The Impact of Six Sigma on the Quality of Pharmaceutical Services:

A Field Study on Private Jordanian Hospital Pharmacies.

تأثير الحيود السداسي على جودة الخدمات الصيدلانية

دراسة ميدانية على صيدليات المستشفيات الأردنية الخاصة

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Examination Committee Decision

This thesis of the student Doaa Khalid Al Duraini, study "The Impact of Six Sigma on the Quality of Pharmaceutical Services: Field Study on Private Jordanian Hospital Pharmacies." has been defined, accepted and approved on June, 13th, 2022.

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Dedication

I would take a chance to dedicate this work to the ones I cherished the most, my Family. I would like to thank my mother and father for always believing in me and giving me all the support I need to achieve my dreams and goals. Special thanks to my brothers and sister for always being there for me in my time of need.

I'm grateful for having such a wonderful family and friends, my love and gratitude for them couldn't be expressed truly with mere words. I truly appreciate your presence and support.

Doaa Khalid Al Duraini

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Prepared by:

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Abstract (English)

The purpose of this study is to investigate the impact of Six Sigma DMAIC approach (Define, Measure, Analyze, improve and Control) on the Quality of Pharmaceutical Services in Private Hospital Pharmacies in Jordan. The study designed as a quantitative cross-sectional and descriptive Cause-effect study carried out on Jordanian Private Hospital Pharmacies. Study methodology is to use a questionnaire that was built after reviewing the previous literature and used to measure the perception of pharmacists working in hospital pharmacies about the level of implementation of Six Sigma DMAIC approach and the Service Quality Dimensions. The questionnaire was distributed over 17 hospital pharmacy and the data was collected from 151 responses out of 180 distributed questionnaires. The data collected was analyze through normality test, validity test, reliability test, correlation and multiple regression. The result of the study reveal that Six Sigma and Service Quality Dimensions in implemented in Private hospital pharmacies in Jordan, but not in full scale and pharmacist not fully aware of the concept. However, the result also showed that Six Sigma has a significant impact on Service Quality dimensions except on responsiveness and empathy dimensions Moreover, Six Sigma can be used as a method of improvement for pharmaceutical services. The study recommend to consider the tangible dimension of service quality as an area need improvement. This study is conducted on Jordanian Private Hospital Pharmacies. The recommendation for future studies is to conduct the study on the public hospital pharmacies and community pharmacies.

Keywords: Six Sigma, DAMIC approach, Service Quality, SERVQUAL, Hospital pharmacy.

تأثير الحيود السداسي على جودة الخدمات الصيدلانية
دراسة ميدانية على صيدليات المستشفيات الأردنية الخاصة

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Abstract (Arabic)

تتمحور غاية الرسالة في البحث في أثر الحيود السداسي نهج DMAIC (الذي يتكون من التحديد والقياس والتحليل والتحسين والتحكم) على جودة الخدمات الصيدلانية في صيدليات المستشفيات الخاصة الأردنية. صممت الدراسة على أن تكون دراسة مقطعية، كمية، وصفية، أثرية أجريت على صيدليات المستشفيات الخاصة الأردنية. اعتمدت منهجية الدراسة على استخدام الاستبيان كأداة قياس والذي تم بناؤه بعد مراجعة الأدبيات السابقة، حيث أنه يقيس تصور الصيادلة عن الحيود السداسي وأبعاد جودة الخدمة. تم توزيع الاستبانة على 17 صيدلية مستشفى، وتم جمع 151 استبانة من اصل 180 استبانة تم توزيعها. تم تحليل البيانات التي تم جمعها من خلال اختبار الارتباط الطبيعي واختبار الصلاحية واختبار الموثوقية والانحدار المتعدد. وتظهر نتائج الدراسة على أن الحيود السداسي وأبعاد جودة الخدمة مطبقة في صيدليات المستشفيات الخاصة رغم أن الصيادلة لا يوجد لديهم الدراية الواسعة والمعرفة الواضحة عنها. وأيضا، أظهرت الدراسة أن للحيود السداسي أثراً على أبعاد جودة الخدمة، باستثناء بُعد التعاطف والاستجابة. علاوة على ذلك يمكن استخدام الحيود السداسي كأداة لتحسين جودة الخدمة الصدلانية. وتوصي الدراسة في النظر في البُعد الملموس من جودة الخدمة حيث أنه يعتبر كمجال بحاجة للتحسين. كما أن الدراسة قد أجرية على صيدليات المستشفيات الخاصة الأردنية مما توصي الدراسة بإعادة عمل الدراسة على صيدليات المستشفيات العامة وصيدليات المجتمع.

الكلمات المفتاحية: الحيود السداسي، نهج DMAIC، جودة الخدمة، SERVQUAL، صيدلية المستشفى.

Chapter One: Introduction

1.1 Introduction:

Nowadays, Service Quality has been the main concern of hospitals that seek to be in the lead of the healthcare industry and gain a competitive advantage. The trend is moving toward the improvement of Service Quality and implementing quality improvement tools to do so. Solving the problems and defects in the service provided via Six Sigma is one way of improving the quality of service.

Pharmaceutical services are one of the healthcare services that is provided in a hospital and play an essential role in the healthcare delivery system. Since Pharmacies are responsible for medication delivery for treatments and managing medication supplies and medication inventory in the hospital. Pharmacists are the line between doctors, nurses, and patients (Kumar & Kwong, 2011). Improving health care Service Quality as well as the Pharmaceutical services quality has become of great importance to societies and healthcare organizations (Sabry, 2014, Mahmoud, 2016). Hospitals require to deliver the finest possible service to those in need of treatment (Cristanto & Tarigan, 2021).

As quality becomes an important element of the competition between hospitals, all hospital internal operations need to be implemented perfectly to ensure the patients' satisfaction (Vijay, 2014, Cristanto & Tarigan, 2021). As there is a strong relationship between patient satisfaction and firm performance and profitability (Ghotbabadi et al. 2015). The success of quality improvement needs to create an internal culture, which supports the change and provides the resources needed (Silva, et al. 2019). Improving Service Quality leads to high perceived value that leads to high prices which increase revenue and profitability of the firm, with increasing patient satisfaction and loyalty (Upadhyai, et al, 2019).

Although the perception of quality depends on the industry, the quality of care can be defined differently depending on who is defining it, whether, it's the healthcare provider, the patient, or the stakeholder (Aniza, & Suhaila, 2011). Customers' perceptions of the service offered can result in satisfaction or dissatisfaction, thus the quality of service plays an important role since it depends primarily on their previous experience of customers to the

service (Ghotbabadi et al. 2015). The gap resulting from the difference between service expectation and service perceived caused by a defect in the service, assessment, and improvement of these gaps are the core of Service Quality improvement (Ramya, et al 2019)

On the other hand, Service Quality can be assisted by employees' perception of the service provided. Employees are a company's internal consumers, and the nature and quality of service they provide to external customers are determined by their impressions of their work environment. They are on the front lines, the can establish or destroy the firm's reputation. There it is important to take into consideration their perception of Service Quality. (Musaba, et al. 2014).

Quality improvement practices such as lean manufacturing, kaizen, and Six Sigma have proved their importance in improving quality across the manufacturing industry, where the focus is on reducing operational costs and improving quality. In healthcare systems, as well, the use of these quality improvement practices begin to rise because of the need for reducing budgeting, human resources shortage, and the increase in demand (Kumar, & Kwong, 2011). One of the most used practices is Six Sigma.

Six Sigma supports high-quality results, with the ultimate objective of fewer than 3.4 defects per million for practically all products, qualities, or services. Although achieving this goal may be challenging, using the Six Sigma methodology and tools will help to improve Service Quality (Arafeh, et al., 2014). The ability to identify and solve problems is one of the fundamentals of the Six Sigma philosophy (De Mast, & Lokkerbol, 2012, Mustafa, 2015).

Six Sigma DMAIC approach has been introduced primarily by Motorola, it has a five-stage approach (Define, Measure, Analyze, Improve, and Control) that aims to get the highest level of improvement by identifying and improving problems (Chakrabortty, et al. 2013, López Villanueva, 2019). Six Sigma is a problem-solving methodology that aims to identify variations and the root of the problem to improve Service Quality (Justitiaa, 2021).

Although the process of improvement was mainly the concern of the manufacturing industry (Sharma, et al., 2011). Six Sigma has been used by many organizations all over the world and in different service industries, the main areas that have been beneficial of Six Sigma implementation are banking services, health care, supply chain management, and more (Antony, 2015). In healthcare sitting Six Sigma had proved to be a strategy of choice for Service Quality management and potentially to be used in improving hospital

performance and services (Guspianto, 2019). Currently, Six Sigma has become one of the most successful processes to achieve and maintain process and service perfection, Six Sigma is considered a strong business strategy (Mesut & Gülmez, 2020).

Based on the mentioned in the introduction above, this study aims to investigate the effect of Six Sigma DMAIC approach in improving Pharmaceutical services in Private Hospital Pharmacies in Amman, Jordan.

1.2 Study Purpose and Objectives:

The purpose of this thesis is to investigate the effect of Six Sigma on Service Quality 5 dimensions in Private Hospital pharmacies. The study focus on the impact of Six Sigma DMAIC approach (Define, Measure, Analysis, Improve, and Control) on Service Quality dimensions (Reliability, Assurance, Tangibility, Empathy, and Responsiveness)

Where the objective of this study is:

1. To study the level of implantation of Six Sigma components in Pharmaceutical services in Jordanian Private Hospital Pharmacies.
2. To study the level of Service Quality dimensions in Pharmaceutical services in Jordanian Private Hospital Pharmacies.
3. To study the relationship between Six Sigma and Service Quality in Pharmaceutical services in Jordanian Private Hospital Pharmacies.
4. To investigate the effect of Six Sigma on Service Quality in Pharmaceutical services in Jordanian Private Hospital Pharmacies.

Moreover, to provide a new concept to evaluate and improve Service Quality dimensions in Pharmaceutical services. Raise awareness about Six Sigma deployment in the improvement of Pharmaceutical services quality. To provide sound recommendations to hospitals, the healthcare industry, other manufacturing and service industries, as well as, to decision-makers. This study may also add more scientific enrichment to the theoretical framework and benefit in supporting future studies and research.

1.3 Study Significance and Importance:

The current study might be considered one of the primary studies in investigating the use of Six Sigma DMIAC approach and its effect on Service Quality dimensions in the

Pharmaceutical services field in Jordanian private hospitals. The content also may be of interest to academic studies related to the reporting and decision-making concerning the Pharmaceutical Service Quality of Jordanian private hospitals.

Therefore, the value of this study arises from the following scientific and practical considerations:

1. Drive the attention to Six Sigma DMIAC approach and its influence on enhancing the Pharmaceutical Service Quality of Jordanian private hospitals.
2. Highlight the importance of visualizing and controlling Six Sigma DMIAC approach (define, measure, analyze, improve, and control) and their influence on Service Quality dimensions (Reliability, Assurance, Tangibility, Empathy, and Responsiveness) of Pharmaceutical services in Jordanian Private Hospitals.
3. Support other researchers in the study of Six Sigma DMIAC approach, and its importance either on pharmaceuticals services or for other services.
4. Support the decision-makers in private hospitals Pharmacies or even other Pharmacies and give recommendations for applying Six Sigma DMIAC approach to Pharmaceutical Service Quality.

Therefore, this study is dedicated to investigating the effect of Six Sigma on the Quality services of Pharmacies in Jordanian Private Hospitals.

1.4 Study Problem Statement:

In a private hospital Pharmacy, it is most important to provide high-quality service to the patient, as it plays a great role in improving their health and safety. The problem is in having good resources and qualified pharmacist, yet the utilization of these resources, skills, and knowledge is not in the best way possible and lead to a high percent of complaint from patients. Such complaints are; that the service isn't at the level intended to be, the process of dispensing medication not effective and takes too many steps and the waiting time is long.

As the manager of Istiklal Hospital implies, "despite that, there are qualified pharmacists in knowledge and experience, and a considerable amount of effort they put into work, yet still there are patients complain of the low level of service provided to them. Moreover, the number of performance errors in the service provided that lead to re-opening

of financial invoices to correct errors, it's maybe possible to use one of quality improvement tools like Six Sigma to assist and improve the Service Quality in the Pharmacy".

Pharmaceutical services have an essential role in patients' stay in the hospital and it is the main source of medication and has an important role in the medication supply chain (Kumar & Kwong, 2011). Improving the quality of Pharmaceutical services is essential to maintain patient safety and decrease the number of errors and defects in medication handling process. It is important to understand the needs of patients and their expectations of Service Quality then monitor and improve the provided service, to close the gap between patient expectation and their satisfaction. (Dehghan, et al. 2012).

As has been implied by many studies, Six Sigma has proved that it can improve Service Quality by decreasing the number of defects and eliminating variation:

Kumar & Kwong (2011) study focus on the application of Six Sigma tools to improve the retail Pharmacy service process. Christyanti & Christyanti (2012), the study showed the use of Six Sigma in defining and improving the quality of asbestos roofing. Moreover, Dehghan, et al. (2012) proposed that six sigma can be used to decrease the gaps in Service Quality and improve it, Hsia, et al. (2013) used Six Sigma DMAIC approach to develop a series of systems to improve the overall customer satisfaction with product and Service Quality. Arafeh, et al. (2014) used the Six Sigma DMAIC framework to reduce the prescription preparation time by developing customer-oriented processes in a cancer outpatient Pharmacy. Vijay (2014) study validated the application of Six Sigma DMAIC methods to reduce and optimize the patients' discharge process with a specific focus on a Medical and Surgical Department. Antony, (2015) a case study presents a classic example of how Six Sigma methodology can change the process and the mindset of the frontline workers and improve Service Quality. A study by Karout & Awasthi, (2017) had proposed the using Six Sigma DMAIC based approach for improving software quality in organizations Cristanto, & Tarigan, (2021) study used has Six Sigma methodology to improve inpatient service in a hospital by identifying waste and defects in the process of service provided and improve the service.

Kumar & Kwong, (2011) had recommended further study Six Sigma on improving the pharmacy work process for validation and extrapolating the results. Silva, et al. (2019)

suggested that more studies on Six Sigma in pharmacy service improvements are needed. Cristanto, & Tarigan, (2021) suggested that further studies on improving the quality of service in the hospital sitting using Six Sigma is needed.

Therefore, this study is directed to answer the following main question: Does Six Sigma DMIAC approach affect Pharmaceutical Service Quality in Jordanian Privates Hospital Pharmacies?

1.5 Study Questions:

Based on the problem statement the main aim of this research is to study the effect of Six Sigma DMAIC approach on services quality dimensions of Pharmaceutical services provided in Pharmacies of Jordanian Private Hospitals via answering the following questions:

1. What is the level of Six Sigma DMAIC approach implementation in Pharmaceutical services in Jordan?

2. What is the level of Quality Services dimensions implementation in Pharmaceutical services in Jordan?

3. Is there a relationship between Six Sigma DMAIC approach and Service Quality dimensions of Pharmaceutical services in Jordanian Privates Hospital Pharmacies?

4. Does Six Sigma DMAIC approach affect the quality of service in Pharmaceutical services in Jordanian Privates Hospital Pharmacies?

Questions 1 and 2 are answered by using descriptive analysis, and question 3 is answered by a correlation test, finally, question 4 is answered by testing the following hypotheses by using multiple regressions.

1.6 Study Hypothesis:

Based on the problem statement, and study questions, the following hypothesis are developed:

H_{01}: Six Sigma DMAIC approach does not affect Service Quality variables (reliability, assurance, tangibility, empathy, responsiveness), at $\alpha \leq 0.05$.

According to Service Quality dimensions, the main hypothesis can be divided into the following sub-hypotheses:

$H_{01.1}$: Six Sigma does not affect the Reliability of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

$H_{01.2}$: Six Sigma does not affect Assurance of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

$H_{01.3}$: Six Sigma does not affect Tangible of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

$H_{01.4}$: Six Sigma does not affect Empathy of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

$H_{01.5}$: Six Sigma does not affect Responsiveness of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

1.7 Study Model:

This study model has been generated according to the problem statement, study questions, and study hypotheses.

