Arab American University
Faculty of Graduate Studies

Assessment of Health Information Systems Implementations in West Bank Governmental Hospitals: A Survey of Health Providers Perceptions.

By
Reema Abdullah Abu Kheel

Supervisor
Prof. Mohammed Awad

This Thesis was submitted in partial fulfillment of the requirements for the Master's degree in the Health Informatics.

February / 2024

Thesis Approval

"Assessment of Health Information systems implementations in West Bank Governmental Hospitals: A Survey of Health Providers Perceptions"

By
Reema Abdullah Abu Kheel

This thesis was defended successfully on 3/2/2024 and approved by:

Committee members	Signature
1. Prof. Mohammed Awad: Supervisor	
2. Dr.Yousef Mimi: Internal Examiner	
3. Dr. Hala Labadi : External Examiner	

Declaration

This thesis was submitted in partial fulfillment of the requirements for the master's degree in health informatics.

I declare that the content of this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

The Name of The Name: Reema Abu Kheel

ID: 202012334

Signature 

Date: 06/10/2024

Dedication

This work is dedicated to Allah, my parents, sisters and brothers, my husband, my children, everyone who helped me and believed in my abilities to achieve this degree, my university (AAUP), and my homeland, Palestine.

Acknowledgments

God, I’m deeply grateful for the endless blessings and for your unconditional and endless mercy and grace. **Alhamdulillah.**

To Professor Mohammed Awad, I would like to extend my sincere appreciation., to my beloved advisor, who made this work possible. Thank you for your kind supervision and invaluable guidance throughout the past challenging months, I am appreciative of what you provided for me. My mother, who is the most significant person in my life, has my sincere thanks. I appreciate your prayers. All my life, my father, you have been and continue to be my hero. My sisters and brothers, my backbone and support system, I am blessed to have you. You have always believed in me, and you were always supporting, caring, and loving.

I am heartfelt thanks to my husband and kids, who have missed years of free time without me and the subsequent increased workload. It is quite unlikely that I can compensate them for this or make up for the lost time.

I also have a lot of gratitude for my statisticians., my husband Abdellminem Jalboush, and Mohammed Masri for helping me with data analysis; your contributions have always been valuable and insightful.

I sincerely thank my great group of data collectors: Saja Eideh, Aireen, Shahd Faqeeh, Lubna Abu Aqeel, Anood Kayed, Mai Butmeh, Majdoleen, Khadija, Rayan, my lovely friend Asma’ Khaleel. Special thanks to Sana Derbas, nursing supervisor at Inash Al Usra College.

I'm grateful for the unwavering moral support I receive from my friends and colleagues. Thank you so much to all my classmates for being such wonderful and kind friends. I couldn't have wished for nicer ones.

Abstract

Background: Adopting Health Information Systems (HIS) successfully is a complex procedure. A system must first successfully influence its users to be effective and benefit the company. Palestinian Ministry of Health has adopted a health information system in its hospitals in the West Bank; evaluation must be applied to assess the success of the HIS based-on users' perceptions and satisfaction with the quality and net benefits of the system.

Aim of this study: this study aims to assess the health information system success in governmental hospitals in West Bank by identifying the perception of health providers, based on DeLone and McLean's framework for information system success, and determining the characteristics of the system by studying user's perception on its components: the system quality, information quality, service quality, use, user satisfaction, and net benefit.

Methods: This was a cross-sectional study conducted among Palestinian health providers in the three governmental hospitals, Jenin (Khalil Suliman Hospital), Ramallah (Palestine Medical Complex), and Beit Jala (Al Husein) Hospital. Data were collected by a self-administered questionnaire based on DeLone and McLean's framework for information system success from a Stratified simple random sample of 250 health providers. Data were analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 25. Descriptive analysis, and Linear regression analysis, are to find out if there is a relationship, effect, and statistical significance between the dependent variables and the independent variables.

Results: Results indicated that there was a high degree of (User Satisfaction) according to respondents' point of view, where the total degree was (mean=3.54) with (70.9%) acceptance. Among the three qualities, information quality got the highest quality (mean=3.82) with (76.3%) of acceptance, followed by system quality (mean=3.51) with (70.2%) of acceptance, service quality was the lowest (mean=3.22) with (64.5%) of acceptance. System use (mean 3.85) with (77.0%) of acceptance, while net benefit (mean=3.76) with (75.2%) of acceptance. A significant and positive relationship was detected between the three quality factors and user satisfaction, between system use and user satisfaction, and between user satisfaction and the net benefit of the system.

Conclusion: Despite the generally high overall user satisfaction with the HIS at West Bank governmental hospitals, specific components of the system and service qualities should be revised by policymakers, mainly the availability of the system, development process, use of new technologies, and integration with another HISs. Adequate technical support from HIS system provider, overall infrastructure should be adequate especially, internet connection and hardware, improving overall support services on the HIS that received from IT support personnel.

