variables such as technical and water quality is proposed where this study relatively focused on functionality. Moreover, it can be conducted based on the size of the service providers or joint service council.

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**Appendix A: Thesis Questionnaire** 

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# College of Postgraduate Studies Quality Management Master Program

استبيان لتقييم جودة خدمة توفير المياه بالجملة في سلطة المياه الفلسطينية – دائرة مياه الضفة الغربية من خلال تطبيق اداة SERVQUAL

تقوم الباحثة شيرين محمود عمار في برنامج ماجستير ادراة الجودة في كلية الدراسات العليا الجامعة العربية الامريكية. و كجزء من أطروحتها بإجراء مسح ميداني لتقبيم جودة خدمة توفير المياه بالجملة المقدمة من قبل سلطة المياه الفلسطينية - دائرة مياه الضفة الغربية من خلال استخدام أداة SERVQUAL فنأمل من حضرتكم مساعدتها وذلك باستكمال الاستبيان ادناه. حيث سيتم استخدام كافة البيانات لأغراض البحث العلمي فقط. الوقت المقدر لإكمال هذا الاستبيان حوالي خمس دقائق

> لمزيد من الاستفسار ات والايضاحات : شيرين محمود عمار طالبة ماجستير – برنامج إدارة جودة رام الله <u>فاسطين</u> 00975940050521

اولا: الاطار الهيكلي للمؤسسة يرجى الاجابة عن الاسئلة التالية بوضع اشارة (X) في المكان المناسب 1- طبيعة المؤسسة : ( ) بلدية ( ) مجلس خدمات مشترك – مصلحة مياه ( ) مجلس قروي ( ) قطاع خاص 2- المحافظة .

3- عدد الموظفين العاملين في قسم المياه في المؤسسة :
() 10-11 () 10-30 () اكثر من 100

4- عدد الموظفين العاملين في قسم الصيانة لشبكة المياه :

173

7- مصادر المياه المتوفرة :

مشتراة من دائرة مياه الضفة الغربية

() اقل من 3 () 4-6

- منتجة من الابار والينابيع الذاتية +مشتراة من دائرة مياه الضفة الغربية
- ( ) قطاع خاص (ابار زراعية خاصة) + مشتراة من دائرة مياه الضفة الغربية

() مشتراة من دائرة مياه الضفة الغربية + منتجة من الابار والينابيع الذاتية +قطاع خاص (ابار زراعية خاصة)

9- عدد الشكاوى التي استقبلتها المؤسسة خلال العام الماضى : \_\_\_\_\_\_

10- نسبة الفاقد من المياه بالشبكة : \_\_\_\_\_.

<u> ثانيا : جودة الخدمة المقدمة</u>

فيما يلي مجموعة من الاسئلة تتعلق بتقييم جودة الخدمة المقدمة من سلطة المياه الفلسطينية – دائرة مياه الضفة الغربية التي تلقيت أو التي نتلقى منها الخدمة. يرجى منكم توخي الدقة في الاجابة على الاسئلة التالية بالاجابة عن جزئين لكل سؤال، الاول يتعلق بالمستوى المتوقع من جودة الخدمات والثاني (المقابل) له علاقة بالمستوى الفعلي (الحقيقي) للخدمات المقدمة. يرجى

() 7–10 () اکثر من 10

الاجابة بوضع اشارة (X) حسب ما ترونه مناسبا. علما ان اوافق بشدة تمثل 5, اوافق 4, محايد 3, غير موافق 2, غير موافق موافق بشدة 1

ي ة. ة	الفعلم لجو ( مقدم	نوى يقي) ات ال	المسن إالحقب لخدم	) ) 1				ā	المقده	المستوى الذي كنت تتوقعه لجودة الخدمات
1	2	3	4	5	1	2	3	4	5	الجملة
										1-تمتلك سلطة المياه- دائرة المياه أجهزة و معدات
										حديثة.
										2- المظهر العام لسلطة المياه- دائرة المياه جذابة(المبنى و
										المكاتب الداخلية).
										3-يتمتع موظفو سلطة المياه- دائرة المياه بمظهر أنيق وحسن.
										4–المواد المتعلقة بخدمات سلطة المياه– دائرة المياه جذابة
										الاعلانات وغيرها). المظهر (مثل النشرات