Model 1.1: Study Model
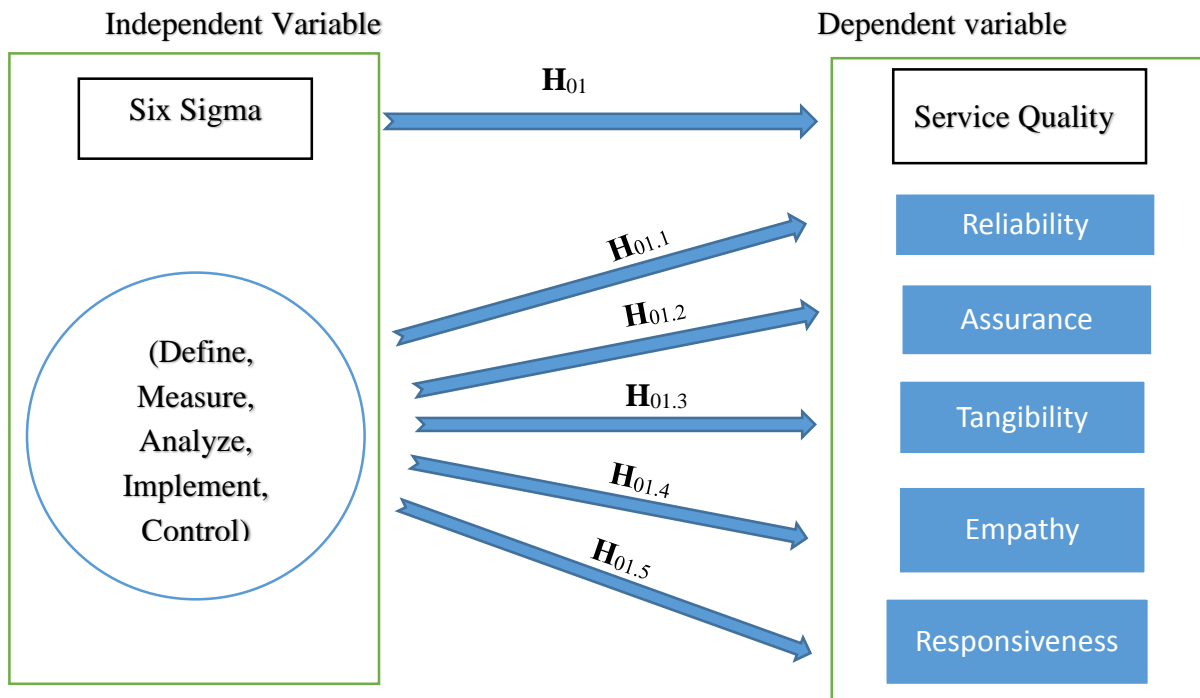
Sources: (Kumar, & Kwong, 2011, Christyanti & Christyanti 2012, Hsia, et al. 2013, Yarimoglu, 2014, Arafeh, et al. 2014, Vijay, 2014, Ghotbabadi, et al. 2015, Antony, 2015, Kondasani & Panda 2015, Pramanik 2016, Karout & Awasthi, 2017, Ramya, et al. 2019, Upadhyai, et al. 2019, Tešić 2020, Cristanto, & Tarigan, 2021)

1.8 Operational and Procedural Definitions of Key Words:

Independent Variables:

Six Sigma: is a methodology that is used for reducing defects and continuous improvement of Services Quality that manifested in DMAIC approach which stands for (Define, Measure, Analyze, Improve, and Control)

- **Define Stage**: is to determine the errors in the quality of pharmaceutical service provided, patients requirement, and the objective of the improvement project. This answered questions 1-5.

- **Measure Stage:** is to collect data to evaluate the current level of pharmaceutical Service Quality and set a baseline for errors frequency. This answered questions 6-10.

- **Analyze Stage:** is to evaluate the collected data to determine the root cause of the errors and opportunities for improvement. This answered questions 11-15.

- **Improve Stage**: is to find a creative solution to make suitable changes and correct errors in Service Quality. This answered questions 16-20.

- **Control Stage:** is to monitor the implemented changes to pharmaceutical Service Quality and initiate policies and procedures to guarantee the stability and continuity of these changes. This answered questions 21-24.

Dependent Variables:

Service Quality: is the gap created by the difference between the expectation of service provided and the perceived service by the costumers, it can be measured through 5 dimensions (Reliability, Responsiveness, Assurance, Tangibles, and Empathy)

- **Reliability:** is the ability to perform the promised service within a time frame dependably and accurately. This answered questions 25-29.

- **Responsiveness:** is the willingness of pharmacists to respond to a request, help patients and provide fast service. This answered questions 30-34.

- **Assurance:** is the degree of courtesy, knowledge, and competence of pharmacists and their ability to inspire trust and confidence with patients. This answered questions 35-39.

- **Tangible:** is the appearance of pharmacists who provide the pharmaceutical service, the equipment, and the physical facilities of the pharmacy. This answered questions 40-44.

- **Empathy:** is the degree of caring, communication, and access to pharmacists to individualize attention to patients. This answered questions 45-49.

1.9 Limitations and Delimitations:

Human Limitation: This study is carried out on pharmacists who are working at Private Hospital Pharmacies in Amman.

Place Limitation: This study is carried out in Private Hospital Pharmacies in Amman –Jordan.

Time Limitation: This study is carried out within the 2nd semester of the academic year 2021/2022.

Delimitations: There is a lack of enough studies that assist Pharmacists in improving the quality of service in Jordanian Private Hospital pharmacies. The differentiation in Pharmacy sitting in different hospitals can lead to inconsistency of results that may be collected in this study.

Chapter Two: Conceptual and Theoretical Framework and Previous Studies

2.1 Introduction:

This chapter includes the definition and components of Six Sigma and Service Quality and the relationship between Six Sigma and Service Quality. Moreover, it includes previous studies and models. Finally, it summarize what differentiates this study from previous ones.

2.2 Definitions and Components of Variables:

2.2.1 Dependent Variables:

Six Sigma: is one of the quality improvement tools and has been used widely to improve services and product quality. According to researchers and scholars, Six Sigma has been defined as follows; Sharma et al, (2011) stated, Six Sigma is a statistical term for standard deviation, which is an indicator of the degree of variation in a set of measurements, a process, or a product. For Chakrabortty, et al. (2013) Six Sigma management is a philosophy that focuses on reducing variation in all critical processes to accomplish continuous and advanced improvements. Antony (2015) defines Six Sigma as it is a data-driven process improvement approach for achieving stable and accurate results in processes. It does not only focus on minimizing process variation and defects, but it also encourages the organization to adopt a process thinking mindset. Cristanto, & Tarigan, (2021) stated that Six Sigma is a methodology for determining whether or not a product's quality is acceptable. Justitiaa, et al, (2021) define Six-Sigma as a structured problem-solving methodology that would be used to reduce variation and enhance process efficiency to improve service for consumers and promote competitiveness.

In summary, Six Sigma is a methodology that is used for reducing defects and continuous improvement of Service Quality manifested in DAMIC approach which stands for (Define, Measure, Analyze, Improve, and Control).

Definitions of DMAIC approach (Define, Measure, Analyze, Improve, and Control):

According to Vijay, (2014). DMAIC in Six Sigma is described as an approach for problem-solving. Karout, & Awasthi, (2017) define it as a systematic approach for eliminating errors and improving efficiency. López Villanueva, (2019) Refers to DMAIC as an improvement approach used for improving, optimizing, and stabilizing processes and designs, it is multipurpose and can be used in any improvement application to generate

exceptional results. Justitiaa, et al (2021) refers to the DAMIC approach as a sub-methodology that aims to identify and improve Service Quality. Six Sigma DMAIC approach consists of 5 steps:

The first step is "Define"; once there is a problem and a decision made to use Six Sigma DMAIC approach. The first thing is to Define. According to Sharma, et al. (2011) Define step is to determine the type of customers, and their requirements, critical quality issues, or core business processes to be improved. Arafeh, et al. (2014) consider the "define stage" of a project to determine the objective and their importance and to discuss them with the selected team. For Antony, (2015) the "define phase" aims to outline the business problem and the field of the project and processes to be improved. Senger, & Cengiz, (2018) define this phase as used to determine the product quality features that are critical for customers. Whereas, López Villanueva, (2019) implies that the goal of the "Define step" is to identify the current state by developing a problem statement that specifies what the team intends to improve on, demonstrating the need for the project and its potential value.

Therefore, the Define Stage is the first step of the approach and is to determine the errors in the quality of service provided, patients' requirements, and the objective of an improvement project.

The second step is to Measure: after defining the defects in the system some measurement need to be done. According to Sharma, et al. (2011) measure step is to evaluate the core business process performance and collect data to develop a database about the process, product, or service to determine the defects. For Arafeh, et al. (2014) measure stage is to assess the initial state of the system and to collect data to determine the initial Service Quality level. According to Antony, (2015), the "measure phase" aims to acknowledge and record the current state of the processes that need to be improved, collect information, evaluate the current state, and verify the measurement system. For Senger, & Cengiz, (2018) this phase aims to determine the frequency of defect occurring and identify if the production process is affected by it. López Villanueva, (2019) implies that the objective of this phase is to acknowledge the process that needs to be improved, by accurately collecting data, and creating a baseline for the measurements.

Therefore, the Measure Stage is the second step of the approach and consists of collecting data to evaluate the current level of pharmaceutical Service Quality and set a baseline for error frequency.

The third step is to Analyze: once measurement of the defects is done and set a baseline it's time to analyze the data. Sharma, et al. (2011) refer to this step as examining and investigating the collected data and process map to define the root cause of defects, identify the gaps in performance and source of variation, and highlight areas for improvement. Arafeh, et al. (2014) stated that the "analyze stage" aims to study the root cause of the defect in the process, and brainstorming sessions held get different processes focusing on special causes. Antony, (2015) said that the goal of the "analyze phase" is to examine the data collected to identify the root cause of the problems and generate the capability of the process. Senger, & Cengiz, (2018) implied that this phase is concerned with defining the input and outputs defects that affect the production process and understanding the relationship between the features critical to customers. López Villanueva, (2019) defines the "analyze step" as studying the collected data and identifying the root cause of the defects and opportunities for improvements.

Therefore, the Analyze Stage is the third step of the approach and consists of evaluating the collected data to determine the root cause of the errors and opportunities for improvement.

The fourth step is "Improve": once the analysis is complete, a decision on the changing measures and their implementation need to be done. Sharma, et al. (2011) the "improve step" to improve the targeted process is to design a creative solution to correct and prevent problems and to install implantation plans. Arafeh, et al. (2014) define improve stage as the phase to execute changes in the system to improve the quality. Antony, (2015) defines the aim of this phase as to define the correcting measures, design the targeted state and execute these changes. Senger, & Cengiz, (2018) define the phase as a phase that includes creating the most suitable changes to improve the features that are critical to customers. López Villanueva, (2019) refers to the goal of this phase is to make creative solutions to correct the defects and eliminate the chances of future occurrence.

 Therefore, the Improve Stage is the fourth step and consists of finding a creative solution to make suitable changes and correct errors in Service Quality.

The final step is Control: once improvement measures have been implemented, control plans need to be done. According to Sharma, et al. (2011), this phase is to monitor the improvement measure taken and prevent the rebound to the "old ways" and then generalize these improvements. Arafeh, et al. (2014) define the control stage as a requirement to establish policies and procedures that guarantee the stability of the improvements created. Antony, J. (2015) defines this phase as a requirement to measure the implemented improvement, monitor the change on a large scale, and define replication of opportunities. Senger, & Cengiz, (2018) define the phase as a phase that includes preventing potential defects in the features critical to customers and then generalizing successful changes. López Villanueva, (2019) refers to this step as the maintenance and development of newly implemented changes.

Therefore, the final step is Control Stage and consists of monitoring the implemented changes to Pharmaceutical Service Quality and initiating policies and procedures to guarantee the stability and continuity of these changes.

2.2.2 Dependent Variables:

Service Quality: Service Quality has been the interest of scholars for years, and for the past few decades researchers have been generating models to assist it. The hard thing about Service Quality is the absence of tangibility, unlike product quality. In 1978, Sasser and his colleagues defined the factors that affect Service Quality levels. And in 1984, Grönroos developed the first Service Quality that is based on technical and functional quality. In 1985, Parasuraman and his colleagues developed the GAP Service Quality model that is built on the gaps developed through the difference between expected Service Quality and the perceived Service Quality. Based on the GAP model, Parasuraman, Zeithaml, and Berry also introduced the SERVQUAL model in 1985 that is consists of ten dimensions. In 1988, Parasuraman and his colleagues had reduced these dimensions to five (Reliability, Responsiveness, Assurance, Tangibles, and Empathy), (Dehghan, et al. 2012, Yarimoglu, 2014, Ghotbabadi, et al. 2015, Kondasani & Panda, 2015, Pramanik 2016, Ramya, et al. 2019, Upadhyai, et al. 2019, Tešić, 2020). Although many studies used SERVQUAL as a tool to measure Service Quality in healthcare sitting, many have used different dimensions

according to their sittings (Endeshaw, 2020). Yet, the primary 5 dimensions are the concern of this study.

Therefore, Service Quality is the gap created by the difference between the expectation of service provided and the perceived service by the customers, it can be measured through 5 dimensions (Reliability, Responsiveness, Assurance, Tangibles, and Empathy)

Service Quality Dimensions:

Tangibility: according to Yarimoglu, (2014) consider to be the physical facilities, equipment, and appearance of personnel who provide the service. For El Saghier, (2015) it is the degree to which physical facilities, equipment, and appearance of personnel are adequate for the service performed. Likewise, Pramanik, (2016) has defined tangibility of service as the physical facilities, equipment, and appearance of personnel who provide the service. Mesut, & Gülmez, (2020) defined it as the appearance of the physical facility, equipment, personnel, and contact material.

Therefore. Tangible is considered as the appearance of pharmacists who provide the pharmaceutical service, the equipment, and the physical facilities of the pharmacy.

Reliability: Yarimoglu, (2014) and Pramanik, (2016) define reliability as the ability to perform the promised service dependably and accurately. El Saghier, (2015) refers to reliability as the degree to which a promised service is performed dependably and accurately. Whereas, Mesut, & Gülmez, (2020) defined it as the ability to be able to perform the promised service reliably and correctly.

Therefore, Reliability is considered as the ability to perform the promised service within a time frame dependably and accurately.

Responsiveness: Yarimoglu, (2014) defines responsiveness as the ability to help customers and provide prompt service. El Saghier, (2015) refers to responsiveness as the degree to which service providers are willing to help customers and provide prompt service. Pramanik, (2016) defines responsiveness as the willingness to help customers and provide prompt service. Mesut, & Gülmez, (2020) define responsiveness as being able to respond, the willingness to help customers, and providing fast service.

Therefore, Responsiveness is considered as the willingness of pharmacists to respond to a request, help patients and provide fast service.

Assurance: according to Yarimoglu, (2014) assurance is the courtesy knowledge, the ability of employees to inspire trust and confidence with customers. El Saghier, (2015) defined assurance as the extent to which service providers are knowledgeable, courteous, and able to inspire trust and confidence. Pramanik, (2016) referred to assurance to include competence, knowledge, and courtesy of employees and their ability to inspire trust, confidence, credibility, and security. Mesut, & Gülmez, (2020) considered assurance as to the knowledge, kindness, and reliability of the personnel who provide the service.

Therefore, Assurance is considered as the degree of courtesy, knowledge, and competence of pharmacists and their ability to inspire trust and confidence with patients.

Empathy: according to Yarimoglu, (2014) empathy is the caring, individualized attention the firm provides its customers. While El Saghier, (2015) defined empathy as the degree to which the customers are offered caring and individualized attention. Pramanik, (2016) considered empathy to include access, communication, and understanding of customers. Whereas, Mesut, & Gülmez, (2020) referred to empathy as the understanding of the customer, striving to recognize customers and their needs.

Therefore, Empathy is considered as the degree of caring, communication, and access to pharmacists to individualize attention to patients.

2.3 The Relationship between Six Sigma and Service Quality

As it has been clear from previous literature, Six Sigma has an impact on Service Quality and can help in improving the quality of service. It has been supported by many studies that the use of Six Sigma DMAIC approach aid in assisting the gaps in performed service and suggests ways to improve it.

Dehghan, et al. (2012) propose from their study that six sigma can be used to solve problems in Service Quality and close the gaps found to improve the quality of the service provided. Hsia, et al, (2013) a study proposed that Six Sigma DMAIC approach can establish a series of systems that enhance overall consumer satisfaction with Service Quality. Mustafa, et al (2015), had integrated into their study Six Sigma DMAIC approach to identify the problems in the service and uses the SERVQUAL tool to assist the service provided. A cause and effect analysis is carried out to determine the causes of poor quality of the service and then imitate improvement measures that improve the service. Senger, & Cengiz, (2018)

present through their study that Six Sigma DMAIC approach can improve the Service Quality by detecting and eliminating errors. Mesut, & Gülmez, (2020) in their research showed that the SERVQUAL method, when applied in the Six Sigma DMAIC approach, can be used to measure the Qualityof the services and initiate measure to improve it.