Keywords*:* Delone and McLean, HIS assessment, Palestine, perception.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

AAUP: Arab American University of Palestine

CeHEM: Constructive eHealth Evaluation Method

D&M: Delone and McLean

EHR: Electronic Health Record

ERMIS: Emergency Response Medical Information System

HIS: Health Information System

IPC: Infection Prevention Control

IRB: Institutional Review Board

IS: Information System

IT: Information Technology

MOH: Ministry of Health

PACS: Picture Archiving Response Medical Information System

RFI: Request for Information

SPSS: Statistical Package of Social Science

UNRWA: United Nations Relief and Works Agency for Palestine Refugees in the Near East

USAID: United States Agency for International Development

Chapter One

Introduction

1.1 Background

Medical practice is one of the many industries where information technology has made significant advances in recent years. Health information systems (HIS) are significant technical innovation that has involved medical practitioners in a variety of fields (Al-Hashimi et al., 2018). Health information systems collect, store, maintain, and distribute data on people's health or the operations of health-care institutions, are an essential aspect of clinical decision-making in a multidisciplinary team that offers treatment to a single patient, in addition, they provide uninterrupted and smooth patient-centered service (Alnashmi et al., 2022; Getachew et al., 2022).

The benefits of using an HIS include increased healthcare value, increased productivity, and simpler data acquisition and collection. In comparison to a manual approach, HIS can reduce mistakes and improve communication among employees. A well-designed HIS, in general, is a coordinated effort to collect, analyze, report, and use health data and information to affect policy and decision-making, service delivery, personal and public health outcomes, and research (Al-Sanjary & Desi Hertin, 2018 ;Getachew et al., 2022). It must fulfill specific requirements to be adopted, these include user satisfaction, systems use, net advantages, flexibility, efficiency, information quality, service quality, system development, training on those systems, and systems quality (Hasan & Uk, 2019).

The successful adoption of Health Information Systems (HIS) is a complex process that depends on organizational, societal, human, and technological aspects (Hasan & Uk, 2019). In order for a system to function well and benefit the company, it must first have a

successful impact on its users. Additionally, the use of an information system in procedures must begin to become standard practice, and ensuring that the system and information are of good quality is one of the first steps in achieving a successful system (Ngurah et al., 2022a).

Actually, a number of studies have found that one of the primary obstacles to HIS usage is a lack of widespread acceptance among healthcare providers, including employees and professionals. The most widespread adoption of electronic information systems has been observed in general practices rather than hospitals, even though certain countries have done so adequately. The findings provide light on the topic, "How is HIS acceptance among health professionals, especially in the hospital setting?" with an additional question, "How to assess HIS acceptance?" as well as to get knowledge of certain evaluation frames or models that are used to describe and look into hospital health professionals' adoption and acceptance of HIS (Septiani & Mairani, 2021). Organizations would like to know whether their investments in technology will be successful in the long run. They are naturally interested in the return on these investments, in addition to the impact of these systems on productivity and overall quality of care (Abdullah et al., 2018). There is a critical need for rigorous evaluation of information systems with a different setting, to understand the factors of success and failure of these information systems (Sood et al., 2008). Moving forward and succeeding in the health sector needs additional and consistent input of information about HIS (Hasan & Uk, 2019).

Because users are the system's actual customers, measuring the success of HISs by their satisfaction is highly significant. For this reason, figuring out what factors influence users' satisfaction and investigating them will help improve the system's quality, which

may then have a positive effect on the standard of patient care. Users' assessments of systems appear to be a good indicator of a system's performance since they consider their systems as tools that obstruct them from completing their duties (Mimi, 2015). Because success is reliant on expectations and lacks a single stated definition, measuring the success of an information system is challenging. Once the system has been put into place and approved for use by the end users and they are satisfied with the system, it is generally recognized that the information system is successful. As a result, some academics hypothesized that user satisfaction and system usage are the key factors in user adoption and may be used to assess the success of information systems (Tilahun & Fritz, 2015a).Different assessment approaches and frameworks may be implemented to assess the adoption of health information systems and the level of support they receive from medical practitioners, e.g., DeLone and McLean Model, Constructive eHealth Evaluation Method (CeHEM), Roger's Theory of Diffusion of Innovation, Theory of workarounds, Acceptance Model and Framework of Global Assessment of HITECH, HIT Impact Assessment Framework (Septiani & Mairani, 2021).