# القسم الاول : مظهر المرافق المادية والمعدات والأفراد والمواد الإعلامية

#### القسم الثانى : القدرة على أداء الخدمة الموعودة بثقة وبدقة

المستوى الذي كنت تتوقعه لجودة الخدمات	المقدم	ä					لمست الحقي لخدم	نوى ا بقي) ات ال	الفعلم لجو د مقدم	ي ة. ع
الجملة	5	4	3	2	1	5	4	3	2	1
- عندما تعد إدارة سلطة المياه- دائرة المياه بالقيام										
ممل ما في وقت محدد، فأنها تلتزم بذلك.										
)-عندما تواجه مشكلة ما، فان موظفو سلطة المياه- دائرة المياه										
بدوا اهتماما صادقا بحلها.										
يقوم موظفو سلطة المياه– دائرة المياه بنقديم الخدمات بالشكل										
صحيح و المطلوب من المرة الأولى .										

8-يقوم موظفو سلطة المياه- دائرة المياه بتقديم الخدمات					
المواعيد المتفق عليها.					
9-تحرص إدارة سلطة المياه- دائرة المياه على ان تكون سجلات					
لمستفيدين من خدماتها خالية من الأخطاء.					

#### القسم الثالث : الاستعداد لمساعدة المستفيدين وتقديم الخدمة السريعة

ي ة. ا	الفعلم لجو د مقدم	نوى بقي) ات ال	لمست الحقب لخدم	) ) )				مة	المقد	المستوى الذي كنت تتوقعه لجودة الخدمات
1	2	3	4	5	1	2	3	4	5	الجملة
										10- يقوم موظفو سلطة المياه- دائرة المياه بإبلاغ
										المستفيدين من خدماتها بشكل محدد عن الوقت
										المطلوب لإنجاز خدمة معينة .
										11-موظفو سلطة المياه- دائرة المياه مستعدون ومتحفزون
										لتقديم الخدمات بصورة فورية.
										12- موظفو سلطة المياه- دائرة المياه مستعدون وراغبون في
										تقديم المساعدة للمستفيدين.
										13-لا يمنع انشغال الموظفين بأعمالهم الداخلية في الاستجابة
										الفورية لطلبات المستفيدين .

5 2	الفعلي لجو د مقدماً	نوى ا يقي) لات ال	المسن (الحقر الخدم	1				1	لمقدمة	المستوى الذي كنت تتوقعه لجودة الخدمات ا
1	2	3	4	5	1	2	3	4	5	الجملة
										14-ان سلوك الموظفين يعطي انطباع بالثقة لدى
										المستفيدين من خدمات سلطة المياه- دائرة المياه.
										15–يشعر المستفيدون بالأمان في تعاملاتهم مع سلطة المياه–
										دائرة المياه.
										16-يتمتع الموظفون باللباقة والمجاملة عند تعاملهم مع
										المستفيدين من خدمات سلطة المياه- دائرة المياه
										17-يمتلك الموظفون المعرفة التامة للإجابة على أسئلة
										واستفسارات المستفيدين.

# القسم الرابع :معرفة ومجاملة الموظفين وقدرتهم على كسب الثقة

#### القسم الخامس: توفير الرعاية والاهتمام الفردي للمستفيدين

المستوى الذي كنت تتوقعه لجودة الخدمات	، المقد	مة				) ) 11	لمست الحقي لخدم	لو ی ا بقي) ات ال	القعلم لجو د مقدم	ي ة. لم
الجملة	5	4	3	2	1	5	4	3	2	1
18–تولي سلطة المياه– دائرة المياه الاهتمام										
الشخصي للمستفيدين.										
19-ان ساعات عمل سلطة المياه- دائرة المياه ملائمة لجميع										
الفئات من المستفيدين.										
20–يولي الموظفون في سلطة المياه– دائرة المياه اهتماما										
شخصيا بالمستفيدين من الخدمات.										
21-تضع سلطة المياه- دائرة المياه مصلحة المستفيدين من										
خدماتها في مقدمة اهتماماتها.										
22- يتفهم الموظفون الاحتياجات المحددة للمستفيدين.										