2.4Previous Models:

When talking about Service Quality, it is worth presenting the primary models that the base Service Quality developed from.
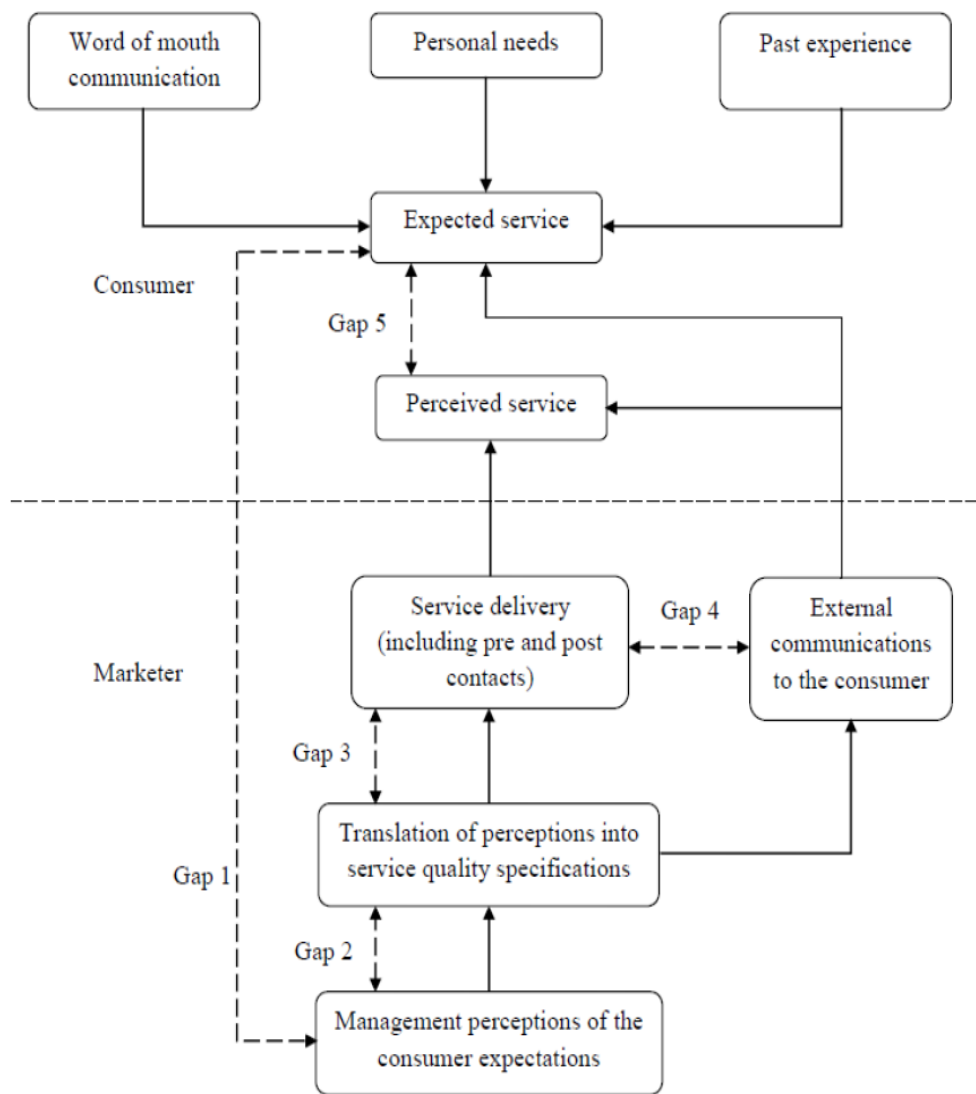
Model 2.1 Parasuraman et al., 1985

A review done by Ghotbabadi et al. (2015), presented the measurement tools used to measure Service Quality. SERVQUAL has been developed based on the disconfirmation model of Parasuraman, Zeithaml, and Berry (1985), the GAP model (Model 2.1), which suggests that Service Quality is related to the difference between perceived service and expected service. Moreover, they have their theory based on gap analysis which is presented through five gaps presented in the following model.
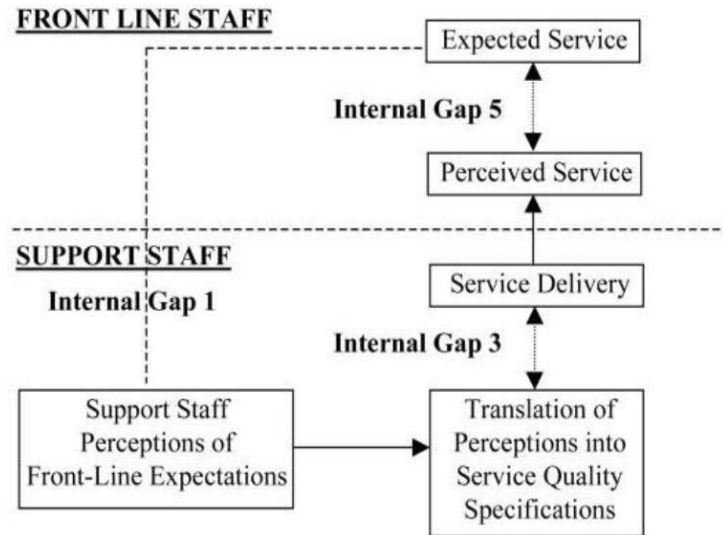
Model 2.2 Frost & Kumar, 2000

Another model had been developed based on GAP analysis (Model 2.2), the model of Frost & Kumar (2000) that represent the gaps in internal Service Quality. As employees play the role to affect the service provided, this model proposed the dimensions and their relationship to the internal customers (first-line employees and support staff). Model 2.1 and 2.2 were both retrieved from Ghotbabadi et al. (2015) review.
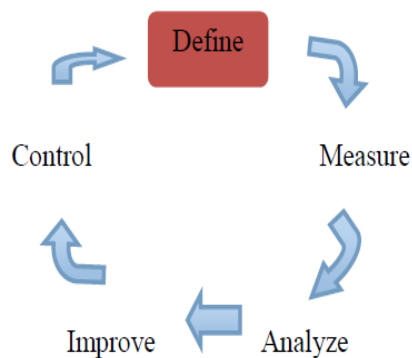
Model 2.3 Mustafa et al, 2015

Mustafa et al, 2015 used Six Sigma DMAIC approach (Model 2.3) to determine the causes of the poor Service Quality. Six Sigma is a continuous approach that is used to determine errors in service provided and fix it.

Dehghan, et al. 2012 the authors of this study had integrated the concepts of SERVQUAL and Six Sigma continuous strategy (DMAIC approach), to develop a model that deploys Six Sigma in closing the gaps in Service Quality. It seems that the process has to be carried out in 2 stages. (Model 2.4)
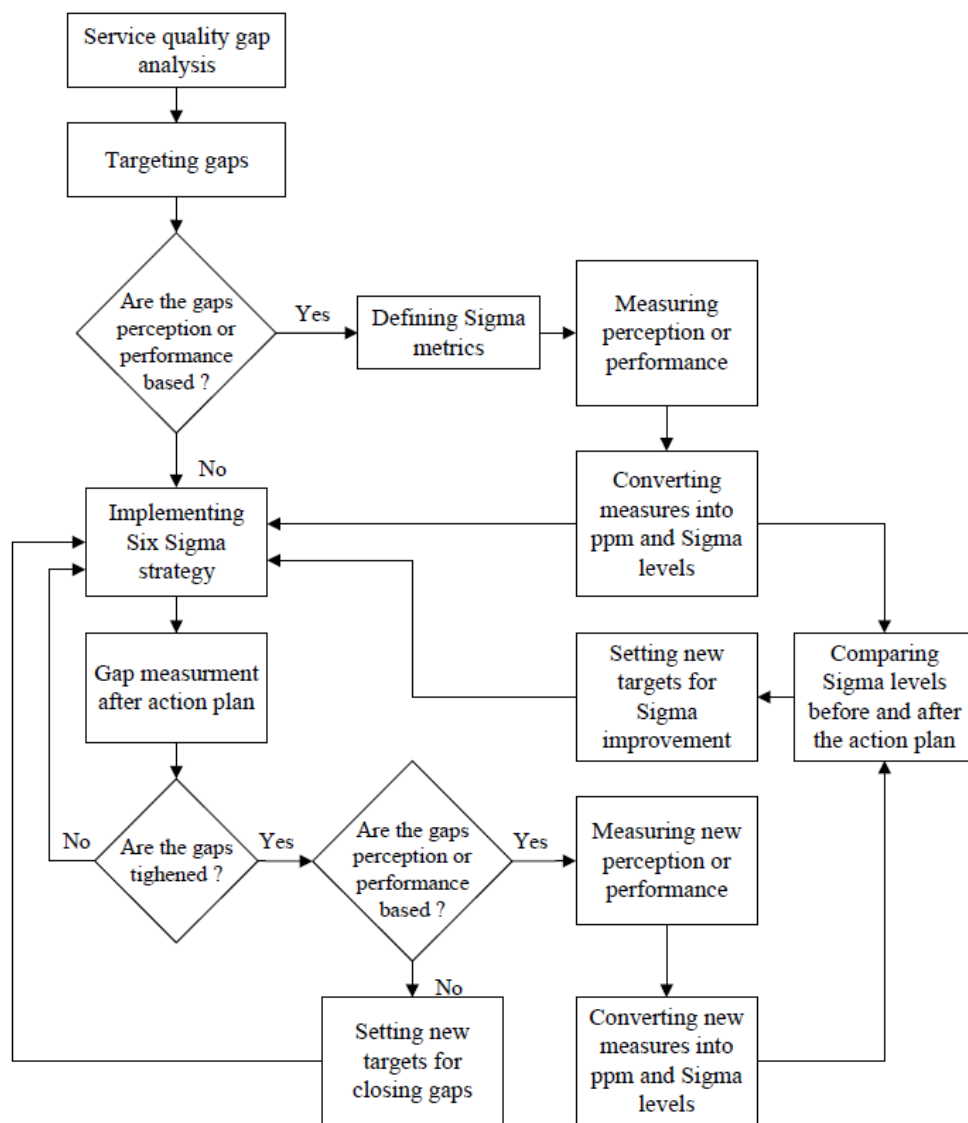
Model 2.4 Dehghan, et al. 2012

Chu, (2012) the author of this study had integrated the approach of Six Sigma DMAIC with the bases of the SERVQUAL model, to create a framework to improve the service process and Service Quality of an information system application.
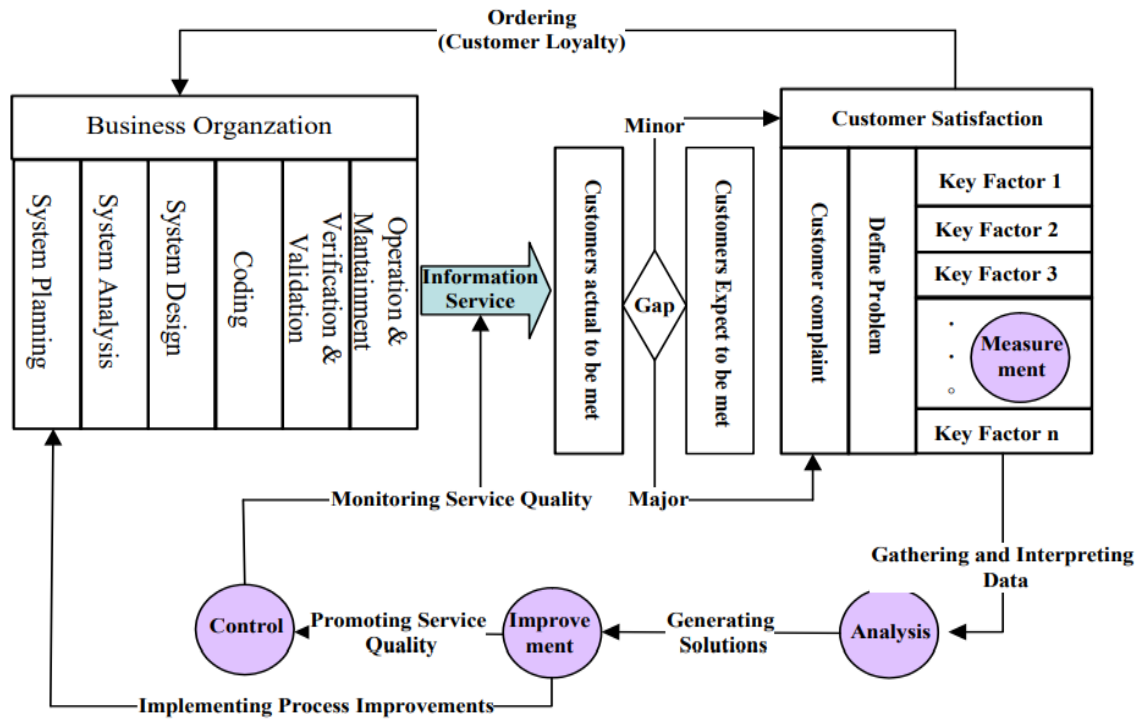
Model 2.5 Chu, 2012

2.5 Previous Studies:

After reviewing the previous literature, it has been found that not only the definition and consideration of variables vary but also the methodology applied is in despair.

Kumar & Kwong, (2011) a case study titled: **Six sigma tools in integrating internal operations of a retail Pharmacy.** A study aim to integrate information and healthcare delivery system issues, especially in inpatient retail Pharmacy operations in the U.S., used Six Sigma tools to investigate the effects of an inpatient retail Pharmacy service process, the results were analyzed to identify and propose process improvements. The research concluded that Six Sigma tools are very applicable and quite effective in improving and integrating the Pharmacy process flow. Gap analysis results were used to identify the process areas to focus

on to increase customers and employee satisfaction and successfully initiate to effectively narrow the gaps. The study serves as a framework for the initiatives that should be applied for successful process improvement, evaluation, and implementation.

Agrawal, (2011) a study titled: **Application of 'Six Sigma' in Libraries for Enhancing Service Quality.** As improving the quality of services is the main trend nowadays, the study proposes the use of Six Sigma in improving the service of the library. The study implied that as the organization has to use Six Sigma approach, it has to pass through 6 phases of preparations. The implementation of Six Sigma approach starts at phase five, as the library process is to be improved and elected. Implanting the DMAIC approach means that the service process needs to be identified, collect validate measured data, analyze the data and find the gap between the expected and perceived. After analysis, improvement measures created are validated and controlled. The study concluded that Six Sigma can be to improve library services.

Rohini, & Mallikarjun, (2011). A study was carried out in India, titled: **Six Sigma: Improving the Quality of Operation Theatre.** The study deployed Six Sigma DMAIC approach to improve the process of operation department, of a corporate multi-specialty hospital in Bangalore, India. The DMAIC approach demonstrated a broader application and how a healthcare organization may gain competitive advantages, efficient decision-making, and problem-solving competencies within a short period. The study outlines each stage in-depth, explains the instruments required and highlights the obstacles to improvement efforts' success. The study concluded with recommendations to improve operations.

Christyanti, & Christyanti, (2012), a study carried out in Indonesia, titled: **Improving the Quality of Asbestos Roofing at PT BBI Using Six Sigma Methodology.** The study aims to improve quality issues of asbestos roofing by using Six Sigma methodology as an initiative. By implanting the Six Sigma methodology, the company identifies the issue that causes the flat side as the main defect, due to the speed curing. And they were able to propose a solution that has increased the level of Six Sigma as a result of quality improvement. Although the study goal is to reach a high result, the recommendation for the company is to keep continuous improvement measures to reach the desired level.

Udayai, & Kumar, (2012), a study done in India, titled: **Implementing Six Sigma to Improve Hospital Discharge Process.** In this study, the authors deployed Six Sigma

DMAIC approach to improve the process of patient discharge in hospitals. The approach results in more patients being handled each month, resulting in significant financial impact as well as an improvement in patient satisfaction. The study proposes that in a competitive world, it is important to focus on addressing patients' requirements and pressure to deliver the best Service Quality. Six Sigma can be the ultimate solution to resolve these concerns.

El-Banna, (2012). A study titled: **Improving Patients Discharge Process in Hospitals by using Six Sigma Approach.** In this study, the author applied Six Sigma to reduce the time of patient discharge from the hospital. By doing so, there was an increase in customer satisfaction, an increase in the number of admissions and turnover in the rooms, and an increase in hospital profitability. This has proven the efficacy of implementing Six Sigma to improve service process quality in the healthcare industry.

Ramakrishna (2012), in a study, titled: **Achieving Competitive Advantage through the implementation of Six Sigma DMAIC Process in Service Sector in India.** As Six Sigma is considered a philosophy for continuous improvement in products, processes, and services of organizations. And as the concept of Six Sigma was famous in the production sector, it gained importance in the service sector as well. The study was conceptual research through a literature survey, applying Six Sigma DMAIC approach to different businesses in service sectors. The study concluded that Six Sigma can be applied in the service sector for the improvement of services, but it is advisable to keep into consideration the customer needs and perceptions.

Chu, (2012) a study carried out in Taiwan titled: **The Application of Six Sigma to Promote Information System Service Quality**. The study proposes a framework for integrating Six Sigma DMIAC approach to improving the service of information systems. The problem with the service is that users were disappointed with Intranet application delivery at an all-time high. Applying Six Sigma DMAIC approach to resolve this problem. After assisting the service process and identifying the gap in services that need improvement. The study showed that applying Six Sigma helped in improving Gap 5 and improve Service Quality. It showed that not only did this strategy help the development team focus on lowering service variation, but it also gave the rest of the firm a better grasp of the IT engagement required for success.

Chakrabortty, et al (2013), in their study case that was carried out in Bangladesh, titled: **Reducing Process Variability by Using DMAIC Model: A Case Study in Bangladesh.** The case study deployed Six Sigma DMAIC approach to reduce variation in the process of manufacturing operations. The application of Six Sigma in the study yielded major outcomes, reducing cost, reducing time, maximizing profits, quality of the products, and increasing customer satisfaction. The study assured that a successful application of the approach can have positive impacts on organizations.

Hsia, et al (2013), in a study titled: **The Application of Six Sigma to Enhance Product and Service Quality in Internet Marketing,** the authors had applied Six Sigma DMAIC approach to improve Service Quality. The study proposed that Six Sigma DMAIC approach can establish a series of systems that enhance overall consumer satisfaction with Service Quality. The study provides a procedure to measure, analyze, improve, and control Service Quality through a step-by-step approach and posits a practical method by which firms maintain and enhance their quality and customer satisfaction.