DeLone and McLean Model is the one that is used in this research, DeLone and McLean developed the Information Systems Success Model (IS Success Model) in 1992, (DeLone & McLean, 1992) and modified it in 2003 (Tilahun & Fritz, 2015a). It is one of the most well-known evaluation methods for information systems success, this framework was shown to be appropriate and acceptable for evaluating HIS, and it was discovered that the D&M model's components and relations can be used to evaluate a system's effectiveness, various studies had supported the model's validity for health information systems evaluations' success (J.-M. Palm et al., 2010)and (Tilahun & Fritz, 2015a). The 2003 model was upgraded to include several elements, including

Information Quality, System Quality, Service Quality, Intention to Use/Use, User Satisfaction, and finally Net Benefits. The model illustrates the relationships among various parameters. "System Quality" component, that measures how "excellent" the information system is in terms of its functional attributes, is part of the model. How "excellent" The outputs of the information system are determined by "Information Quality". The phrase "service quality" refers to how "excellent" the information system's provided services are. The term "System Use" describes how the information system uses and makes use of its outputs. An essential factor in determining the success of an information system is "User Satisfaction," which assesses how satisfied users are as they utilize the system. The term "System Benefits" relates to the advantages that the system may provide and is a crucial component of the system's total worth to those who use it or the company. The IS success model has been widely utilized for information system evaluation in numerous fields, including healthcare Karitis et al., 2021.

Studies found a strong correlation between user satisfaction and the three quality dimensions of system, information, and service. By using the Delone and Mclean information, Mukhtar S. Al-Hashimi and Mishleen M. Aqleh conducted a study in Bahrain in 2018 to evaluate the success of the country's health information systems (HISs) from the users' perspectives based on Delone and Mclean system success model, the research revealed that the impact of the HISs' quality dimensions was all supported and accepted in this study. There are significantly positive relationships between the quality dimensions, user satisfaction, system use, and the effect on the perceived net benefit of the HIS.Net benefits were shown to be highly correlated with both use and user satisfaction, while user satisfaction had a more significant impact than system use on net benefits. Therefore, it is crucial to guarantee that any HIS satisfies the system

quality, service quality, and information quality requirements to ensure user satisfaction will have a good impact on each person's and the hospital's performance Al-Hashimi et al., 2018.

International literature indicates that the effectiveness of information systems is crucial. In the performance of the institutions and helps understand the elements that influence whether something is successful or not of an information system, there is an urgent need for a systematic examination of these information systems in different environments. Countries should encourage scientists to conduct further studies that will advance information systems, including health information systems Sood et al., 2008.

1.2 Problem Statement

Many healthcare providers have embraced HIS to save healthcare costs while enhancing service delivery, performance, and quality. Palestinian Ministry of Health adopted HIS in its hospitals in the West Bank in 2010, but the researcher is not aware of any evaluation procedure that was used to evaluate HIS success from perceptions of HIS users at West Bank governmental hospitals to provide recommendations based on careful assessment depending on the user's perceptions and satisfaction, in addition to their evaluation of the system, information, and service quality.

1.3 Research Significance

HIS has presented several opportunities to lower medical errors, increase efficiency, and improve patient safety and care quality; it is an essential aspect of clinical decision-making in an interdisciplinary group providing care for a lone patient (Alnashmi et al., 2022). However, when health users oppose the deployment of the system or the

deployed system is ineffective, the adverse effects of HIS might occur. This will result in a significant loss of the money invested in these systems. According to several studies, HIS system failure may result from a lack of user assessment or feedback. The rationale for the healthcare reform is that raising the standard of healthcare will help Palestinians stay healthy and free from disease. The processes that control the quality of care must be improved to increase efficacy and reduce staff effort, among other things. This may be accomplished by thoroughly analyzing effectiveness care quality, effectiveness, and productivity indicators. Regardless of the outcomes, the evaluation offers the opportunity to inform the organizations about the system's flaws through recommendations based on accurate analysis.

Palestinian Ministry of Health implemented the Health Information System (HIS) AVICENNA in government hospitals in 2012. It connects all West Bank governmental hospitals. It was purchased through a tender not based on a request for information (RFI) from the Palestinian MOH team, and they were not involved enough in choosing the system. It provides administrative and clinical workers access, with different interfaces and user access permissions, since the adoption of HIS in Palestine. Therefore, this study would be the first in Palestine to access the perceptions of health providers of health information systems implementations in the West Bank; it would alert policymakers to its present flaws and user ideas and work on improving the qualities of the system, its information, and services to enhance user satisfaction and perceived net benefits.

1.4 Aim of the Study

This research aims to assess the health information system success in West Bank governmental hospitals by identifying the perception of health providers, dependent on the information system success model developed by DeLone and McLean, which is the most popular approach to measuring information system success, and identifying the features of the system by examining how users perceive its different components, this model consists of six parameters: the system, information, service qualities, system use, user satisfaction, and net benefit.

1.5 Objectives of the Study:

The main objectives of our research are to:

- To evaluate the HIS success by identifying the perception of system users (health providers) in West Bank governmental hospitals based on DeLone and McLean's model for health information system success.
- To assess the features of a health information system by examining the healthcare provider’s perception of system components: system quality, information quality, service quality, user satisfaction, system use, and net benefit.
- To evaluate health information systems from the viewpoint of medical professionals to achieve objectives and expected results and to avoid new problems with the application of informatics in healthcare services.