ثالثًا : رضى الزبائن عن جودة الخدمة المقدمة من قبل سلطة المياه- دائرة المياه

يرجى الاجابة بوضع اشارة (X) حسب ما نترونه مناسبا. علما ان اوافق بشدة تمثّل 5, اوافق 4, محايد 3, غير موافق 2, غير موافق بشدة 1

الجملة	1	2	3	4	5
انا راضٍ عن مستوى جودة الخدمات المقدمة من قبل سلطة المياه- دائرة مياه الضفة الغربية					
انا راضٍ عن اداء موظفين سلطة المياه- دائرة المياه					
الخدمات المقدمة من قبل سلطة المياه- دائرة المياه توافق توقعاتي					
تحدث بايجابية عن اداء سلطة المياه- دائرة المياه					
أنا راضٍ عن الية تقديم الخدمة من قبل سلطة المياه- دائرة مياه الضفة الغربية					
أنا راضٍ عن ألية معالجة الشكاوي في حال حدوثها					
أنا راض عن السياسات التي تتبعها سلطة المياه- دائرة المياه التحقيقً نشاطاتها					



# College of Postgraduate Studies Quality Management Master Program

# Quality Assessment of Bulk Water Provision Service Using SERVQUAL Model in Palestinian Water Authority - West Bank Water Department

The researcher **Shireen Ammar**, who is enrolled in the quality management master program at the Arab American University, is conducting the following questionnaire as part of her thesis, which aims to **assess the quality of bulk water provision service provided by Palestinian Water Authority- West Bank Water Department** using the **SERVQUAL model**. Kindly, we request your help to fill out the attached questionnaire, where the estimated time to complete the questionnaire is about five minutes. The collected data will be kept confidential and used only for scientific research purpose.

Shireen Mahmmoud Ammar Quality Management Program Ramallah- Palestiane Email: <u>shammar88@icloud.com</u> 00970594050521

## Part one: Organizations' Framework

- **1- Organization type:**
- □ Municipality
- □ Village Councils

- □ Joint Services Council and Water Undertaking (JSCW)
- □ Private sector
- 2- Governorate:
- 3- Number of employees in the water department
- □ 1-10
- □ 11-30
- □ 31-50
- □ 51-100
- □ >100
- 4- Number of employees in the water network maintenance department
- $\Box$  Less than three
- □ 4-6
- □ 7-10
- $\Box$  More than ten

#### 5- The served population number

- $\Box$  Less than 5000
- □ 5001-15,000
- □ 15,001-30,000
- □ 30,001-80,000
- □ 80,001-150,000
- □ More than 150,000

#### 6- Number of active water connections

- $\Box$  Less than 1000
- □ 1001-5000
- □ 5001-10000
- □ 10001-20000
- $\square$  More than 20000

#### 7- Bulk water sources provided by:

- □ West Bank Water Department (WBWD)
- $\Box$  Private wells + WBWD
- $\Box$  Self-owned wells + WBWD

 $\Box$  self-owned wells +private wells + WBWD

#### 8- Number of prepaid water meters

- □ There are no prepaid water meters
- □ 1-100
- □ 101-500
- □ 501-1000
- $\square$  More than 1000

9- Number of annual complaints \_\_\_\_\_

10- Annual percentage water loss\_\_\_\_\_

**Part Two: Service Quality** 

Where Strongly Agree represents 5, Agree represents 4, Neutral 3, Disagree 2, and Strongly Disagree 1