Musaba et al, (2014), in a study titled: **Employee Perceptions of Service Quality in the Namibian Hotel Industry: A SERVQUAL Approach.** In the line of assisting Service Quality through employee perception, the study assessed Service Quality through employee perceptions in the Namibian hotel industry by using the SERVQUAL approach, the data was collected by using a questionnaire that cover the five Service Quality dimensions, then data was analyzed by gap score analysis and factor analysis. The study is based on the principle that employees play an important role in assisting the Service Quality as they are the internal customers of the company, and can influence the quality of the service provided. The study has shown that it is important to address employees' concerns in the formulation of their strategy to improve and maintain Service Quality.

Arafeh, et al. (2014), a study carried out in Jordan titled: **Six Sigma Applied to Reduce Patients' Waiting Time in a Cancer Pharmacy.** The study proposed the use of the Six Sigma DMAIC approach to decrease patients' waiting time in a cancer pharmacy. Using the improvement methodology of Six Sigma, Various improvement opportunities have been identified throughout the project phases to reduce patient waiting times. As a result of the study, patient waiting time had been reduced to 50%. A result that is reflected in the improvement of the provided Service Quality.

Vijay, (2014) a study titled: **Reducing and Optimizing the Cycle Time of Patients Discharge Process in a Hospital Using Six Sigma DMAIC Approach.** A study was carried out in a multidisciplinary hospital in India. It aimed to use the Six Sigma DMAIC approach to improve the level of Service Quality by reducing and optimizing the cycle time of the patient discharge process. This research was carried out through the five phases of the Six Sigma DMAIC Model, utilizing various Quality tools and techniques. After identifying the defects and implementing the improvement strategies, there was a 61% reduction in the cycle time of the Patients' discharge process. This result implies the usefulness of Six Sigma utilization in improving Service Quality by improving the process. This study is to help Health Care Managers reduce and optimize the cycle time of the Patients Discharge Process in Hospitals using the Six Sigma DMAIC model.

Mustafa et al, (2015) a study titled: **Improving Service Quality in Preschool by Using the Six-Sigma DMAIC Model.** The goal of this study was to present the application of Six Sigma DMAIC (Define, Measure, Analyze, Improve, and Control) approach to build a feedback system step by step. The study made several recommendations for how to improve the quality of tangibility services in preschools. As a result, this decision-making approach should be developed to ensure that the corrective measures can be performed and monitored using systematic procedures.

Narula & Grover, (2015) a case study titled: **Application of six sigma DMAIC methodology to reduce service resolution time in a service organization.** As Six Sigma has been used in many studies over the past years, it's a proven strategy for achieving considerable bottom-line savings by improving process performance. The study showed how Six Sigma can be used to enhance Service Quality. The goal of this study is to provide Six Sigma DMAIC approaches that will assist service firms in analyzing their processes. It also highlights the critical relationships between process improvement and process variance. The research pinpoints essential process parameters and recommends a team structure for Six Sigma projects in service companies.

Karout & Awasthi, (2017) a study case titled: **Improving software quality using six sigma DMAIC based approach.** This study carried out by RK Company in Canada, aimed to use Six Sigma DMAIC based framework for improving software quality. Critical quality attributes are identified, production issues are classified and measured, and the causes of a

large number of production issues are specified, leading to various improvement recommendations. This study demonstrates how a systematic approach, such as DMAIC, can be used by businesses to eliminate errors and improve efficiency. By applying DMAIC at "RK" company, DMAIC can be used in organizations to improve the quality of their software products. Which result in reduced cost and cycle times, achieve customer satisfaction and improve profit margin.

Abdul & Purwatmini, (2018) a study titled: **Improving Service Quality of Call Center Using DMAIC Method and Service Blueprint.** Customer satisfaction is a key factor for organizations since it encourages customers to utilize the service repeatedly. Customer satisfaction is also associated with the customer's previous experience with the company's products or services. The company found that there is a waste of customer time waiting. The study utilizes Six Sigma DMAIC approach as an improvement measure. The study concluded that there was an improvement in sigma levels, which means an improvement in Service Quality.

Kowalik, (2018) a case study titled: **Six Sigma as a method of improving the quality of service process.** The study aimed to present a practical implementation of Six Sigma DMAIC approach to improving the process of Service Quality. First, the study started by defining the area of improvement, collecting initial data about the service process, then the collected data was analyzed to determine the root cause of the problems and develop suitable solutions. Finally, the study determines the measure for controlling the improvement measures. The study concluded that Six Sigma DMAIC approach can have a practical implementation in service improvement. It indicates the significance of considering customer voice for the improvement process.

Senger & Cengiz, (2018) a study titled: **Implementation Six Sigma of Service Industry: A Case of Tourism Industry.** A study was carried out in Turkey on the truism industry, to apply Six Sigma DMAIC approach as a tool to improve Service Quality. It aimed to detect and correct the errors that cause poor Service Quality by using DMAIC approach to the hotel serving in Kars Province. The study found that implementing DMAIC approach to improve Service Quality is a success. In measuring the initial state, comparisons are made with the new measurements that are taken once the improvements have been fully integrated into the system and the achievement of the set goals of the improvement project is clearly

illustrated. The application of selected changes to the company and the implementation of essential controls reduce process errors and improve quality levels.

Mesut & Gülmez, (2020) a study titled: **Six Sigma Approach to Improve Service Quality and a Practice Study in Hospitality Sector.** In this study, the authors implement Six Sigma DMAIC approach to improve the service process in a five-star hotel located in the city center. In the study, they deployed both DMAIC approach to assist and identify the causes and defects in Service Quality and the SERVQUAL tool to assist the level of quality before and after initiating improvement measures. The study resulted in proving the success of integrating Six Sigma DMAIC approach with the SERVQUAL method to improve Service Quality in the truism service industry.

Sinha, et al (2020) a study titled: **Improving the Service Quality of telecommunication companies using online customer and employee review analysis.** The study was carried out in the telecommunication and network industry, to improve Service Quality and customer satisfaction. The study proposes the use of Six Sigma DMAIC approach to assist and identify the problems with the service and improve it. The study considers assisting Service Quality through both customers' and employees' satisfaction. The study is concluded with a recommendation to improve Service Quality and help the organization gain its reputation in the brand market.

Hakim, et al. (2020) a study titled: **Service Performance Improvement during Pandemic COVID 19 Using Integrated SERVQUAL and Six Sigma: Telecommunication and Information Industry Case Application.** The study aimed to assess the level of customer satisfaction with the Service Quality of Wi-Fi.id Corner Service Company. And determine the way to improve the services provided. The study integrates Six Sigma with the Service Quality SERVQUAL model. The study concluded the cause of low Service Quality level in the company and customers' complaints. And the recommendation was provided to improve Service Quality gaps determined.

Cristanto & Tarigan, (2021) a study titled: **Improving the Quality of Inpatient Services with Lean Service and Six Sigma Methods at Eshmun Hospital.** A study carried out in Eshmun hospital in Indonesia, aimed to improve hospital Service Quality by utilizing lean service and Six Sigma. The study analyzed the processes of diagnosing diseases, responsive patient care, hospital security, hospital access roads, completeness of facilities,

and medicines. The defects and waste activity were identified and improved, which lead to reducing service activities from 15 to 11 activities, this saves time in carrying out service. Reducing time by removing non-value activities, means a better more efficient service provided.

Fathurohman, et al. (2021) a case study carried out in Indonesia titled: **Value Stream Mapping and Six Sigma Methods to Improve Service Quality at Automotive Services in Indonesia.** The study was performed in the Automotive Toyota dealer's service in Indonesia to improve the problem of high aftersales lead time. The service cycle takes 120 min, which is a higher lead time than charged by 60 min for a type of Express Maintenance service. In the study, the Six Sigma DMAIC approach was applied, and both qualitative and quantitative data were collected from multiple sources. By assessing the service process, it was possible to identify the part of the process that cause the problems. Managing the problem was found to decrease the total lead time for express maintenance from 120 to 64 mins. Implementing Six Sigma in this study, Six Sigma methodologies confirm earlier studies, particularly enhancing Service Quality, which may be improved to boost customer satisfaction, company profitability, and corporate competitiveness to maintain the industry's future sustainability.

Wahyuningsih, et al. (2021) a study titled: **The Analysis of Delivery Service Quality Using Six Sigma and SERVQUAL Methods in Improving Customer Satisfaction.** The study is conducted on logistics business, to enhance Service Quality of delivery services which is considered an essential factor to be continually enhanced. The study proposes the implementation of the SERVQUAL and Six Sigma methods in the logistics service industry. The study employee mix method is to be completed. A quantitative method of collecting data through a survey, and a qualitative method in which data is collected through interviews. The data were obtained and analyzed by Six Sigma DMAIC approach with integration to SERVQUAL gap analysis. The study reveals that there is a gap between customer expectations of the service they receive, which cause their dissatisfaction. And the cause of this gap was identified as well.

In summary, the previous studies had proposed that the implementation of Six Sigma DMAIC approach can be beneficial and used in many industries. It's used in identifying the root causes, defects, and variation in Service Quality, and provides a problem-solving method

that can introduce improvement measures to enhance Service Quality. Through the identification of Service Quality levels based on SERVQUAL model, the assessment can pinpoint the areas that have defects and focus on the opportunities to improve them.

2.6 The Contributions of the Current Study as Compared with Previous Studies:

1. On the concept of Six Sigma and Service Quality: it seems that few studies had integrated the concept of DMAIC approach with SERVQUAL model to propose a framework for Service Quality improvement.

2. Purpose: most previous studies works were a direct application of Six Sigma to identify defects and correct them. As a result, improve the quality of the service process. However, the purpose of this study is to assist the effect of Six Sigma on the individual dimensions of Service Quality in pharmaceutical services.

3. Environment: most previous studies have been carried out in different counties with one being carried out in Jordan, this study may be the second study in pharmaceutical services in Jordan to focus on private hospital pharmacies.

4. Industry: the application of previous studies was on different types of services, including pharmacy services. However, each was a concern of a single aspect of the service, whether, inpatient, outpatient, or discharge process. This study is concerned with all the aspects of service provided in a hospital pharmacy and how it can be improved.

5. Methodology: in contrast to previous studies, where they applied Six Sigma directly. This study investigate the impact of Six Sigma DMAIC approach on Service Quality dimensions. It aims to have an overview that focuses on the quality of Pharmaceutical services in general, and how Six Sigma can aid in the process of improvement. Exploring pharmacist awareness of Six Sigma DMAIC approach and its use in improving the processes and services provided in Jordanian private hospital Pharmacies.

6. Population: most previous studies consider community pharmacy or a part of pharmacy services and assisting Service Quality through customers. This study consider private hospital pharmacies. As pharmacists are the service providers and

are mostly in contact with patients, Service Quality is assisted through their perceptions to provide perspective to the field.

7. Comparison: The current study results are compared with previous studies' results to highlight similarities and differences that might be there and why.

2.7 An Overview of the Pharmaceutical Sector in Jordan.

According to the last statistics done in 2016 of the Jordanian pharmacy association, the total registered pharmacists in Jordan is more than 17400. Recently, there are 117 Jordanian hospital that distributed between the public and private sector 48 to 69 respectively. (As registered in Jordanian Pharmacy Association and Private Hospitals Association).

In Jordan, the healthcare system consist of privet and public sectors, most occupied professions are nursing, physicians and pharmacists of the health workforce. In both sectors there are hospitals, primary care clinics, pharmacies and ancillary services. In healthcare system pharmacists have an essential role in patient care through providing a patient oriented pharmaceutical services. Pharmacist role in hospital pharmacy employed in outpatient and inpatient pharmacies, their most responsibility include drug procurement and inventory management, order processing, medication distribution, drug information, and participation in patient safety and quality improvement initiatives. Pharmacist practice profession in community based pharmacies and hospital pharmacies. (Alefan & Halboup, 2016, Nazer & Tuffaha, 2017).

In the recent few years, pharmacy practice has changed it moved from basically just dispensing and compounding drugs to more patient oriented care that provide pharmaceutical care services which focus more in communication with patient about their medication and health status. Pharmacists are considered to be the most accessible healthcare provider, as they see a large number of general public and provide many health related services, also people don't need to take appointment for consultation. That's why pharmacies provide a ground for medical intervention, pharmacists are in contact with both sick and healthy people, this allow them to participate in prevention effort as they can screen for different diseases and their risk factors, also provide treatment and help for those who need it (Mukattash, et al. 2018).

Recently, clinical pharmacy has been also added to the scope of pharmaceutical services provided by pharmacist, although it not yet has the privileges to be performed fully but the emphasis on its role in patient care is present. Their contribution in saving patients' lives by educating them on the proper use of medication and how to handle them correctly to get the best benefit from them (Jarab, et al 2012, Basheti, et al 2014, Alefan & Halboup, 2016). They play a huge role in optimizing a safe and effective use of medication (Bates, et al 2020).

Chapter Three: Study Methodology (Methods and Procedures)

3.1 Introduction:

This chapter includes study methodology, population and sampling, data collection methods, data collection analysis, study tool, and validity and reliability test. In addition to respondents' demographic description.

3.2 Study Design:

This study is a quantitative cross-sectional and descriptive Cause-effect research. It aims to investigate the impact of Six Sigma DMAIC approach on the services quality dimension of SERVQUAL model on pharmaceutical services of Private Hospital pharmacies. It starts with a literature review to develop a model to measure the impact of Six Sigma on the Service Quality of pharmaceutical services in private hospital pharmacies. Then, a panel of judges was used to improve the measurement tool i.e. questionnaire. Afterward, the survey was carried out and the data was collected from pharmacists working in Private Hospital pharmacies. After that, the data collected is coded against SPSS 26. Then, data is analyzed for normality, validity, reliability, and a descriptive analysis are carried out. Additionally, correlation among variables is checked. Finally, the impact is tested by multiple regressions.

3.3 Study Population and Sample and Unit of Analysis:

The population of this study consists of a total of (49) Jordanian Private Hospitals in Amman, all are registered by the Private Hospitals Association (PHA) in Jordan. The study targets 17 Private Hospital Pharmacies, which are the hospitals that are general hospitals and have more than 120 beds. This negates the need for sampling.

Unit of analysis: the survey unit of analysis is composed of all the pharmacists, clinical pharmacists, and pharmacy assistants working in hospital pharmacies in the targeted private hospital pharmacies in Amman, Jordan.

3.4 Data Collection Methods (Tools):

For fulfilling the purposes of the study, the data is collected from two sources: secondary and primary data as follows:

Secondary data is collected from books, journals, thesis, articles, dissertations, and the worldwide web used to write the theoretical framework of this study.

Primary data is collected via a questionnaire answered by working pharmacists in Hospital pharmacies, which was built and developed for this purpose.

3.4.1 Study Tool (Questionnaire):

For this study, the questionnaire is used as the main tool for collecting data, which contains two parts, as follows:

Part one contains the demographic (gender, age, education, position, and experience) of respondents, the second part contains questions about the independent variables, and dependent variables, which are divided into the following:

Independent variable: Six Sigma DMAIC approach which presented as stages: Define, Measure, Analyze, Improve, and finally Control.

Dependent variable: Service Quality 5 Dimensions based on the SERVQUAL model are Tangibles, Reliability, Responsiveness, Assurance, and Empathy.

Both independent and dependent variables are measured by using five Likert scales to rate respondents' actual perceptions regarding each item as follows: 1 (strongly unimplemented) to 5 (strongly implemented).

Table 3.1 Five-Point Likert Scale

Degree	Frequently Implemented	Almost Implemented	Sometimes	Slightly Implemented	Never Implemented
	5	4	3	2	1
Relative weight	81-100%	61-80%	41-60%	21-40%	1-20%

3.4.2 Data Collection and Analysis:

Hundred fifty-one (151) questionnaires were collected out of 180 questionnaires distributed to pharmacists working in all departments of the targeted 17 Jordanian Private Hospital pharmacies, during April 2022.

All collected questionnaires were complete and suitable and coded against SPSS 26.

3.4.2.1 Validity Test:

The validity of the questionnaire is checked by three methods. The content validity is confirmed through literature review resources such as books, journals, working papers, research, thesis, dissertations, articles, and the worldwide Web. Face validity is confirmed through the Panel of judges (see appendix 1). Finally, construct validity is confirmed by Pearson correlation coefficients and convergent structural validity of the study variables, the exploratory general analysis test.

3.4.2.2 Construct Validity:

To ensure the construct validity of the study tool, Pearson correlation coefficients were found between each paragraph and the total degree of its axis, to determine the ability of each paragraph of the scale to be distinguished, and the paragraphs whose correlation coefficient is less than (0.25) is considered low and should be deleted (Linn & Gronlund, 2012), and the following tables show that:

Table 3.2: Pearson Correlation Coefficients between Each Paragraph of the Dimensions of the Six Sigma DMAIC approach and the Total Degree of Its Axis

Define stage		Measure stage		Analyze stage		Improve stage		Control stage	
#	Pearson Correlation	#	Pearson Correlation	#	Pearson Correlation	#	Pearson Correlation	#	Pearson Correlation
1	0.519**	6	0.771**	11	0.810**	16	0.882**	21	0.853**
2	0.719**	7	0.789**	12	0.855**	17	0.896**	22	0.911**
3	0.698**	8	0.825**	13	0.852**	18	0.912**	23	0.923**
4	0.714**	9	0.755**	14	0.824**	19	0.836**	24	0.918**
5	0.594**	10	0.841**	15	0.832**	20	0.863**		0.523**

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

It is evident from the above table 3.2 that the Pearson coefficients for the paragraphs the "Six Sigma DMAIC Method" ranged between (0.519-0.923), which are significant values at the level ($\alpha \leq 0.01$), which are items that enjoy a high distinction being greater than (0.25),

which It indicates that the items of the independent study variable are true to what they were designed to measure.