1.6 Research Question

Our primary research questions are:

1. Are health users satisfied with the system quality (performance, reliability, privacy, and response time) of HIS in West Bank governmental hospitals?
2. Are health users satisfied by the information quality (overall quality, format/layout, accuracy, and availability)? of HIS in West Bank governmental hospitals?
3. Are health users satisfied with the service quality (training and support) of HIS in West Bank governmental hospitals?
4. Are the health users in governmental hospitals overlay satisfied by HIS (overall satisfaction, ease of use, and better workflow/make the job easier)?
5. Does user satisfaction affect the perceived net benefit (overall productivity and reduced manual needs) (overall quality of care, coordination of care, and clinical decision support) of HIS in West Bank governmental Hospitals?

1.7 Research Hypothesis

H1. System quality positively affects users' satisfaction in West Bank governmental hospitals.

H2. Information quality positively affects users' satisfaction in West Bank governmental hospitals.

H3. Service quality positively affects user satisfaction in West Bank governmental hospitals.

H4. System use positively affects user satisfaction in West Bank governmental hospitals.

H5. User satisfaction positively affects the perceived net benefit of HIS in West Bank governmental hospitals.

1.8 Research Expected Outcome

Respondents will be satisfied with the health information system. Among the three dimensions that describe the system (information quality, system quality, and service quality), 'information quality' may score the highest satisfaction, while service quality and system quality will be less. Most respondents may agree that the system improved the net quality of health, but fewer will agree that the system will improve the net productivity. It is suggested that health users must be contemporary to the two periods (paper-based period and system-based period) so they will be more able to evaluate the system.

1.9 Description of Thesis Chapters

This thesis is structured as follows:

- Chapter one: contains a general introduction about the study, problem statement, study objectives, research questions, research expected outcomes, and the significance of the study
- Chapter two includes a literature review about HIS in Palestine. The researcher describes the most relevant and significant information regarding this topic and highlights the main gaps in this research field. Contains a description of the conceptual framework of this research.

- Chapter Three: it contains research methodology including study design, setting, population and sample size, data collection instrument, instrument validation, data collection and analysis, and ethical considerations and study limitations.
- Chapter Four: It includes a descriptive presentation of participants' characteristics, model validation, correlational analysis, and hypothesis testing.
- Chapter Five: it includes a discussion, conclusion, recommendations, and future research along with the strengths and limitations of this study.

Chapter Two

Literature Review

2.1 Introduction

Healthcare organizations aim to improve health status by adopting Health Information Systems (HIS) to enhance care quality and effectiveness, reduce staff workload, and improve daily operations through a comprehensive evaluation of several indicators (Abdullah et al., 2018). Regardless of the outcome, the evaluation offers an opportunity to make suggestions based on a thorough assessment that will make the organization aware of gaps in the system (Karitis et al., 2021). Since HIS in governmental hospitals in West Bank was implemented more than ten years ago, (Salameh et al., n.d.) and no obvious assessment of health providers' perception based on Delone and Mclean framework was done since that time, the researcher sees that it is essential to conduct this kind of study.

From the concept and role of health informatics to improve cooperation and coordination between health care practitioners, simplify medical quality assurance procedures, and increase cost-effectiveness in health care delivery, the benefit of this research comes to enhance the critical role of health informatics that was newly added to the health sector in Palestine. This chapter includes Health information systems in governmental hospitals in West Bank, an evaluation of health information systems in general, and DeLone and McLean's model for information system success; this chapter also shows the literature concerned with the Assessment of Health Information systems implementations in hospitals depending on Multidisciplinary health providers' perception.

2.2 Health Information System in Governmental Hospitals in West Bank.

The information system is an integrated system of subsystems used to gather, store, and process data; such information and knowledge gained from the data is utilized to assist operations, management, and decision-making (Zheng et al., 2023). Since it was necessary to transform from traditional paper health records to electronic health records in Governmental hospitals in Palestine, health information system, Avicenna, was implemented in public hospitals in 2010 with the goal of integrating patient health data to manage healthcare services across all levels, Palestinian Ministry of Health (MOH) is the owner of Avicenna, which has been implemented with USAID funding (Nemer et al., 2023). Palestinian Medical Complex hospital, one of the major governmental hospitals, operating AviCenna Hospital Information Management Platform (AviCenna Health Information System [HIS]), in September 2012. Upon implementation at this hospital, it has been put into practice in more than 13 Palestinian government hospitals, after being authorized at this facility, it standardizes medical practices and diagnoses and provides a single computerized file for each patient. Additionally, it coordinated the efforts of all administrative, financial, and medical hospital departments (Salameh et al., n.d). AviCenna is not implemented at a national level, it is implemented at governmental hospitals only, additionally there is no integration between AviCenna and other HISs applied in private sector hospitals(Shawar & Jaabari, 2023). it lacks of consistent assessment and evaluation standards as well as a lack of cooperation across various stakeholders and groups ,it faces a number of obstacles, including inadequate infrastructure, a shortage of knowledgeable HIS specialists and professionals, a lack of funding, and a lack of integration with other HISs. Avicenna is a comprehensive, integrated computer system. Within this umbrella system, there are varieties of

subsystems in medical specialties, there are five key components or “modules” in the system, include:

1. **Registration**:

   “Patient Management and Billing” The system captures and records patient demographics and visits at the point-of-care. Registration data will be displayed consistently and automatically on screens in the clinical system.