#### 1- Tangibility

	The level	exp of	pected PW	d qu A-W	iality BWD	The actual (Perceived) quality level of PWA-				
Statement	prov	vided	servi	ces		WBV	VD pi	rovide	d servi	ices
	5	4	3	2	1	5	4	3	2	1
1-PWA-WBWD has										
modern tools and										
equipment										
2- the overall PWA-										
WBWD appearance is										
attractive										
3- PWA-WBWD										
employees having a neat										
and good-looking										
appearance										
4- PWA-WBWD										
publications appearance										
related to its services										
look attractive										

#### 2- Reliability

Statement	The leve prov	exp l of ⁄ided	pecteo PW servi	d qu A-Wl ces	iality BWD	The quali WBV	act ty l VD pi	ual evel rovide	(Perce of P d servi	eived) PWA- ices
	5	4	3	2	1	5	4	3	2	1
5- When PWA-WBWD										
management promises to										
do an action by a certain										
time, they commit										
themselves										
6- When you have a										
certain problem PWA-										
WBWD employees show										
sincere concern in										
solving it										
7-PWA-WBWD										
performs the right service										
in the right manner from										
the first time										
8- PWA-WBWD										
employees provide the										
services at the time they										
promise to do so										
9- PWA-WBWD insists										
on customers error-free										
records										

#### **3- Responsiveness**

	The	exp	oected	l qu	ality	The	act	ual	(Perceived)	
Statement	leve	l of	PW	A-WE	BWD	qualit	ty l	evel	of F	PWA-
	prov	vided	servi	ces		<b>WBW</b>	D pr	ovided	l servi	ces
	5	4	3	2	1	5	4	3	2	1
10- PWA-WBWD										
employees inform you										
exactly when a particular										
service will be performed										
11- PWA-WBWD										
employees are motivated										
and willing to provide										
services immediately										
12- PWA-WBWD										
employees are ready and										
willing to assist the										
customers										
13- PWA-WBWD										
employees are never										

busy with their internal					
work to respond					
promptly to customers'					
requests					

### **4-** Assurance

	The	exp	pected	l qu	ality	The	act	ual	(Perce	ived)
Statamont	level	of	PW	A-W	BWD	quali	ty l	evel	of P	WA-
Statement	provi	ided	servi	ces		WBV	VD pı	covide	d servi	ces
	5	4	3	2	1	5	4	3	2	1
14- PWA-WBWD										
employees' behavior										
instills confidence of										
PWA-WBWD services in										
customers										
15- PWA-WBWD										
customers feel secure in										
their transaction with										
PWA-WBWD										
16- PWA-WBWD										
employees are courteous										
when they are dealing										
with the customers										
17- PWA-WBWD										
employees are courteous										
when they are dealing										
with the customers										

#### 5- Empathy

Statement	The expected quality level of PWA-WBWD provided services				The actual (Perceived) quality level of PWA- WBWD provided services					
	5	4	3	2	1	5	4	3	2	1
18- PWA-WBWD pay										
individual attention to its										
customers										
19- PWA-WBWD										
operating hours are										
convenient to all										
categories of its										
customers										
20- PWA-WBWD										
employees give its										

customers personal attention					
21- PWA-WBWD puts its customers' interest at the forefront of its concerns					
22- PWA-WBWD employees understand the special needs of their customers					

## Third Part: Sub-customers' Satisfaction

Statement	5	4	3	2	1
1-I am satisfied with the quality level of					
services provided by the Water Authority -					
the West Bank Department (PWA-WBWD)					
2-I am satisfied with PWA-WBWD					
employees' performance					
3-The services provided by PWA-WBWD					
meet my expectations					
4-I speak positively about PWA-WBWD					
performance					
5-I am satisfied with PWA-WBWD services					
providing mechanism					
6-I am satisfied with PWA-WBWD					
complaints handling process					
7- I am satisfied with the policies followed by					
PWA-WBWD to execute its activities					

Name	Position
Dr. Ashraf Almimi	Head of the Administration and Financial Sciences Department at Arab American University
Dr. Majeed Mansour	Associate professor, department of marketing at Arab American University