It is evident from table 3.3 that the coefficients that characterize the paragraphs of "Service Quality" ranged between (0.790-0.904), which are functional values at the ($\alpha \leq 0.01$) level, which are paragraphs with the high distinction being greater than (0.25), which indicates that the paragraphs of dependent variables are true to what they were designed to measure.

Table 3.3: Pearson Correlation Coefficients between Each Paragraph of the Service Quality and the Total Degree of Its Axis

Tangible		Responsiveness		Reliability		Assurance		Empathy	
#	Pearson Correlation	#	Pearson Correlation	#	Pearson Correlation	#	Pearson Correlation	#	Pearson Correlation
25	0.842**	30	0.790**	35	0.887**	40	0.835**	45	0.885**
26	0.846**	31	0.814**	36	0.868**	41	0.831**	46	0.898**
27	0.888**	32	0.826**	37	0.881**	42	0.892**	47	0.856**
28	0.854**	33	0.867**	38	0.904**	43	0.856**	48	0.900**
29	0.795**	34	0.880**	39	0.897**	44	0.851**	49	0.796**

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

3.4.2.3 Convergent Structural Validity Using Exploratory Factor Analysis:

To ensure the convergent structural validity of the study variables, the exploratory general analysis test was used, saturation (loading) values of factors that represent the independent variable through orthogonal rotation of the axes (Varimax)

Independent Variable (Six Sigma DMAIC Approach):

The results of the exploratory factor analysis showed that the Kaisar Meyer Olkin KMO division amounted in total to equal(0.932) and according to the rule (Kaiser, 1979) which indicates that the minimum acceptable test value is (0.4), it turns out that the resulting value is greater than 0.5 Thus, the sample size is sufficient and appropriate for the study and the application of the exploratory factor analysis, and it's noticeable from the data shown in the following tables that the Eigen value is greater than the correct one.

The results also showed the values of the explained variance ratios for each factor that was extracted, the lowest explanatory variance value was (3.68), and the total explanatory ratios amounted to (72.23%) of the total variance of the independent variable.

Moreover, the results shown in the following tables also show the loading values (saturation) for each of the paragraphs of each of the extracted factors, and it was found that the lowest value was (0.541), and this value is greater than (0.50), so it is considered sufficient and appropriate and expresses acceptable and sufficient saturation values for the paragraphs Every factor is extracted.

Define Stage:

Table 3.4 showed the saturation values of factors that represent the Define stage as it ranges between 0.541 and 0.747, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 54.25 and the Eigen value is 13.02.

Table 3.4: Saturation Values of Factors That Represent the Define Stage

No.	Paragraph	Saturation values
1	The hospital pharmacy defines patients requirements	0.560
2	The hospital pharmacy searches for complaints about Service Quality level	0.747
3	The hospital pharmacy defines the nature of patients' complaints about the service	0.702
4	The hospital pharmacy determines the objectives of improvement	0.541
5	The hospital pharmacy assigns personnel responsible for improvement project	0.637
KMO		0.932
Eigenvalue		13.02
Explained variance ratio		54.24

Measure Stage:

Table 3.5 showed the saturation values of factors that represent the Measure stage as it ranges between 0.611 and 0.735, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 5.24 and the Eigen value is 1.26.

Table 3.5: Saturation Values of Factors That Represent the Measure Stage

No.	Paragraph	Saturation values
6	The hospital pharmacy collects data about the current level of Service Quality	0.685
7	The hospital pharmacy uses different measurement systems to collect data	0.683
8	The hospital pharmacy determines the current quality level	0.728
9	The hospital pharmacy determines the frequency of errors	0.611
10	The hospital pharmacy identifies the important elements of the service provided	0.735
	KMO	0.932
	Eigen value	1.26
	Explained variance ratio	5.24

Analyze Stage:

Table 3.6 showed the saturation values of factors that represent the Analyze stage as they range between 0.725 and 0.780, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 4.85 and the Eigen value is 1.16

Table 3.6: Saturation Values of Factors That Represent the Analysis Stage

No.	Paragraph	Saturation values
11	The hospital pharmacy evaluates the collected data	0.738
12	The hospital pharmacy defines the current cause of complaints	0.780
13	The hospital pharmacy evaluates the current quality level	0.774
14	The hospital pharmacy identifies the relationship between the customer requirements and complaints	0.768
15	The hospital pharmacy describes the area for improvements	0.725
	KMO	0.932
	Eigen value	1.16
	Explained variance ratio	4.85

Improve Stage:

Table 3.7 showed the saturation values of factors that represent the improvement stage as they range between 0.763 and 0.814, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 4.217and Eigen value is 1.012.

Table 3.7: Saturation Values of Factors That Represent the Improve Stage

No.	Paragraph	Saturation values
16	The hospital pharmacy designs creative solutions to improve Service Quality	0.806
17	The hospital pharmacy makes suitable changes to provide service	0.806
18	The hospital pharmacy corrects the causes of complaints about service	0.851
19	The hospital pharmacy conduct pilot tests to the improvements to Service Quality	0.763
20	The hospital pharmacy confirms that changes are made to improve the service	0.814
	KMO	0.932
	Eigen value	1.012
	Explained variance ratio	4.217

Control Stage:

Table 3.8 showed the saturation values of factors that represent the Control stage as they range between 0.774 and 0.874, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 3.68 and the Eigen value is 0.88.

Table 3.8: Saturation Values of Factors That Represent the Control Stage

No.	Paragraph	Saturation values
21	The hospital pharmacy monitors changes implementation	0.774
22	The hospital pharmacy determines the appropriateness of the changes	0.818
23	The hospital pharmacy makes plans to control changes implementation	0.874
24	The hospital pharmacy follows up on control plans	0.826
	KMO	0.932
	Eigen value	0.88
	Explained variance ratio	3.68

Dependent Variable: (Service Quality):

The results of the exploratory factor analysis appearing in the following tables showed that the KMO division amounted to (0.934) and according to the rule (Kaiser, 1979) which indicates that the minimum acceptable test value is (0.4), it turns out that the resulting value is greater than 0.5 Thus, the sample size is sufficient and appropriate for the study and the application of the exploratory factor analysis, and it's noticeable from the data shown that the Eigen value is greater than the correct one.

The results shown in the following tables showed the values of the explained variance ratios for each factor that was extracted, and the lowest explanatory variance value was (2.54), and the total explanatory ratios amounted to (77.44%) of the total variance of the dependent variable.

Moreover, the results showed that the loading values (saturation) for each of the paragraphs of each of the extracted factors, and it was found that the lowest value was (0.516), and this value is greater than (0.50), so it is considered sufficient and appropriate and expresses acceptable and sufficient saturation values for the paragraphs Every factor is extracted.

Tangibles:

Table 3.9 showed the saturation values of factors that represent the Tangible dimension as it ranges between 0.645 and 0.874, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 58.49 and the Eigen value is 14.62.

Table 3.9: Saturation Values of Factors That Represent the Tangible Dimension

No.	Paragraph	Saturation values
25	The hospital pharmacy has a suitable internal design to provide service	.774
26	The hospital pharmacy has physical facilities that attract the eyes of patients	.818
27	The hospital pharmacy uses suitable equipment	.874
28	The hospital pharmacy uses modern technology	.826
29	The hospital pharmacy encourages pharmacists to look professional and well dressed	.645
KMO		0.932
Eigen value		14.62
Explained variance ratio		58.49

Responsiveness:

Table 3.10 showed the saturation values of factors that represent the Responsiveness dimension as it ranges between 0.536 and 0.772, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 7.92 and the Eigen value is 1.98.

Table 3.10: Saturation Values of Factors That Represent the Responsiveness Dimension

No.	Paragraph	Saturation values
30	The hospital pharmacy tells patients the time needed for the service	.536
31	The hospital pharmacy has pharmacists who are willing to assist patients.	.629
32	The hospital pharmacy prepares pharmacists to respond to patients' requests	.668
33	The hospital pharmacy gives patients fast service	.760
34	The hospital pharmacy is ready to handle patients' requests as come in.	.772
KMO		0.932
Eigen value		1.98
Explained variance ratio		7.92

Reliability:

Table 3.11 showed the saturation values of factors that represent the Reliability dimension as it ranges between 0.656 and 0.783, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 4.96 and the Eigen value is 1.24.

Table 3.11: Saturation Values of Factors That Represent the Reliability Dimension

No.	Paragraph	Saturation values
35	The hospital pharmacy provides the services as promised	.783
36	The hospital pharmacy delivers the service in the promised time	.656
37	The hospital pharmacy responds with interest to patients' complaints	.749
38	The hospital pharmacy performs the service right the first time	.748
39	The pharmacy provides consistent service	.778
KMO		0.932
Eigen value		1.24
Explained variance ratio		4.96

Assurance:

Table 3.12 showed the saturation values of factors that represent the Assurance dimension as it ranges between 0.702 and 0.798, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 3.228 and the Eigen value is 0.807.

Table 3.12: Saturation Values of Factors That Represent the Assurance Dimension

No.	Paragraph	Saturation values
40	The hospital pharmacy trains pharmacists to treat patients with kindness	.724
41	The hospital pharmacy has competent pharmacists to provide services	.702
42	The hospital pharmacy encourages pharmacists to build trust with the patients	.798
43	The hospital pharmacy gives pharmacists support to provide service	.731
44	The hospital pharmacy provides the pharmacist with the knowledge to answer patient's questions	.777
KMO		0.932
Eigen value		0.807
Explained variance ratio		3.228

Empathy:

Table 3.13 showed the saturation values of factors that represent the Empathy dimension as it ranges between 0.516 and 0.747, therefor the construct validity is assumed. KMO scored 0.932. Explained variance ratio is 2.84 and the Eigen value is 0.71.

Table 3.13: Saturation Values of Factors That Represent the Empathy Dimension

No.	Paragraph	Saturation values
45	The hospital pharmacy gives patients individual attention	.725
46	The hospital pharmacy understands patient's specific needs	.739
47	The hospital pharmacy directs pharmacists to give personal attention to patients	.747
48	The hospital pharmacy has the patient's best interest	.516
49	The hospital pharmacy operating hours convenient to patients	.697
KMO		0.932
Eigen value		0.71
Explained variance ratio		2.84

3.4.2.4 Reliability of the Study Tool:

Cronbach's alpha test is used to test reliability. The reliable tools have a Cronbach's alpha above 0.70 and are accepted if it is exceeding 0.60 (Hair, et. al. 2014).

Table 3.14 Cronbach Alpha Coefficients for Testing the Stability of the Study Instrument

Dimension	Cronbach alpha coefficients	No. of paragraphs
Define stage	0.91	5
Measure Stage	0.64	5
Analyze Stage	0.79	5
Improve Stage	0.77	5
Control Stage	0.80	4
Six Sigma DMAIC approach	**0.82**	**24**
Tangible	0.89	5
Responsiveness	0.80	5
Reliability	0.79	5
Assurance	0.81	5
Empathy	0.79	5
Service Quality	**0.82**	**25**

Table 3.14 shows that the reliability coefficient for Six Sigma DMAIC approach variables ranges between 0.91 and 0.64, and for Service, Quality dimensions ranges between 0.89 and 0.79.

Through the values of the Cronbach alpha coefficients in the above table, all the data exceed (0.6), which indicates the stability of the study tool (Sekaran & Bougie, 2016).

3.4.2.5 Demographic Analysis:

The demographic analysis presented based on the characteristics of the valid respondent i.e. frequency and percentage of participants such as gender, age, education, Position, and Experience.

Gender: Table 3.15 shows that the majority of respondents are females, were 121 (80.1%), and only 30 (19.9%) are males. This is justified since the female proportion is higher within the scope of pharmaceutical industry as it is associated with the percentage of university graduates, for hospital pharmacy scope the percentage is much higher than within other scopes i.e. pharmaceutical industry and medical marketing.

Table 3.15: Respondent Gender

Gender	Frequency	Percentage
Male	30	19.9%
Female	121	80.1%
Total	151	100%

Age: Table 3.15 shows that the majority of respondents' ages are less than 30 years 104 (68.9%) out of the total sample and this is matching with study scope, then those ages between (30-34 years) 32 (15.2%), after that the respondents older than 40 years 14 (9.3%), finally those between (35-39 years) 10 (9.3%). This is relatively associated with large number of females in the industry, as they may prefer the work in early ages and tend to mostly quit after marriage because of the long working hours and night shifts.

Table 3.16: Respondent Age

Age	Frequency	Percentage
Less than 30	104	68.9%
30-34	23	15.2%
35-39	10	6.6%
40 or more	14	9.3%
Total	151	100%

Education: Table 3.17 shows that the majority of respondents hold a high educational level and this came from the nature of working in the healthcare field, which emphasizes continuous learning and improvements, where the majority of 120 (79.5%) have a bachelor's degree after that 15 (9.9%) have a diploma in pharmacy, and 14 (9.3%) have a master degree, finally 2 (1.3%) have Ph.D. Pharmacists who had Ph.D. mostly tend to move to the academic field rather than staying in working in hospitals.

Table 3.17: Respondent Education

Education	Frequency	Percent
Diploma	15	9.9%
Bachelor	120	79.5%
Master	14	9.3%
Ph.D.	2	1.3%
Total	151	100%

Position: Table 3.18 shows that the majority of respondents are pharmacists 99 (65.5%) out of the total respondents, 28 (18.5%) are clinical pharmacists, the third category is managers 13 (8.6%), finally the pharmacy assistants 11 (7.3%) out of total respondents.

Table 3.18: Position of Respondents

Position	Frequency	Percent
Manager	13	8.6%
Pharmacist	99	65.6%
Clinical pharmacist	28	18.5%
Pharmacy assistant	11	7.3%
Total	151	100%

Experience: Table 3.19 shows that the majority of respondents are having experience of less than 5 years 89 (58.9%) which matches with the study sample targeted, then respondents experience between (5-9 years) 37 (24.5%), followed by those with an experience more than 15 years 16 (10.6%). Finally, respondents with experience between (10-14 years) are 9 (6.0%). These percentage is directly related to the percentage of age groups as the majority are aged less than 30 years old.

Table 3.19: Respondent Experience

Experience (years)	Frequency	Percent
Less than 5	89	58.9%
5-9	37	24.5%
10-14	9	6.0%
15 or more	16	10.6%
Total	151	100%

Chapter Four: Data Analysis

4.1 Introduction:

This chapter includes data descriptive statistical analysis of respondents' perception, Pearson Bivariate Correlation matrix to test the relationships among Six Sigma DMAIC approach variables with each other, Service Quality dimensions with each other; and between Six Sigma DMAIC approach variables with Service Quality dimensions. Finally, multiple regressions to check the hypothesis: the impact of Six Sigma on Service Quality.

4.2 Descriptive Analysis

To test the study hypotheses, the SPSS 26 software was used to conduct descriptive analysis by using statistical methods. The mean, standard deviation, t-value, ranking, and implementation level are used to describe the respondents' perception and the degree of implementation of each variable, dimension, and item.

Table 4.1 Ranking of Implementation Level

Ranged length	The upper limit - the lower limit	=	1- 5	=1.33
	The number of levels		3	

So the number of levels is as follows:

Ranged	The Level
1-2.33	Low (L)
2.34-3.67	Medium (M)
3.68-5	High (H)

Independent Variable, Sigma DMAIC Approach:

Table 4.2 shows that the means of Six Sigma variables range between (3.68-3.92), and the standard deviations range between (0.968-0.812). This indicates that respondents agree on the high implementation of Six Sigma DMAIC approach, which is supported by high calculated t-value compared to the T-value =3.

The average mean is 3.75 with a standard deviation of 0.783, which indicates that the respondents are highly aware of Six Sigma DMAIC approach where the t-value is 11.738.

All stages that represent the independent variables obtained high degrees ranging between (3.68-3.92), and the dimension "Define stage" got the highest degrees, and the "Measure stage" got the lowest degrees.

Table 4.2: Means, Standard Deviations, And the Degree of Six Sigma DMAIC Approach implementation

#	Variable	Mean	S.D.	t-value	Sig.	Rank	Impl.
1	Define stage	3.92	.847	13.265	.000*	1	H
2	Measure stage	3.68	.812	10.283	.000*	5	H
3	Analyze stage	3.76	.850	10.994	.000*	2	H
4	Improve stage	3.69	.968	8.823	.000*	4	H
5	Control stage	3.71	.959	9.040	.000*	3	H
	Six Sigma DMAIC approach	3.75	.783	11.738	.000*		H

Define Stage:

Table 4.3 shows that all paragraphs expressing the "Define stage" have obtained high means ranging between 3.68 to 4.11, and standard deviations between 0.782 and 2.563. This indicates that respondents agree on the high implementation of the Define stage, which is supported by a high t-value compared to the T-value =3. Paragraph 5 "The hospital pharmacy determines the objectives of improvement" with the highest mean and standard deviations of 2.563 which indicate that there was a strong disagreement on the possibility that the hospital pharmacy is able to define the correct objective of the improvement project.