2. **Scheduling**:

   Patient scheduling schedules patients for appointments with clinicians or for tests and procedures.

3. **Patient Billing:**

   All billable health services will be accessible and processed in this system

4. **Order Entry and Results Reporting:**

   All clinical orders will be listed with indications of what has been completed and what is pending. Electronic alerts will appear for orders duplication and errors and provide information to assist clinical decision-making

5. **Clinical Documentation:**

   This module provides on-line documentation of clinical encounters such as flowcharts and structured notes.

6. **Subsystems of AviCenna HIS**

   - Picture Archiving Communication System (PACS): (picture archiving and communication system) is a web- based medical imaging technology used and integrated in AviCenna Health information system to securely store and digitally transmit electronic images and clinically relevant reports

- Radiology Information System (RIS): it is the core system for the electronic management of imaging departments in AviCenna. The major functions of the RIS can include patient scheduling, resource management, examination performance tracking, reporting, results distribution, and procedure billing. Clinical Information System (CIS)
- Physician Information Systems (PIS)
- Financial and Resources Information System (FIS): is a part of AviCenna that charged with monitoring finances within the hospital. It takes complex data and processes it into specialized reports.
- Laboratory Information System (LIS): is a part of AviCenna system care information system that records, manages, and stores data for clinical laboratories. LIS has traditionally been most adept at sending laboratory test orders to lab instruments, tracking those orders, and then recording the results, typically to a searchable database.
- Nursing Information Systems (NIS): is a part of AviCenna health care information system that deals with nursing aspects, particularly the maintenance of the nursing record.
- Pharmacy Information System (PIS): is a multi-functional system in AviCenna that allows pharmacists effectively maintain the supply and organization of drugs. The system helps decrease medication errors, increase patient safety, report drug usage, and track costs.
- Clinical decision support System (CDSS): AviCenna Health information system has no decision support system and there is no future plan to have such support system. CDSS is an important system that should be in AviCenna Since it has a

number of important benefits, including: Increased quality of care and enhanced health outcomes. Avoidance of errors and adverse events. Improved efficiency, cost-benefit, and provider and patient satisfaction.

Palestine, a developing nation, has the same difficulties as other developing nations when implementing health informatics. However, unlike many other developing countries, studying new technology outside of Palestine is frequently tricky for its citizens (Luna et al., 2014). In Palestine, a study conducted by Salameh et al., nurses mainly recognizing documentation generated by computers when it came to understanding and evaluating their opinions about the installation of an electronic health information system in governmental hospitals in Palestine based on their responses to an attitude questionnaire, only nurses took part in this work, so it will be crucial to see whether other healthcare groups have comparable or different degrees of acceptability (Salameh et al., n.d).

Many problems and difficulties that health providers encounter can be resolved by enhancing the quality of HIS. To apply HIS successfully, it is necessary to take into account its qualities and attributes. Making the best HIS model choice is crucial because of how its characteristics affect, how users see the system and why they would use it regularly (Jad & Zainol, 2023).

Consequently, this study aims to investigate and assess the health providers' perception regarding health information systems in governmental hospitals in the West Bank**.** This system, which primarily provided benefits to governmental hospitals, is regarded as one of the most effective in the Palestinian health sector. However, the most critical point is that this system depends on a technological infrastructure of computers, network devices, and servers, and this all requires continuous development and systematic

evaluation and training for users. This development, in turn, requires the allocation of large sums of money, especially after the many advantages of implementing HIS; its results will not be successful enough if it is not linked to the acceptance of healthcare providers who will use the technology, specifically that it was purchased through a tender that was not based on a request for information (RFI) from the team of Palestinian Ministry of Health, and they did not participate in the system selection process sufficiently.

2.3 Evaluation of Health Information Systems

The use of Information Systems is expanding quickly in the modern, interconnected world; it is currently influencing many parts of life and acting as a development tool for people, businesses, and governments in general. The level of IS utilization that enterprises and governments employ determines how well they operate and how well they can withstand competitive pressure. As a result, the proper implementation of Information systems has long been a subject of interest (Al-Kofahi et al., n.d). IS success has several different meanings and metrics; however, the concept of IS success differs for each stakeholder and depends on their viewpoint(Delone & Mclean, 2003).Consequently, various viewpoints may be used to analyze the various aspects of IS and its success (Al-Kofahi et al., n.d).