## **Appendix B: Experts reviewed the questionnaire**

## **Appendix C: Translation Expert**

Name	Position				
Basel Asaad	Certified translator				

## **Appendix D: Interviews' Questions**

- 1. What is the specificity that the Palestinian water sector has?
- 2. Why PWA-WBWD sub-customers sight PWA-WBWD appearance in terms of facilities, staff, equipment, technologies, materials, and tools fall short of their expectations?
- 3. Why the sub-customers catch sight of PWA-WBWD unable to perform their services right from the first time and to keep precise records?
- 4. Why the sub-customers sense that PWA-WBWD has not the willingness to help them, provide timely individualized services, and quick complaints handling?
- 5. Why the sub-customers feel that PWA-WBWD employees have not sufficient expertise and knowledge to deliver safe quality water and they don't inspire the trust?

- 6. Why the sub-customers feeling lack of attention, caring and conveniences offered to them?
- 7. What are the effective actions should PWA-WBWD take to enhance the water provision service quality?
- 8. What are the difficulties faced PWA-WBWD that prevents it to execute their tasks?
- 9. What are the practices that satisfy PWA-WBWD sub-customers based on your experience in the water sector and your transactions with the sub-customers?

Name	Position	Selection Reason			
Dr. Moath abu Saada	Technical Advisor	Expert in water sector			
		related issues modeling			
Mr. Ziyad Fouqaha	General Director of Training	Pervious expert in financial			
	and Development	affairs in addition to his			
		current work in capacity			
		building targeting service			
		providers			
Eng. Fadi Abd	General Director of WBWD	Expert in resources water			
Alghani	Well Sites	supply			
Mrs. Shireen Dissi	Finance Department Director	Expert in the financial laws			
		and system adopted by the			
		government			
Mr. Ashraf Dweikat	Data Bank Department	Expert in collecting,			
	Director	entering, and validating			

## **Appendix E: PWA-WBWD Interviewees**

		data of all types that				
		essential in water sector				
Eng. Beesan Shounar	Policies and Technical	Previous experience in				
	Support Director	water projects quality				
		assurance department in				
		addition to variance				
		experience in different				
		PWA department				
Mrs. Hanadi Bader	Microbiology Lab Section	Expert in two fields: gender				
	Head	and water quality in				
		addition to long experience				
		in water sector				
Mr. Saed Samaaneh	Revenues Section Head	Have enough experience in				
		dealing with sub-customers				
		in daily bases and debt file				
Mr. Mohmmad	Water Quality and	Expert in water quality				
Hedidon	Sterilization Specialist	delivered to the end-users				
Mr. Abd Alnaser	Consumer Affairs Section	Expert in wells licenses				
Vahla	Head	processes and complaints				
Nailla		handling for service				
		providers and end-users				
		-				