Table 4.3: Means, Standard Deviations, and the t-Values of Define Stage

#	Paragraph	Mean	S.D.	t-value	Sig.	Rank	Impl.
1	The hospital pharmacy defines patients requirements	4.08	.782	16.922	.000	2	H
2	The hospital pharmacy searches for complaints about Service Quality level	3.91	.969	11.545	.000	3	H
3	The hospital pharmacy defines the nature of patients' complaints about the service	3.80	.983	9.967	.000	4	H
4	The hospital pharmacy determines the objectives of improvement	4.11	2.563	5.274	.000	1	H
5	The hospital pharmacy assigns personnel responsible for improvement project	3.68	1.041	7.945	.000	5	H
	Define stage	3.92	.847	13.265	.000		H

Paragraph 5 "The hospital pharmacy assigns personnel responsible for improvement project" with the lowest mean with standard deviations 1.041 that also there was a disagreement between respondent whether the hospital pharmacy assign personnel for the project. . The mean of Define stage was a high 3.92, with standard deviations of 0.847, which indicate that respondents are aware of the implementation of the Define stage elements at the t-value is 13.265.

Measure Stage:

Table 4.4 shows the paragraphs expressing the "Measure stage" that have obtained a medium to high means ranging between 3.47-3.87, and standard deviations between 0.910 and 1.120. This indicates that respondents agree on a medium level on implementation of the Measure stage, which is supported by a high t-value compared to T-value =3. Paragraph 9 "The hospital pharmacy determines the frequency of errors" with the highest mean and paragraph 7 "The hospital pharmacy uses different measurement systems to collect data" with the lowest mean. The mean Measure stage was a high 3.68, with standard deviations of 0.812, which indicate that respondents are aware of the implementation of the Measure stage where the t-value is 10.283.

Table 4.4: Means, standard deviations, and t-Values of Measure Stage

#	Paragraph	Mean	S.D.	t-value	Sig.	Rank	Impl.
6	The hospital pharmacy collects data about the current level of Service Quality	3.57	1.120	6.198	.000	4	M
7	The hospital pharmacy uses different measurement systems to collect data	3.47	1.091	5.313	.000	5	M
8	The hospital pharmacy determines the current quality level	3.66	1.045	7.788	.000	3	M
9	The hospital pharmacy determines the frequency of errors	3.87	.943	11.307	.000	1	H
10	The hospital pharmacy identifies the important elements of the service provided	3.82	.910	11.091	.000	2	H
	Measure stage	3.68	.812	10.283	.000		H

Analyze Stage:

Table 4.5 shows that all paragraphs expressing the "Analyze stage" have obtained a high mean ranging between 3.70-3.88, and standard deviations between 0.956 and 1.095.

This indicates that respondents agree on a high level of implementation of Analyze stage, which is supported by a high t-value compared to the T-value =3.

Table 4.5 Means, Standard Deviations, and the t-Values Of Analyze Stage

#	Paragraph	Mean	S.D.	t-value	Sig.	Rank	Impl.
11	The hospital pharmacy evaluates the collected data	3.70	.986	8.670	.000	5	H
12	The hospital pharmacy defines the current cause of complaints	3.75	1.057	8.654	.000	3	H
13	The hospital pharmacy evaluates the current quality level	3.79	.956	10.031	.000	2	H
14	The hospital pharmacy identifies the relationship between the customer requirements and complaints	3.88	.969	11.125	.000	1	H
15	The hospital pharmacy describes the area for improvements	3.73	1.095	8.175	.000	4	H
	Analyze stage	3.76	.850	10.994	.000		H

Paragraph 14 "The hospital pharmacy identifies the relationship between the customer requirements and complaints" with the highest mean and paragraph 11 "The hospital pharmacy evaluates the collected data" with the lowest mean. The mean of Analyze stage was a high 3.76, with standard deviations of 0.850, which indicate that respondents are aware of the implementation of Analyze stage where the t-value is 10.994.

Improve Stage:

Table 4.6 Means, Standard Deviations, and the t-Values of Improve Stage

#	Paragraph	Mean	S.D.	t- value	Sig.	Rank	Impl.
16	The hospital pharmacy designs creative solutions to improve Service Quality	3.75	1.086	8.492	.000	4	H
17	The hospital pharmacy makes suitable changes to provide service	3.82	1.071	9.419	.000	1	H
18	The hospital pharmacy corrects the causes of complaints about service	3.77	1.072	8.883	.000	3	H
19	The hospital pharmacy conduct pilot tests to the improvements to Service Quality	3.34	1.101	3.793	.000	5	M
20	The hospital pharmacy confirms that changes are made to improve the service	3.79	1.181	8.200	.000	2	H
	Improve stage	3.69	.968	8.823	.000		H

Table 4.6 shows that all paragraphs expressing the "Improve stage" have obtained a medium to high mean ranging between 3.34-3.82, and standard deviations between 1.071 and 1.181, all of the are more than 1 which indicate that there is a disparity in opinion on the

elements of Improve stage. This indicates that respondents semi-agree on a medium to a high level of implementation of Improve stage, which is supported by a high t-value compared to the T-value =3. Paragraph 17 "The hospital pharmacy makes suitable changes to provide service" with the highest mean and Paragraph 19 "The hospital pharmacy conduct pilot tests to the improvements to Service Quality" with the lowest mean. The mean of Improve stage was a high 3.69, with standard deviations of 0.968, which indicate that respondents are aware of the implementation of Improve stage where the t-value is 8.823.

Control Stage:

Table 4.7 shows that all paragraphs expressing the "Control stage" have obtained a high mean ranging between 3.64-3.78, and standard deviations between 0.955 and 1.148. This indicates that respondents agree on a medium to a high level on implementation of the Control stage, which is supported by a high t-value compared to the T-value=3. Paragraph 24 "The hospital pharmacy follows up on control plans" with the highest mean and Paragraph 23 "The hospital pharmacy makes plans to control changes implementation" with the lowest mean. The mean of Control stage was a high 3.71, with standard deviations of 0.959, which indicate that respondents are aware of the implementation of the Control stage where the t-value is 9.040.

Table 4.7: Means, Standard Deviations, and the t-Values of Control Stage

#	Paragraph	Mean	S.D.	t-value	Sig.	Rank	Impl.
21	The hospital pharmacy monitors changes implementation	3.74	.955	9.540	.000	2	H
22	The hospital pharmacy determines the appropriateness of the changes	3.66	1.048	7.713	.000	3	M
23	The hospital pharmacy makes plans to control changes implementation	3.64	1.098	7.113	.000	4	M
24	The hospital pharmacy follows up on control plans	3.78	1.148	8.363	.000	1	H
	Control stage	3.71	.959	9.040	.000		H

In summary, the results shown in the previous tables indicate that Six Sigma DMAIC approach in implemented in Jordanian Hospital Pharmacies, however the awareness of it is quite low, and pharmacists may implement the elements of each stage or part of it, but do not related to Six Sigma DMAIC approach.

Dependent Variable Services Quality Dimensions:

Table 4.8 shows that the means of Service Quality dimensions mean range between 3.99 and 4.08 and the standard deviation range from 0.801to 0.990. This indicates that respondents agree on the high implementation of Service Quality dimensions, which is supported by a high calculated t-value compared to the T-value =3

Table 4.8: Means, Standard Deviations, and the t-Values of Service Quality

#	Dimension	Mean	S.D.	t-value	Sig.	Rank	Impl.
1	Tangible	3.57	.990	7.110	.000	4	M
2	Responsiveness	4.08	.801	16.597	.000	1	H
3	Reliability	4.01	.838	14.746	.000	2	H
4	Assurance	3.99	.906	13.365	.000	3	H
5	Empathy	3.99	.881	13.789	.000	3	H
	Service Quality	3.93	.776	14.675	.000		H

The average mean is 3.93 with a standard deviation of 0.776, the dimension "Responsiveness" got the highest degrees, and ''Assurance, Empath'' got the same degrees, except the dimension "Tangible" got a medium degree with 3.57. This indicates that the respondents are highly aware of Service Quality dimensions where the t-value is 14.675.

Tangible:

Table 4.9: Means, Standard Deviations, and t-Values of Tangible

#	Paragraph	Mean	S.D.	t-value	Sig.	Rank	Impl.
25	The hospital pharmacy has a suitable internal design to provide service	3.63	1.198	6.454	.000	3	M
26	The hospital pharmacy has physical facilities that attract the eyes of patients	3.48	1.188	4.932	.000	4	M
27	The hospital pharmacy uses suitable equipment	3.72	1.122	7.835	.000	2	H
28	The hospital pharmacy uses modern technology	3.25	1.275	2.361	.000	5	M
29	The hospital pharmacy encourages pharmacists to look professional and well dressed	3.79	1.070	9.081	.000	1	H
	Tangible	3.57	.990	7.110	.000		M

Table 4.9 shows that all paragraphs expressing the "Tangible" dimension have obtained a medium means ranging between 3.25-3.79, and standard deviations between 1.070

and 1.275, which are higher than 1 this indicate that there is a disparity in opinions of pharmacist about the elements of Tangible dimension. This indicates that respondents agree on a medium to a high level on implementation of the Tangible dimension, which is supported by a high t-value compared to the T-value=3. Paragraph 29 "The hospital pharmacy encourages pharmacists to look professional and well dressed" with the highest mean and Paragraph 28 "The hospital pharmacy uses modern technology" with the lowest mean ant a calculated t-value that is less than the T-value =3 means the significance of this paragraph is lost. The mean of Tangible dimension was medium 3.57, with standard deviations of .990, which indicate that respondents are quite aware of the implementation of the Tangible dimension where the t-value is 7.110.

Responsiveness:

Table 4.10 shows that all paragraphs expressing the "Responsiveness" dimension have obtained a high mean ranging between 3.87-4.21, and standard deviations between 0.887 and 1.125. This indicates that respondents somewhat agree on a high level of implementation of the Responsiveness dimension, which is supported by a high t-value compared to the T-value=3. Paragraph 31 "The hospital pharmacy has pharmacists who are willing to assist patients." with highest mean, Paragraph 30 "The hospital pharmacy tells patients the time needed for the service" with the lowest mean with a standard deviations 1.125 which indicate a high disparity of opinions of pharmacists.

Table 4.10: Means, Standard Deviations, and t-Values of Responsiveness

#	Paragraph	Mean	S.D.	t-value	Sig.	Rank	Impl.
30	The hospital pharmacy tells patients the time needed for the service	3.87	1.125	9.394	.000	4	H
31	The hospital pharmacy has pharmacists who are willing to assist patients.	4.21	.919	16.119	.000	1	H
32	The hospital pharmacy prepares pharmacists to respond to patients requests	4.14	.887	15.776	.000	2	H
33	The hospital pharmacy gives patients fast service	4.07	.950	13.793	.000	3	H
34	The hospital pharmacy is ready to handle patients' requests as come in.	4.14	.931	15.031	.000	2	H
	Responsiveness	4.08	.801	16.597	.000		H

Paragraphs 32 "The hospital pharmacy prepares pharmacists to respond to patients requests" and 34 "The hospital pharmacy is ready to handle patients' requests as come in"

have the same mean. The mean of Responsiveness dimension was high at 4.08, with standard deviations of 0.801, which indicate that the respondent is aware of the implementation of the Responsiveness dimension where the t-value is 16.597.

Reliability:

Table 4.11 shows that all paragraphs expressing the "Reliability" dimension have obtained a high mean ranging between 3.97-4.04, and standard deviations between 0.852 and 0.987. This indicates that respondents agree on a high level of implementation of the Reliability dimension, which is supported by a high t-value compared to the T-value=3. Paragraph 39 "The pharmacy provides consistent service" with the highest mean, and Paragraph 35 "The hospital pharmacy provides the services as promised" with the lowest mean, and Paragraphs 36 "The hospital pharmacy delivers the service in the promised time" and 38 "The hospital pharmacy performs the service right the first time" have the same mean. The mean of Reliability dimension was high at 4.01, with standard deviations of 0.838, which indicate that respondents are aware of the implementation of the Reliability dimension where the t-value is 14.746.

Table 4.11: Means, Standard Deviations, and t-Values of Reliability

#	Paragraph	Mean	S.D.	t-value	Sig.	Rank	Impl.
35	The hospital pharmacy provides the services as promised	3.97	.959	12.477	.000	4	H
36	The hospital pharmacy delivers the service in the promised time	4.01	.852	14.511	.000	2	H
37	The hospital pharmacy responses with interest to patients complaints	4.00	.987	12.455	.000	3	H
38	The hospital pharmacy performs the service right the first time	4.01	.956	12.943	.000	2	H
39	The pharmacy provides consistent service	4.04	.965	13.236	.000	1	H
	Reliability	4.01	.838	14.746	.000		H

Assurance:

Table 4.12 shows that all paragraphs expressing the "Assurance" dimension have obtained a high mean ranging between 3.76-4.13, and standard deviations between 0.940 and 1.166. This indicates that respondents semi-agree on a high level of implementation of the Assurance dimension, which is supported by a high t-value compared to the T-value=3. Paragraph 40 "The hospital pharmacy trains pharmacists to treat patients with kindness" with the highest mean, and Paragraph 43 "The hospital pharmacy gives pharmacists support to

provide service" with the lowest mean. The mean of Assurance dimension was high at 3.99, with standard deviations of 0.906, which indicate that respondents are aware of the implementation of the Assurance dimension where the t-value is 13.365.

Table 4.12: Means, Standard Deviations, and t-Values of Assurance

#	Paragraph	Mean	S.D.	t-value	Sig.	Rank	Impl.
40	The hospital pharmacy trains pharmacists to treat patients with kindness	4.13	1.025	13.460	.000	1	H
41	The hospital pharmacy has competent pharmacists to provide services	4.05	.940	13.601	.000	3	H
42	The hospital pharmacy encourages pharmacists to build trust with the patients	4.06	1.054	12.279	.000	2	H
43	The hospital pharmacy gives pharmacists support to provide service	3.76	1.166	7.938	.000	5	H
44	The hospital pharmacy provides the pharmacist with the knowledge to answer patient's questions	3.95	1.132	10.206	.000	4	H
	Assurance	3.99	.906	13.365	.000		H

Empathy:

Table 4.13 shows that all paragraphs expressing the "Empathy" dimension have obtained a high mean ranging between 3.91-4.07, and standard deviations between 0.974 and 1.067. This indicates that respondents agree on a high level of implementation of the Empathy dimension, which is supported by a high t-value compared to the T-value=3.

Table 4.13: Means, Standard Deviations, and t-Values of Empathy

#	Paragraph	Mean	S.D.	t-value	Sig.	Rank	Impl.
45	The hospital pharmacy gives patients individual attention	3.91	1.067	10.451	.000	5	H
46	The hospital pharmacy understands patient's specific needs	4.01	.976	12.714	.000	2	H
47	The hospital pharmacy directs pharmacists to give personal attention to patients	4.07	.974	13.540	.000	1	H
48	The hospital pharmacy has patient's best interest	3.97	1.043	11.229	.000	4	H
49	The hospital pharmacy operating hours convenient for patients	4.00	1.033	11.898	.000	3	H
	Empathy	3.99	.881	13.789	.000		H

Paragraph 47 "The hospital pharmacy directs pharmacists to give personal attention to patients" with the highest mean, and Paragraph 45 "The hospital pharmacy gives patients individual attention" with the lowest mean. The mean of Empathy dimension was high at

3.99, with standard deviations of 0.881, which indicate that respondents are aware of the implementation of the Empathy dimension where the t-value is 13.789

The Relationship between Six Sigma DMAIC Approach and Service Quality Dimensions:

Using a multiple regression analysis tests requires that the independent variables be closely related to the dependent variables, and at the same time that they do not correlate with each other strongly, and to make sure of this, the following tests were conducted:

Through the values of the Pearson correlation coefficients in table 4.14, shows that the highest correlation was 0.762 between the two independent variables, Control stage and Measure stage, and this indicates the absence of the phenomenon of high multiple linear correlations between the independent variables, as it is less than 80%, which It indicates that the sample is free from the problem of high multiple linear correlations (Gujarati, 2017).

Table 4.14: Pearson Correlation Matrix for Six Sigma DMAIC approach and Service Quality dimensions

#		1	2	3	4	5	6	7	8	9	10	11	12
1	Define stage												
2	Measure stage	0.514**											
3	Analyze stage	0.620**	0.717**										
4	Improve stage	0.597**	0.723**	0.615**									
5	Control stage	0.551**	0.762**	0.605**	0.534**								
6	Six sigma	0.751**	0.870**	0.924**	0.915**	0.908**							
7	Tangible	0.506**	0.670**	0.688**	0.720**	0.717**	0.757**						
8	Responsiveness	0.573**	0.568**	0.546**	0.599**	0.573**	0.648**	0.564**					
9	Reliability	0.594**	0.640**	0.595**	0.655**	0.612**	0.703**	0.573**	0.851**				
10	Assurance	0.597**	0.666**	0.640**	0.675**	0.644**	0.738**	0.595**	0.752**	0.790**			
11	Empathy	0.554**	0.593**	0.637**	0.656**	0.623**	0.702**	0.666**	0.757**	0.815**	0.848**		
12	Service Quality	0.640**	0.716**	0.711**	0.765**	0.726**	0.811**	0.786**	0.881**	0.907**	0.903**	0.927**	

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

In addition, table 4.14 shows that shows that the highest correlation was 0.848 between the two dependent variables, Assurance and Empathy, and this also indicates the

absence of the phenomenon of high multiple linear correlations between the independent variables, as they are between 0.8-0.6, which It indicates that the sample is free from the problem of high multiple linear correlations (Gujarati, 2017).