The act of measuring is usually regarded to constitute the definition of the word evaluation. There are several methods for measuring things, and each is specific to the situation (Mimi, 2015). The concise definition of an evaluation as "the decisive assessment of defined objects, based on a set of criteria, to solve a given problem"(Khoumbati et al., 2009) gives an accurate representation of methods,

parameters, and outcomes despite the complexity and breadth of the act of evaluation (Mimi, 2015).

The value of an evaluation in giving the desired answers should be the decision element when undertaking evaluations; evaluation operations in health informatics are prompted by the understanding that even robust technology does not ensure a successful deployment; it is well recognized that even most innovative technologies do not always guarantee their effective adoption or beneficial use by a variety of user populations (Mimi, 2015). Evaluations provide a way to determine if these initiatives were successful or not, and the identification of the elements that contribute to the implementation of the system's success is one of the main goals of assessments (Shao et al., 2022). It is commonly recognized that assessment will play a part in how he develops in the future; one of its objectives includes facilitating an analysis of the system's performance, safety, and effectiveness while enhancing care quality and cost-efficiency. Additionally, evaluation is beneficial for teaching lessons that will guide future activities (Yusof et al., 2008). Providing this evidence is crucial to validating the benefits that are often advertised. To provide evidence of benefits in health information technology utilization, there should be an account that includes cost, return on investment, critical success factors, and alternative explanations for the successes, these would become examples for future activities (Septiani & Mairani, 2021).

The inadequate policy and administrative support, the more significant time spent using EHR compared to paper-based systems, user reluctance, a lack of skills, a lack of frontline physician participation, and concerns about return on investment are all barriers to the effective adoption of HIS. Therefore, prior evaluations are necessary to implement successful comprehensive HIS. (Bashiri et al., 2023). Ministries of Health

invested money in the development of the HISs, and an evaluation of its performance is necessary to assess the value and efficacy of these systems and to justify the money spent on their creation and implementation (Bashiri et al., 2023).

2.4 DeLone and McLean Framework for Information System Success

One of the popular models for assessing the successful application of information systems is the DeLone and McLean Information Systems Success Model (D&M model), which offers classification metrics for information system success and models of temporal and causal relationships between categories (Delone & Mclean, 1992). has been widely used in business, education, and finance. The approach has lately been applied to the disciplines of medicine and health (Zheng et al., 2023).

Since the 1980s, IS experts have struggled to pinpoint the elements that might contribute to IS success; they have also been working to develop models based on empirical data to advance and enhance IS; as a result of this phenomenon, DeLone and McLean developed a classification for the IS success model, which creates the first version of the IS success model in 1992, and offers a detailed and thorough description of IS success (Al-Kofahi et al., n.d).

The two scientists, WILLIAM H. DELONE AND EPHRAIM R. MCLEAN, offered a methodology for evaluating the effectiveness of information systems; the framework has six main areas or aspects, including system quality, information quality, use, user satisfaction, individual impact, and organizational effect (Abdullah et al., 2018). System quality indicators (features of the system, such as response time, ease of use, system reliability, system accessibility, system flexibility, and system integration, while Information quality indicators (indicators of the information system's output, such as

final reports) are addressed mainly from the perspective of the user and are therefore subjective, such as information accuracy, timeliness, completeness, reliability, conciseness, and relevance, for Information use indicators, such as reported vs. documented use, frequency of use, and extent of use, may only be regarded as valid if system use is voluntary, measures of user satisfaction (user perception of using an information system's output) are the most commonly used metrics for system success, primarily due to their validity and the availability of reliable methods like satisfaction surveys. Individual impact measurements are related to performance indicators like decision-making accuracy and job completion speed, while cost reduction, cost-effectiveness, and profitability are three indicators of organizational impact measures (Delone & Mclean, 1992).

Following the release of DeLone and McLean's original information system success model, several academics in the area have worked to define its expansion and re-definition or even criticized it as a whole. The model is deemed insufficient and needs to include more variables, according to the model's opponents, who also contend that there is superior IS success models. However, the supporters continue to uphold the validity of DeLone and McLean's model and assert that it may accurately gauge the effectiveness of IS (Al-Kofahi et al., n.d.).

The original IS success model was later revised by DeLone and McLean (2003). A decade or so after the original model was created, an upgraded version was developed that considers the original's positive and negative aspects. Due to criticism in earlier literature, DeLone and McLean's revised model was created in 2003 (Delone & Mclean, 2003). The two researchers revised the model by (1) adding the "service quality" dimension as a third dimension to the two original system characteristics, "system

quality" and "information quality; (2) changing the term "intention to use" to "use" as a measure for system usage; and (3) combining the "individual impact" and "organizational impact" variables into the "net benefits" variable. They also argue that the "net benefits" variable must be defined in the context of the system being studied and within the context of people who are evaluating the system effect since these variables significantly affect what constitutes net benefits and, consequently, IS success (Abdullah et al., 2018).