# **Appendix F: Pairwise comparisons test**

1- Perceived tangibility due to governorate





Each node shows the sample average rank of governorate name.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Hebron-Qalqaliyia	5.629	14.256	.395	.693	1.000
Hebron-Bethlahem	10.700	12.386	.864	.388	1.000
Hebron-Ramallah	11.512	13.880	.829	.407	1.000
Hebron-Nablus	14.256	13.580	1.050	.294	1.000
Hebron-Jerusalem	20.100	15.398	1.305	.192	1.000
Hebron-Jenin	23.075	11.969	1.928	.054	1.000
Hebron-Tulkarem	31.867	17.780	1.792	.073	1.000
Hebron-Salfit	44.700	14.256	3.136	.002	.062
Qalqaliyia-Bethlahem	-5.071	10.934	464	.643	1.000
Qalqaliyia-Ramallah	-5.884	12.601	467	.641	1.000
Qalqaliyia-Nablus	-8.627	12.270	703	.482	1.000
Qalqaliyia-Jerusalem	-14.471	14.256	-1.015	.310	1.000
Qalqaliyia-Jenin	17.446	10.458	1.668	.095	1.000
Qalqaliyia-Tulkarem	-26.238	16.801	-1.562	.118	1.000
Qalqaliyia-Salfit	-39.071	13.014	-3.002	.003	.096
Bethlahem-Ramallah	.812	10.439	.078	.938	1.000
Bethlahem-Nablus	3.556	10.036	.354	.723	1.000
Bethlahem-Jerusalem	9.400	12.386	.759	.448	1.000
Bethlahem-Jenin	12.375	7.718	1.603	.109	1.000
Bethlahem-Tulkarem	21.167	15.246	1.388	.165	1.000
Bethlahem-Salfit	34.000	10.934	3.110	.002	.067
Ramallah-Nablus	2.743	11.830	.232	.817	1.000
Ramallah-Jerusalem	-8.588	13.880	619	.536	1.000
Ramallah-Jenin	11.562	9.939	1.163	.245	1.000
Ramallah-Tulkarem	20.354	16.483	1.235	.217	1.000
Ramallah-Salfit	-33.188	12.601	-2.634	.008	.304
Nablus-Jerusalem	-5.844	13.580	430	.667	1.000
Nablus-Jenin	8.819	9.516	.927	.354	1.000
Nablus-Tulkarem	17.611	16.231	1.085	.278	1.000
Nablus-Salfit	-30.444	12.270	-2.481	.013	.471
Jerusalem-Jenin	2.975	11.969	.249	.804	1.000
Jerusalem-Tulkarem	11.767	17.780	.662	.508	1.000
Jerusalem-Salfit	-24.600	14.256	-1.726	.084	1.000
Jenin-Tulkarem	-8.792	14.909	590	.555	1.000
Jenin-Salfit	-21.625	10.458	-2.068	.039	1.000
Tulkarem-Salfit	-12.833	16.801	764	.445	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is . 05. 2- Tangibility gap due to the number of employees in the water department



#### Pairwise Comparisons of number of empolyees in water dep

Each node shows the sample average rank of number of empolyees in water dep.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
51-100-11-30	21.812	25.426	.858	.391	1.000
51-100-1-10	40.763	24.129	1.689	.091	.273
11-30-1-10	18.951	8.910	2.127	.033	.100

Each row tests the null hypothesis that the Sample 1 and Sample 2

Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

3- Expected empathy due the number of employees in the water network maintenance department



#### Pairwise Comparisons of number of employees in maintinance dep

Each node shows the sample average rank of number of employees in maintinance dep.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
<4-4-6	-19.138	12.558	-1.524	.128	.383
<4.>10	-31.513	14.412	-2.187	.029	.086
4-6->10	-12.375	18.709	661	.508	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

## 4- Tangibility gap due to number of employees in the water network maintenance department



Pairwise Comparisons of number of employees in maintinance dep

Each node shows the sample average rank of number of employees in maintinance dep.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
>10-4-6	24.458	18.309	1.336	.182	.545
>10.<4	35.615	14.104	2.525	.012	.035
4-6-<4	11.157	12.289	.908	.364	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

5- Empathy gap due to the bulk water sources



### Pairwise Comparisons of watrer sources

Each node shows the sample average rank of watrer sources.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Private wells + WBWD-WBWD	20.932	7.688	2.722	.006	.039
Private wells + WBWD-Self wells + WBWD	-22.357	11.414	-1.959	.050	.301
Private wells + WBWD-self wells +private wells + WBWD	-34.500	24.658	-1.399	.162	.971
WBWD-Self wells + WBWD	-1.425	9.384	152	.879	1.000
WBWD-self wells +private wells + WBWD	-13.568	23.786	570	.568	1.000
Self wells + WBWD-self wells +private wells + WBWD	-12.143	25.238	481	.630	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