From the result shown in table 4.14, it appears that there is a relationship between Six Sigma DMAIC approach and Service Quality dimensions of Pharmaceutical services in Jordanian Privates Hospital Pharmacies, and the greater relationship was between Six Sigma DMAIC and Tangible of Service Quality with 0.720, and a greater relationship between Improve stage and Service Quality with 0.765, and the overall relation was (0.811), which means that there is a strong and positive relation between Six Sigma DMAIC and Service Quality.

Normal Distribution Test:

To test the normal distribution of the study data, the Skewness and Kurtosis coefficients were extracted, as if the Skewness and Kurtosis coefficient values were less than (1), then the data is considered to be normally distributed (Doane & Seward, 2015).

Table 4.15: Normal Distribution of Data

Variables	Mean	S.D.	Kurtosis	Skewness
Define stage	3.917	0.846	0.349	0.988
Measure stage	3.679	0.812	-0.149	-0.599
Analyze stage	3.761	0.850	-0.095	-0.560
Improve stage	3.695	0.968	0.001	-0.685
Control stage	3.705	0.959	0.042	-0.735
Six Sigma DMAIC Method	**3.748**	**0.783**	**-0.173**	**-0.570**
Tangible	3.573	0.990	-0.132	-0.548
Responsiveness	4.082	0.801	0.810	-0.236
Reliability	4.005	0.838	0.081	-0034
Assurance	3.989	0.906	0.646	-0.945
Empathy	3.989	0.881	0.289	-0.840
Service Quality	**3.927**	**0.776**	**0.439**	**-0.768**

Through the results in table 4.15, all the values of the skewness coefficient are less than 1, indicating that the data are normally distributed.

Normality: Figure (4.1) shows that the shape follows the normal distribution, in such case the model does not violate this assumption.

Figure 4.1: Normality Test
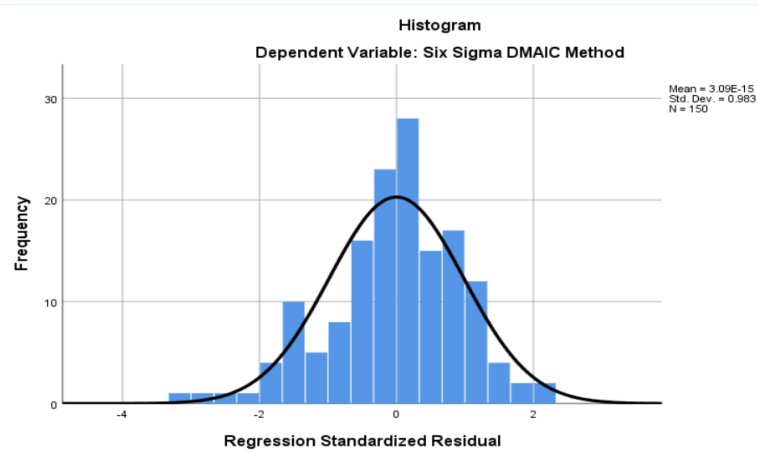
Linearity test: figure (4.2) shows that there is a linear relationship between independent and dependent variables. In such a case, the model does not violate this assumption.

Figure 4.2: Linearity Test
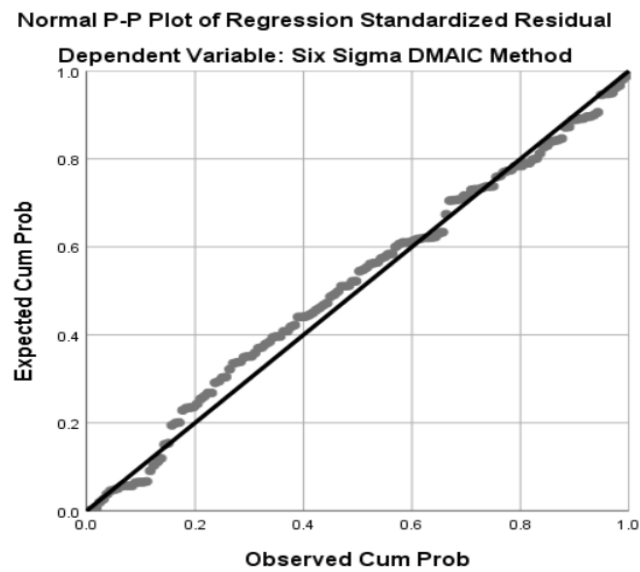
Equal variance (homoscedasticity): figure (4.3) shows that the errors are scattered around the mean, therefore there is no relation between errors and predicted values, in such case the model does not violate this assumption.

Figure 4.3: Linearity Test
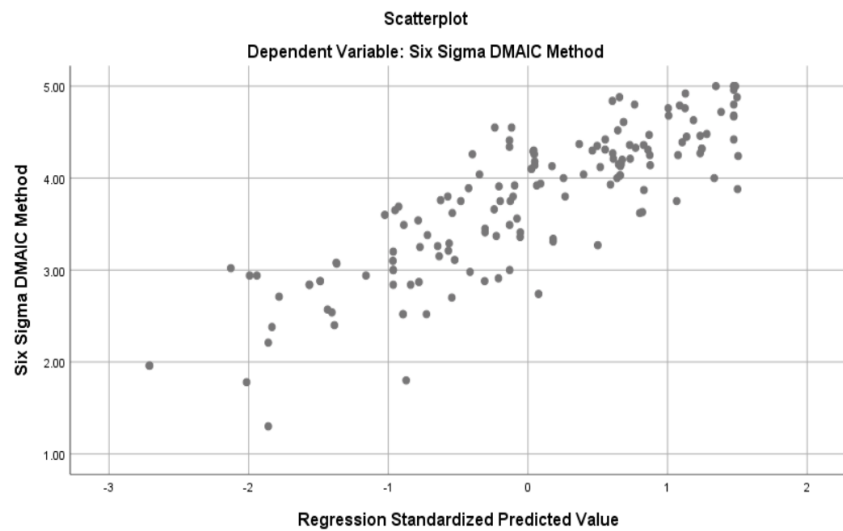
It was ascertained before using the previous methods that there was no high correlation between the independent variables (Multi-collinearity) in addition to the data fulfillment of the normal distribution condition. Table 4.16 indicates that the tolerance coefficient for the independent variables was less than 1 and greater than 0.10. The values of VIF (Variance Inflation Factor) were less than 5, which is an indication that there is no high correlation between the independent variables (Hair et al., 2018).

Table 4.16: Results of Multi-collinearity

Variable	Tolerance	VIF
Define stage	0.588	1.700
Measure stage	0.306	3.273
Analyze stage	0.219	4.563
Improve stage	0.234	4.278
Control stage	0.257	3.892

4.3 Hypothesis Testing:

After confirming validity, reliability, and the correlation between independent and dependent variables, the following tests should be carried out to ensure the validity of regression analysis. (Sekaran, 2003):

In this part, a review of hypothesis testing, where multiple linear regression analysis was used, and the decision rule was relied upon or rejected the following nihilistic hypothesis **H0:**

Significance level (α): adopting (0.05) as the upper limit of the level of significance. If the significance level is (0.05) and less, this indicates the existence of a statistically significant effect, and if it is greater than (0.05), then there is no statistically significant effect.

Calculated value: The calculated value (F) is a second rule for rejecting or accepting the hypothesis. If the calculated value of F is greater than its tabulated value, this indicates the rejection of the null hypothesis (H0), and reviewing the results of the hypotheses as follows:

4.3.1 Main Hypothesis Test:

H_{01}: Six Sigma DMAIC approach does not affect Service Quality variables (reliability, assurance, tangibility, empathy, responsiveness), at α≤0.05.

Multiple regression analysis was used to test this hypothesis, and the following table shows that:

Table 4.17 indicate the results of the statistical test for this hypothesis model represented by a set of independent variable Six Sigma and a dependent variable Service Quality.

Table 4.17: The Multiple Regression of Six Sigma on Service Quality Dimensions

Model	r	R^2	Adjusted R Square	f	Sig.
1	0.849	0.72	0.711	74.45	.000*

Predictors: (Constant), Empathy, Tangible, Responsiveness, Assurance, Reliability *Significant at (α≤0.05) Tabulated F = 2.26

Table 4.17 indicates the effect of Six Sigma DMAIC approach as one entity on each one of the Service Quality dimensions. In this case, it appears that the independent variable Six Sigma have a statistically significant effect on Service Quality dimensions, as the calculated f-value (74.45) is greater than its tabulated f and equal (2.26), which is significant at a significance level less than (0.05), which indicates the significance of the study model, and the value of R^2 (0.72) indicates that the Six Sigma DMAIC approach explained 72% of the variance in Service Quality dimensions, and through Correlation coefficient r (0.849). It is noticeable that there is a strong relationship between the Six Sigma DMAIC approach and Service Quality dimensions (Reliability, Assurance, Tangibility, Empathy, and Responsiveness).

Table 4.18: Multiple Regression of the impact of Six Sigma on Service Quality Dimension (Reliability, Assurance, Tangibility, Empathy, Responsiveness) ANOVA

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant	0.677	0.184		3.686	0.000*
	Tangibles	0.400	0.048	0.469	8.27	0.000*
	Reliability	0.232	0.094	0.249	2.53	0.012*
	Assurance	0.340	0.077	0.394	4.43	0.000*
	Empathy	-0.123	0.087	-0.139	-1.40	0.162
	Responsiveness	-0.039	0.085	-0.040	-0.457	0.649

* Significant at (α≤0.05) Tabulated T = 1.96

The results of the coefficients table for this hypothesis show that the Six Sigma had an impact on the Service Quality dimensions, the highest impact was on Tangibles which reached a beta value of (0.469), and the calculated t value reached (8.72), which is greater than its tabulated value (1.96) and is statistically significant at a lower level of (0.05). Then, the impact on Assurance which reached beta value of (0.394) and the calculated t value reached (4.43), which is greater than its tabulated value (1.96) and is statistically significant at a lower level of (0.05). The least impact was on Reliability which reached beta value of (0.249) and the calculated t value reached (2.53), which is greater than its tabulated value (1.96) and is statistically significant at a lower level of (0.05). However, Six Sigma has no significant impact on Empathy and Responsiveness as the significant levels is greater than 0.05

Based on the above, the main null hypothesis is rejected and the alternative hypothesis is accepted which states: Six Sigma DMAIC approach does affect Service Quality variables (Reliability, Assurance, Tangibility, Empathy, Responsiveness), at $\alpha \leq 0.05$.

4.3.2 Sub-hypothesis Test:

H$_{01.1}$: Six Sigma does not affect the Reliability of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

To test the first sub-hypothesis, multiple regression analysis was used to test this hypothesis:

Table 4.18 indicates the results of the statistical test for this hypothesis model represented the impact of independent variables Six Sigma on dependent variables of Service Quality representing (Reliability, Assurance, Tangibility, Empathy, and Responsiveness).

Through the results in table 4.18, showed that the independent variables Six Sigma DMAIC approach (Define stage, Measure stage, Analyze stage, Improve stage, Control stage) have a statistically significant effect on Reliability dimension of Service Quality, as beta value reached (0.249) and the calculated t value reached (2.53), which is greater than its tabulated value (1.96) and is statistically significant at a lower level of (0.05).This indicate that there is a strong relationship between the Six Sigma DMAIC approach and Reliability of Service Quality, and Six Sigma has a statistical significant effect on Reliability.

Based on the above, the null hypothesis is rejected and the alternative hypothesis is accepted which states: Six Sigma does affect Reliability of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

H$_{01.2}$: Six Sigma does not affect Assurance of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

To test the second sub-hypothesis, multiple regression analysis was used to test this hypothesis:

Table 4.18 indicates the results of the statistical test for this hypothesis model represented the impact of independent variables Six Sigma on dependent variables of Service Quality representing (Reliability, Assurance, Tangibility, Empathy, and Responsiveness).

Through the results in table 4.18, showed that the independent variables Six Sigma DMAIC approach (Define stage, Measure stage, Analyze stage, Improve stage, Control stage) have a statistically significant effect on Assurance dimension of Service Quality, as the beta value (0.394) and the calculated t value reached (4.43),which is greater than its tabulated value (1.96) and is statistically significant at a lower level of (0.05).This indicate that there is a strong relationship between the Six Sigma DMAIC approach and Assurance of Service Quality, and Six Sigma has a statistical significant effect on Assurance.

Based on the above, the null hypothesis is rejected and the alternative hypothesis is accepted which states: Six Sigma does affect Assurance of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

$H_{01.3}$: Six Sigma does not affect Tangible of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

To test the third sub-hypothesis, multiple regression analysis was used to test this hypothesis:

Table 4.18 indicates the results of the statistical test for this hypothesis model represented the impact of independent variables Six Sigma on dependent variables of Service Quality representing (Reliability, Assurance, Tangible, Empathy, and Responsiveness).

Through the results in table 4.18, showed that the independent variables Six Sigma DMAIC approach (Define stage, Measure stage, Analyze stage, Improve stage, Control stage) have a statistically significant effect on Tangible dimension of Service Quality, as the beta value reached (0.469), and the calculated t value reached (8.72), which is greater than its tabulated value (1.96) and is statistically significant at a lower level of (0.05).This indicate that there is a strong relationship between the Six Sigma DMAIC approach and Tangible of Service Quality, and Six Sigma has a statistical significant effect on Tangible.

Based on the above, the null hypothesis is rejected and the alternative hypothesis is accepted which states: Six Sigma does affect Tangibility of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

$H_{01.4}$: Six Sigma does not affect Empathy of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at $\alpha \leq 0.05$.

To test the forth sub-hypothesis, multiple regression analysis was used to test this hypothesis:

Table 4.18 indicates the results of the statistical test for this hypothesis model represented the impact of independent variables Six Sigma on dependent variables of Service Quality representing (Reliability, Assurance, Tangibility, Empathy, and Responsiveness).

Through the results in table 4.18, showed that the independent variables Six Sigma DMAIC approach (Define stage, Measure stage, Analyze stage, Improve stage, Control stage) have no statistical significant effect on Empathy dimension of Service Quality, as beta value reached (-0.139) and the calculated t value reached (-1.40), which is less than its tabulated value (1.96) and is statistically significant at a greater level of (0.05).This indicate that there is negative relationship between the Six Sigma DMAIC approach and Empathy of Service Quality, and Six Sigma has no statistical significant effect on Empathy.

Based on the above, the null hypothesis which states: Six Sigma does affect Empathy of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at α≤0.05 is accepted.

$H_{01.5}$: Six Sigma does not affect Responsiveness of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at α≤0.05.

To test the first sub-hypothesis, multiple regression analysis was used to test this hypothesis:

Table 4.18 indicates the results of the statistical test for this hypothesis model represented the impact of independent variables Six Sigma on dependent variables of Service Quality representing (Reliability, Assurance, Tangibility, Empathy, and Responsiveness).

Through the results in table 4.18, showed that the independent variables Six Sigma DMAIC approach (Define stage, Measure stage, Analyze stage, Improve stage, Control stage) have no statistical significant effect on Responsiveness dimension of Service Quality, as beta value reached (-0.040) and the calculated t value reached (-0.457), which is less than its tabulated value (1.96) and is statistically significant at a greater level of (0.05). This indicate that there is a negative relationship between the Six Sigma DMAIC approach and Responsiveness of Service Quality, and Six Sigma has a no statistical significant effect on Responsiveness.

Based on the above, the null hypothesis which states: Six Sigma does affect Responsiveness of Service Quality in Pharmaceutical services in Privates Hospital Pharmacies in Jordan, at α≤0.05 is accepted.

In summary, after analyzing the above data on multiple regression, it is found that there is a strong relation between Six Sigma DMAIC approach and Service Quality Dimensions (Tangible, Assurance, and Reliability). As it seems that Six Sigma DMAIC approach does not impact the Service Quality Dimensions (Empathy and Responsiveness).

Chapter Five: Results' Discussion, Conclusion, and Recommendations

5.1 Results' Discussion:

The results showed that a Hospital Pharmacies implement Six Sigma DMAIC approach with a high degree in Pharmaceutical services in Jordan.

The results showed that hospital pharmacies implement Six Sigma DMAIC (Define stage) approach with the highest degree in Pharmaceutical services in Jordan. Then, Six Sigma DMAIC (Analyze stage), and after that, Six Sigma DMAIC (Control stage). Followed by Six Sigma DMAIC (Improvement stage). However, Six Sigma DMAIC (Measure stage) implemented hospital pharmacies with a medium degree in Pharmaceutical services in Jordan.

This means that Private Hospital Pharmacies can define the problems found in Pharmaceutical services quality, however, the results also showed that in Define stage the pharmacies determine the objective of the improvement project but with semi-agreement from respondent as the variation on this point was high. Also, hospital pharmacies have the measurement tools to measure the level of Service Quality, but, it seems that there is a need to employee more measurement tools to better assist the Service Quality. Then, the analysis of these measurements is carried out to identify the weak points in Service Quality after that, improvement measures are placed to improve Service Quality, but from the results obtained, it seems hospital pharmacies fall in short when conducting a pilot study to test the new improvement measures. Finally, control measures are placed to ensure the sustainability of the new improvement measures.