2.5 Related Work

Most studies of literature approved that ongoing assessment of the health information systems is crucial to guarantee its success and reaching the optimal objectives of the implementation. Furthermore, users' perception is critical since users react favorably to system features that fulfill task requirements (Jad & Zainol, 2023).The practitioner may benefit from user evaluations since they provide unbiased, in-depth information systems and services diagnostics (Subaeki et al., 2019).

The Delone and McLean Model has been used in several research to assess the effectiveness of HIS; success of HIS is measured using a combination of qualitative and quantitative factors; although some studies on assessing success are seen from the user's perspective, others are employed from the organizational standpoint (Subaeki et al., 2019). Various studies supported the DeLone and McLean model's validity for health information systems success (Ojo, 2017). Other researchers used the D&M paradigm to assess various types of information systems, such as hospital infection prevention and control (IPC), such assessments provide valuable insights into IPC information systems usage among clinicians from the perspectives of technology and organization,

investigation of effectiveness of the emergency response medical information system (ERMIS) also designed by DeLone and McLean Framework (Zheng et al., 2023; Petter & Fruhling, 2011).

D&M paradigm was applied in many settings and several nations; for instance, it was employed for the assessment of HIS in several developed countries with access to good resources, including the USA and France (Abdullah et al., 2018).Additionally, it was hired to assess health information systems in low-resource environments, such as Ethiopia (Tilahun & Fritz, 2015a). The approach was also used to determine HIS in nations with a West Bank-like culture and environment, including Kuwait, where the Picture Archiving and Communication System (PACS) was evaluated, and Saudi Arabia, where implementing a new electronic health record was met with physician satisfaction.

A study published in Ethiopia at 2023 of healthcare professionals' satisfaction toward the use of district health information system and its associated factors in southwest Ethiopia, self-administered questionnaire based on Delone and McLean information success model was used to assess the performance level of the system by identifying the satisfaction of end users. The study showed that overall user satisfaction of using the system was low. System quality, service quality has a direct positive effect on system use and user satisfaction. Additionally, system use and information quality had a direct positive effect on healthcare professionals' satisfaction with using the district health information system. The study recommended more specific user training and offering computer courses for improving use of the system (Walle et al., 2023a).

To evaluate the effectiveness of (EHRs), which are becoming more prevalent in the medical field facilities, a quantitative study titled "Relationship Between Information

System Success Model Dimensions and Electronic Health Records Use" was conducted in U.S (2022). This study used dimensions of Delone and McLean's framework, namely system, information, service qualities, user satisfaction, use, and net benefits, which are the dependent variables. This study's objectives were to assess the effectiveness of EHRs and identify ISSM indicators that affected net benefits. The findings showed a strong positive link between the dimensions. Information quality and user satisfaction were highly positive predictors of net benefits (Oshegbo, 2022).

In Australia a study conducted to assess the success of organizational EHR in routine use from the viewpoint of nursing staff in residential aged care, a questionnaire survey instrument was designed to measure variables in the Delone and Mclean model: system quality, information quality, service quality, use, user satisfaction and net benefits, the study tested the influences among variables: system quality, information quality, service quality and use to user satisfaction, which was supported that these variables are significant determinants of user satisfaction. net benefit was predicted by user satisfaction and use, with user satisfaction possessing 63% of direct effect, that supports the observation that user satisfaction is the best prediction of success (Yu & Qian, 2018).

Delone and Mclean Model was used in a study in Indonesia (2020) to assess the success of an information system at primary health facilities by assessing health providers' perception of Primary Care applications at primary health facilities in Malang, the model contains six dimensions which can assess the success of a system, Information Quality, System Quality, Service Quality, Use, User Satisfaction and Net Benefits. The results of this study indicate that primary care applications can be categorized as successful information systems for each dimension of the D&M Model. Additionally,

the study showed that there are significant relationships between dimensions of DM model except for the relationship between use and user satisfaction, the most significant influence is the effect of system quality on system use (Ariyanto et al., 2020).

A quantitative cross-sectional study conducted in Portugal (2023) to assess the success of Nursing Information Systems (NIS). DeLone and McLean Model of Information Systems Success" (1992; 2003) was used to evaluate the level of satisfaction of Nurses as users of NIS in Electronic Support in Health Centers Group (ACeS) Tâmega II – Vale do Sousa Sul, NIS user satisfaction questionnaire was constructed based on D&M model, results showed that nurses were moderately satisfied with the Nursing Information System used, nurses were less satisfied with dimensions of technical Support, training, and equipment. While dimensions related to architecture, language, decision support, and graphics, and information sharing were the dimensions in which nurses were most satisfied. It was also found that the higher the level of prior training with the NIS, the higher the level of satisfaction(Lourenço, 2023).

In a study that was published in Turkey, 2021 conducted at Usak Training and Research Hospital, the effectiveness of the hospital information management system was assessed in terms of healthcare professionals using the information systems success model created by DeLone and McLean, success of an information management system is measured using the following criteria: system quality, information quality, system use, user satisfaction, and the net benefit, the study showed that increasing the HIS system's system and information quality boosts user satisfaction and system use, and the enhanced user satisfaction helps create favorable opinions of healthcare professionals' voluntary usage of the system and the advantages they derive from it (Makalesi et al., 2021).