#### 6- Reliability gap de number of prepaid water meters



#### Pairwise Comparisons of number of prepaid counters

Each node shows the sample average rank of number of prepaid counters.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-100-501-1000	-22.438	13.897	-1.615	.106	1.000
1-100-0.000	31.513	11.596	2.717	.007	.066
1-100-101-500	-32.812	11.983	-2.738	.006	.062
1-100->1000	-38.550	13.351	-2.887	.004	.039
501-1000-0.000	9.076	9.482	.957	.339	1.000
501-1000-101-500	10.375	9.952	1.043	.297	1.000
501-1000->1000	-16.112	11.563	-1.393	.163	1.000
0.000-101-500	-1.299	6.356	204	.838	1.000
0.000->1000	-7.037	8.664	812	.417	1.000
101-500->1000	-5.738	9.175	625	.532	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

## الملخص

يعد قطاع توفير خدمة المياه من الخدمات التي لا غنى عنها, حيث ان له تأثيرات متعددة الابعاد على التنمية الاقتصادية, التنوعي البيولوجي والكثير من القطاعات المختلفة التي تشكل دورا هاما في اسس الحضارة. ولكن القليل من الدراسات التي تناولت دراسة جودة خدمة المياه من منظور الزبائن الفرعيين لسلطة المياه الفلسطينية- دائرة مياه الضفة الغربية. لذلك, فان الغرض من هذا البحث هو تقييم جودة خدمة تزويد المياه بالجملة المقدمة من سلطة المياه الفلسطينية - دائرة مياه الغربية ومستوى رضا الزبائن الفرعيين. حيث يلعب رضا الزبائن الفرعيين دورا هاما في مستوى خدماتهم المقدمة الى المستهلك. لذا يعتبر هذا البحث الذي يسعى لقياس مستوى جودة خدمة المياه بالجملة من الابحاث الهامة والتي يمكن لقطاع المياه الاستفادة منه للتحسين والتطوير.

استخدمت الباحثة كلا من الطرق الكمية والنوعية لجمع البيانات, حيث استخدمت نموذج SERVQUAL كاداة لجمع البيانات الكمية ولانشاء استبيان هذا البحث. تم توزيع 150 استبيانا الكترونيا حيث كانت نسبة الاستجابة 66%. تم تحليل 85 من الاستبيانات المكتملة باستخدام برنامج Minitab. نظرا لان توزيع البيانات التي تم جمعها لم تكن تشكل توزيعا طبيعيا, فقد تم استخدام فحوصات الاحصاء اللامعلمية مثل ويلكاكسون, كروسكال, اختبار الارتباط ونموذج الانحدار المتعدد. من ناحية اخرى, قامت الباحثة باستخدام البيانات النوعية لتعزيز النتائج الكمية وتفسيرها, وباءا على ذلك قامت بعمل 10 مقابلات شبة منظمة وتحليل البيانات النوعية باستخدام النهج الموضوعي.

اظهرت النتائج ان جميع ابعاد جودة الخدمة لديها ضعف في تلبية توقعات الزبائن الفرعيين الذين اجابوا على الاستبيان حيث ان الابعاد الخمسة احتوت على فجوات سلبية. حصل بعد المصداقية على اعلى فجوة سلبية تليه ابعاد الاستجابة, التعاطف, والثقة على التوالي. بينما حصل بعد الملموسية على اقل فجوة سلبية. ايضا كشفت النتائج ان مستوى رضا الزبائن الفرعيين متوسطا ومرتبطا ارتباطا ايجابيا بجودة الخدمة الاجمالية المدركة. علاوة على ذلك, برغم من الارتباط الايجابي للابعاد الخمسة الجودة الخدمة برضا العملاء الفرعيين الا ان بعدا الموثوقية والثقة لهما تأثير على رضا الزبائن الفرعيين بناءا علة نتيجة نموذج الانحدار المتعدد.

في ضوء نتائج هذا البحث, اقترحت الباحثة توصيات من شأنها مساعدة الاطراف ذات العلاقة على سد الفجوات السلبية, وبالتالي رفع مستوى جودة خدمة تزويد المياه بالجملة المدركة ورضا الزبائن الفرعيين.