The results showed that Hospital Pharmacies implement Service Quality dimensions with a high degree in Pharmaceutical services in Jordan. The results showed that hospital pharmacies implement the Service Quality dimension (Responsiveness) with the highest degree in Pharmaceutical services in Jordan, however, the pharmacists have quite the disagreement on whether they tell the patient about the time expected for the service or not. Then, the Service Quality dimension (Reliability), followed by the Service Quality dimensions (Assurance) and (Empathy) at the same degree. Finally, the results showed that

hospital pharmacies implement Service Quality (Tangible) with a medium degree in Pharmaceutical services in Jordan.

In further elaboration of these results, in the overall data, private hospital pharmacies have been rated high in Responsiveness, Reliability, Assurance, and Empathy of Service Quality dimensions, with respecting the individual differences in Service Quality. However, in Tangible dimension, which represents the internal design, the technology and equipment used, and the general appearance of the pharmacy and pharmacists, has been rated in medium degree, this means that hospital pharmacies need to consider more improvement in this area to better deliver their pharmaceutical services.

From the results have shown, that there is a relationship between Six Sigma DMAIC approach and Service Quality dimensions of Pharmaceutical services in Jordanian Privates Hospital Pharmacies, and the greater relationship was between Six Sigma DMAIC and Tangible of Service Quality with 0.720, and a greater relationship between Improve stage and Service Quality with 0.765, and the overall relation was (0.811), which means that there is a strong and positive relation between Six Sigma DMAIC and Service Quality.

The results also show that the Six Sigma had an impact on the Service Quality dimensions, specifically on Tangibles, Reliability and Assurance. However, Six Sigma has no significant effect on, Empathy and Responsiveness as the significant levels is greater than 0.05

Table 5.1 summarizes the impact matrix among Six Sigma DMAIC approach and Service Quality dimensions of Pharmaceutical services in Jordanian Privates Hospital Pharmacies via ANOVA analysis, the results are as follows:

Table 5.1: Summary of Multiple Regressions Six Sigma DMAIC approach and Service Quality dimensions via ANOVA.

	Service Quality dimensions	Responsiveness	Tangibles	Reliability	Assurance	Empathy
Six Sigma DMAIC approach	+		+	+	+	

+: Significant Impact

It is possible to say that the significant effect of Six Sigma can be consider as an indicator for the need for improvement in the these dimensions. On Tangibles dimension the result showed a medium implementation. Especially on the need to use modern technology that will ease the process of service providing, the need to consider more suitable internal designs of the pharmacies to help providing better service to the patients, also the consideration for deploying more attractive and comfortable physical facilities –like comfortable chairs for waiting- for better service.

On the dimension of Assurance, Hospital pharmacies need to consider providing more support for pharmacist to provide the service for patients, for example empower pharmacist to take decisions in some situation without returning to management. Also, Hospital pharmacies can support pharmacist by endorsing them to take educational courses and workshops to improve their knowledge and skills to provide better service.

On the dimension of Reliability, hospital pharmacies need to consider the possibility for the need to improve the service and the lowest result on the survey was associated with the ability of the Hospital pharmacy to provide the service as promised. Also, the result indicated the need to consider the voice of patient with interest to their complaints which can lead to pinpoint the defects that maybe result in low level of service quality.

On the other hand, Six Sigma showed no significant impact on Empathy and Responsiveness dimensions. It can be said that in pharmaceutical service industry these two dimensions can be considered to be elevated by default when improving the other three dimensions. As changing the internal designs to more suitable ones for the service also can be related of providing an individual attention to patient special needs, like patients on wheels chairs, old aged patients and pregnant patients. Also, improving the equipment and using more modern technologies can improve the Responsiveness of pharmacist to patients' requests. Moreover, improving pharmacists' knowledge and skills make pharmacist more able to provide better and fast service to patients and make them able to handle ant request professionally.

The results of this study agree with the previous studies. Kumar, & Kwong, (2011) concluded that Six Sigma tools are very applicable and quite effective in improving and

integrating the Pharmacy process flow. Dehghan, et al. (2012) propose from their study that six sigma can be used to solve problems in Service Quality and close the gaps found to improve the quality of the service provided. Udayai, & Kumar, (2012), propose that Six Sigma can be the ultimate solution to resolve these concerns. Moreover, Hsia, et al, (2013) a study proposed that Six Sigma DMAIC approach can establish a series of systems that enhance overall consumer satisfaction with Service Quality. Mustafa, et al (2015), had integrated into their study Six Sigma DMAIC approach to identify the problems in the service and uses the SERVQUAL tool to assist the service provided, which lead to service improvement. Senger, & Cengiz, (2018) present through their study that Six Sigma DMAIC approach can improve the Service Quality by detecting and eliminating errors. Mesut, & Gülmez, (2020) in their research showed that the SERVQUAL method, when applied in the Six Sigma DMAIC approach, can be used to measure the quality of the services and initiate measure to improve it.

In overall, it is evident that Six Sigma DMAIC approach has a significant impact on Service Quality dimensions. This agrees with what Christyanti, & Christyanti, 2012, and Kumar, & Kwong, 2011propose in their studies.

5.2   Conclusion:

This study is dedicated to answering the study's main question: Does Six Sigma DMAIC approach affect the Quality of Service in Pharmaceutical services in Jordanian Privates Hospital Pharmacies? Data was collected via a questionnaire, which tested for its validity and reliability. Then, correlation and multiple regressions were used to test the hypothesis.

The results of this study show the implementation Six Sigma DMAIC approach in private hospital pharmacies in Jordan. Where, the Define stage with the highest degree in Pharmaceutical services in Jordan. Then, Analyze stage, after that, the Control stage. Followed by Improve stage. However, Measure stage implemented hospital pharmacies in a medium degree in Pharmaceutical services in Jordan. Although. Six Sigma elements and stages may be implemented in Hospital Pharmacies yet there is no full awareness that it is Six Sigma related.

On the other hand, the results of this study show the implementation Service Quality dimension in Private Hospital Pharmacies in Jordan. In the Service Quality dimension Responsiveness with the highest degree in Pharmaceutical services in Jordan. Then, Reliability, followed by Assurance and Empathy to the same degree. Finally, the results showed that hospital pharmacies implement Tangible with a medium degree in Pharmaceutical services in Jordan.

Finally, results indicate that there is a significant impact of Six Sigma DMAIC approach (Define stage, Measure stage, Analyze stage, Improve stage, Control stage) on the Quality dimension (Reliability, Assurance, Tangibility, Empathy, and Responsiveness) of Pharmaceutical Service in Jordanian Private Hospital pharmacies, specifically on Tangibles, Reliability and Assurance. However, Six Sigma has no significant effect on, Empathy and Responsiveness as the significant levels is greater than 0.05

5.3   Recommendations:

5.3.1 Recommendations   for   Jordanian   Private   Hospital   Pharmacies:

1.   The study recommends integrating Six Sigma DMAIC approach as a part of Service Quality improvement measures.
2. The study recommends using Service Quality dimensions to assist pharmaceutical services in private hospital pharmacies
3. The study recommends considering the tangible dimension as an active improvement area to improve the pharmaceutical service.
4. The study recommends the use of more effective measurement tools of Service Quality in private hospital pharmacies.

5.3.2 Recommendations for Academics and Future Research:

1.   This study is conducted on the general aspect of pharmaceutical services, and it is recommended to be conducted on a specific pharmaceutical service in a hospital pharmacy.
2.   This study is carried out on Jordanian Private Hospital pharmacies in Jordan. To be able to generalize the current study results, it is recommended to conduct such

a study on the same industry in other countries, especially, Arab Countries because they have a similar social and cultural lifestyles.

3. This study is conducted on Jordanian Private Hospital pharmacies in Jordan. It is recommended to be conducted in community pharmacies as well

4. This study is carried out within a limited period, therefore, it is advised to repeat this study after a suitable time to check industry development.

5. Extending the analysis to other sectors and countries offers future research opportunities, and integrating other industries will help alleviate the challenge of generalizing conclusions to other organizations and industries.

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Appendixes

Appendix (1): Panel of Referees Committee

No.	Name	Qualification	Organization
1	Dr. Ahmad Ali Saleh	Professor of Management	Middle East University
2	Dr. Shafeeg Haddad	Professor of Management	Middle East University
3	Dr. Samir AL-Jabali	Professor of Management	Middle East University
4	Dr. Nidal Salhi	Professor of Management	Al Patra University
5	Dr. Najem Abood Najim	Professor of Management	Al- Zaitona University
6	Dr. Mohamad Khair Abu Zeid	Professor of Management	AL Balqaa University
7	Dr. Murad Attiany	Professor of Management	AL Esraa University
8	Dr. Deema AL Tamimi	Manager of hospital pharmacy	Istiqlal hospital
9	Dr. Salsabeel Al-Qazaqi	Former manager of hospital pharmacy	Kindy hospital
10	Dr. Lina Abdelkareem	Clinical Pharmacist	Istishari hospital
11	Dr. Hedaya Al- Zout	Pharmacist	Israa hospital

Appendix (2): Letter and Questionnaire of Respondents:

ΛΛΞU جـــامـــعــة الـــشــرق الأوسـط
MIDDLE EAST UNIVERSITY
Amman - Jordan

Thesis Questionnaire

Dear Doctor. ………

Greeting,

I would like to request you to answer the attached questionnaire related to my thesis titled:

The Impact of Six Sigma on the Quality of Pharmaceutical Services: Field Study on Private Jordanian Hospital Pharmacies.

تأثير الحيود السداسي على جودة الخدمة الصيدلانية

دراسة ميدانية على صيدليات المستشفيات الأردنية الخاصة

This questionnaire includes (49) paragraphs that, cover both independent and dependent variables, and may take only (15) minutes. The responses will be used for research purposes and will be confidential and you do not need to write your name.

I requested you to indicate what is implemented in your pharmacy not what you wish to be implemented.

Finally, I appreciate and thank you for your participation and support, and if you have any questions or comments, please call me (0791053735).

Thank you for your effort.

Prepared by: Doaa Khalid Al Duraini

Supervised by: Dr. Abdel-Aziz Ahmad Sharabati

Part one: Demographic information

Private The hospital name: ……………………..

Gender:	□ Male	□ Female

Age (years): □ less than 30 □ 30- 34 □ 35- 39 □ 40 or more

Education: □ Diploma □ Bachelor □ Mater □ Ph.D.

Position: □ Manager □ Pharmacist □ Clinical Pharmacist □ Pharmacy Assistant

Experience (years): □ less than 5 □ 5- 9 □ 10- 14 □ 15 or more

Part two: The following 49 questions test the perception of Private Jordanian Hospital Pharmacies employees about the implementation of Six Sigma DMAIC method and the Service Quality Dimensions.

Please, rate each question according to actual implementation and not based on your belief, as follows: 1 = Never Implemented, 2 = Slightly Implemented, 3 = Sometimes, 4 = Almost Implemented, 5 = Frequently Implemented.

No.	Item	Never Implemented	Slightly Implemented	Sometimes	Almost Implemented	Frequently Implemented
	Six Sigma DMAIC Method					
	Define Stage					
1.	The hospital pharmacy defines patients requirements	1	2	3	4	5
2.	The hospital pharmacy searches for complaints about Service Quality level	1	2	3	4	5
3.	The hospital pharmacy defines the nature of patients' complaints about the service	1	2	3	4	5
4.	The hospital pharmacy determines the objectives of improvement	1	2	3	4	5
5.	The hospital pharmacy assigns personnel responsible for improvement project	1	2	3	4	5

	Measure stage					
6.	The hospital pharmacy collects data about the current level of Service Quality	1	2	3	4	5
7.	The hospital pharmacy uses different measurement systems to collect data	1	2	3	4	5
8.	The hospital pharmacy determines the current quality level	1	2	3	4	5
9.	The hospital pharmacy determines the frequency of errors	1	2	3	4	5
10.	The hospital pharmacy identifies the important elements of the service provided	1	2	3	4	5
	Analyze stage					
11.	The hospital pharmacy evaluates the collected data	1	2	3	4	5
12.	The hospital pharmacy defines the current cause of complaints	1	2	3	4	5
13.	The hospital pharmacy evaluates the current quality level	1	2	3	4	5
14.	The hospital pharmacy identifies the relationship between the customer requirements and complaints	1	2	3	4	5
15.	The hospital pharmacy describes the area for improvements	1	2	3	4	5
	Improvement stage					
16.	The hospital pharmacy designs creative solutions to improve Service Quality	1	2	3	4	5
17.	The hospital pharmacy makes suitable changes to provide service	1	2	3	4	5
18.	The hospital pharmacy corrects the causes of complaints about service	1	2	3	4	5
19.	The hospital pharmacy conduct pilot tests to the improvements to Service Quality	1	2	3	4	5
20.	The hospital pharmacy confirms that changes are made to improve the service	1	2	3	4	5
	Control stage					
21.	The hospital pharmacy monitors changes implementation	1	2	3	4	5
22.	The hospital pharmacy determines the appropriateness of the changes	1	2	3	4	5
23.	The hospital pharmacy makes plans to control changes in implementation	1	2	3	4	5
24.	The hospital pharmacy follows up on control plans	1	2	3	4	5
	Service Quality					
	Tangible					
25.	The hospital pharmacy has a suitable internal design to provide service	1	2	3	4	5

26.	The hospital pharmacy has physical facilities that attract the eyes of patients	1	2	3	4	5
27.	The hospital pharmacy uses suitable equipment	1	2	3	4	5
28.	The hospital pharmacy uses modern technology	1	2	3	4	5
29.	The hospital pharmacy encourages pharmacists to look professional and well dressed	1	2	3	4	5
	Responsiveness					
30.	The hospital pharmacy tells patients the time needed for the service	1	2	3	4	5
31.	The hospital pharmacy has pharmacists who are willing to assist patients.	1	2	3	4	5
32.	The hospital pharmacy prepares pharmacists to respond to patients' requests	1	2	3	4	5
33.	The hospital pharmacy gives patients fast service	1	2	3	4	5
34.	The hospital pharmacy is ready to handle patients' requests as come in.	1	2	3	4	5
	Reliability					
35.	The hospital pharmacy provides the services as promised	1	2	3	4	5
36.	The hospital pharmacy delivers the service in the promised time	1	2	3	4	5
37.	The hospital pharmacy responds with interest to patients' complaints	1	2	3	4	5
38.	The hospital pharmacy performs the service right the first time	1	2	3	4	5
39.	The pharmacy provides consistent service	1	2	3	4	5
	Assurance					
40.	The hospital pharmacy trains pharmacists to treat patients with kindness	1	2	3	4	5
41.	The hospital pharmacy has competent pharmacists to provide services	1	2	3	4	5
42.	The hospital pharmacy encourages pharmacists to build trust with the patients	1	2	3	4	5
43.	The hospital pharmacy gives pharmacists support to provide service	1	2	3	4	5
44.	The hospital pharmacy provides the pharmacist with the knowledge to answer patient's questions	1	2	3	4	5
	Empathy					
45.	The hospital pharmacy gives patients individual attention	1	2	3	4	5
46.	The hospital pharmacy understands patient's specific needs	1	2	3	4	5
47.	The hospital pharmacy directs pharmacists to give personal attention to patients	1	2	3	4	5
48.	The hospital pharmacy has the patient's best interest	1	2	3	4	5
49.	The hospital pharmacy operating hours convenient for patients	1	2	3	4	5

Appendix (3): List of Hospital Pharmacies Participate In the Study

1. Abd Alhadi hospital pharmacy
2. Al Esraa hospital pharmacy
3. Al Istiklal hospital pharmacy
4. Al Istishari hospital pharmacy
5. Al Kindi hospital pharmacy
6. Al Khaldi hospital pharmacy
7. Al Royal hospital pharmacy
8. Amman Surgical hospital pharmacy
9. Arab Medical Center pharmacy
10. Dar Al Salam hospital pharmacy
11. Dr. Ahmad Al Hamaida hospital pharmacy
12. Gardens hospital pharmacy
13. Ibn Al Haytham hospital pharmacy
14. Jordan hospital pharmacy
15. Philadelphia hospital pharmacy
16. Shmaisani hospital pharmacy
17. Specialty hospital pharmacy

Appendix (4): كتاب تسهيل مهمة طالب

مكتب رئيس الجامعة
Office of the President

الرقم: د ر/خ/1424
التاريخ:2022/04/10

إلى من يهمه الأمر

تحية طيبة وبعد

لغايات توفير وربط أسس التعاون مع خدمة المجتمع المحلي؛ نرجو التكرم بالموافقة على تقديم التسهيلات الممكنة لطالبة الماجستير **دعاء خالد سميح الديريني** ورقمها الجامعي (401920019)، المسجلة في تخصص ادارة الاعمال / كلية الأعمال في جامعة الشرق الأوسط، والتي تتولى القيام بإعداد دراسة بحثية أكاديمية في رسالتها المعنونه بـ "

The Impact of Six Sigma on the Quality of Pharmaceutical Services:

"Field Study on Private Jordanian Hospital Pharmacies.

علماً أن المعلومات التي ستحصل عليها ستبقى سرية ولن تستخدم إلا لأغراض البحث العلمي.

وتفضلوا بقبول فائق الاحترام

رئيسة الجامعة

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