In a study at La Loma Luz Adventist Hospital, which was conducted sixteen years after the Hospital Information System was implemented in 2003, the researcher saw the importance of such research to assess the system's effectiveness since it was the first evaluation of the system it was supposed that the hospital will benefit from this research, it will give higher management and the IT department direct user input on how well the information system is working. The data obtained will aid the IT department in finding methods to enhance the system; Delone and McLean's framework is used to assess Information Quality, System Quality, Complementary Technology Quality, Service Quality, User Satisfaction, Use, and Perceived net benefit of the system. The research indicates a low positive attitude towards the system, with employees feeling it doesn't entirely help job tasks or enhance productivity. They acknowledge the genuine system but don't see it benefiting timesaving or performance management, possibly due to inadequate installation (Arana et al., 2019).

Delone and Mclean model was validated in a study entitled “Validating Delone and Mclean Success Model in Hospitals of United Arab Emirates” which evaluate the impact of three quality attributes (system quality, information quality, service quality) on patient satisfaction and system use of HIS in Al-Sharja public hospitals at 2023, a quantitative method was used by conducting a questionnaire based on Delone and Mclean model. The results indicate that patient satisfaction is significantly impacted by the quality criterion. Put another way, patients choose to use HIS because it satisfies their requirements for information quality (e.g., content correctness, completeness), system quality (e.g., user friendliness, navigation), and service quality (e.g., responsiveness, reliability). Notably, the success of any information system may be

determined by these qualities. Thus, in order to supply these attributes and win the users' acceptance, HIS needs to be implemented correctly(Jad & Zainol, 2023).

Many developing nations' health information systems are weak, fragmented, and frequently only concerned with disease-specific program areas. The implementation of HIS is still limited ,and the quality of data collected in low-income countries has been inaccurate, unreliable, and not timely (Tilahun & Fritz, 2015a). Furthermore, insufficient research has been conducted. In the West Bank to evaluate the success of accredited HIS in governmental hospitals, in addition, there are no previous studies that look at evaluation from the perspective of users (health care providers).

In Palestine, a study conducted in (2018) for assessment of electronic health records implementations in UNRWA clinics by Delone and Mclean paradigm for successful health information systems, the researcher evaluated the effectiveness of the e-health system by determining the perception of individuals who use it at seven UNRWA clinics, examining users' perceptions of the system's three main components—the system quality, information quality, and service quality—the study determined the features of e-health systems, and found that overall user satisfaction with the UNRWA clinics' e-health system was comparatively reasonable, while certain aspects of the system, particularly those related to its performance and service quality, require revision by policymakers (Abdullah et al., 2018).

2.6 Conceptual Framework

The conceptual framework of this research is derived from the DeLone and McLean Information Systems Success Model (D&M model), which was developed in 1992 and modified in 2003. This study is based on the modified model; the validity of the model

has been approved by many studies (Tilahun & Fritz, 2015a; Ojo, 2017). The model is used to categorize the different measures of success and found evidence that supports D&M model constructs of success.

The value of this model for our research can be seen in its ability to assist us in achieving our goals for the evaluation of the critical components of our information system (assessing the HIS success by measuring system quality, service quality, information quality, system use, user satisfaction, and net benefits). Figure 1 shows the updated D&M framework for information system success.

Based on this framework, the six dimensions are interrelated rather than independent (Delone & Mclean, 2003). Implementing a new information system includes various features quality (system, information, and service qualities) which could affect the use and user satisfaction. Subsequently, after utilizing the system and experiencing these characteristics, users decide whether or not to be satisfied with its information or services. Additionally, it is implied that some benefits designated as net benefits will come to pass due to usage and/or user satisfaction. These net benefits could consequently affect user satisfaction and continued system use (Ojo, 2017).

Independent variable: It is described as a variable which is constant and not affected by the others you are attempting to assess. It pertains to the aspect of an experiment that the researcher investigator methodically alters and modifies. It is the likely reason (Sullivan et al., 2008). The independent variables in this study are the variables of the HIS system itself (system quality, information quality, service quality) and system use. User satisfaction will be independent of perceived net benefit.

Dependent variable: the variable that is dependent upon other measurable variables. These variables are expected to change because of an experimental manipulation of the

independent variable or variables (Wiersema & Bowenz, 2009). The dependent variable in this study will be user satisfaction, which depends on the qualities of (system, information, service), and system use. (Perceived Net Benefits) is dependent on user satisfaction.

This study aims to measure the success of the existing HIS in governmental hospitals in West Bank from the users' point of view, use the system quality features as critical components impacting the success of the system, users' satisfaction, system use, and net benefits. This study's objective was achieved through the use of a quantitative methodology and a questionnaire survey that was modified from earlier research.

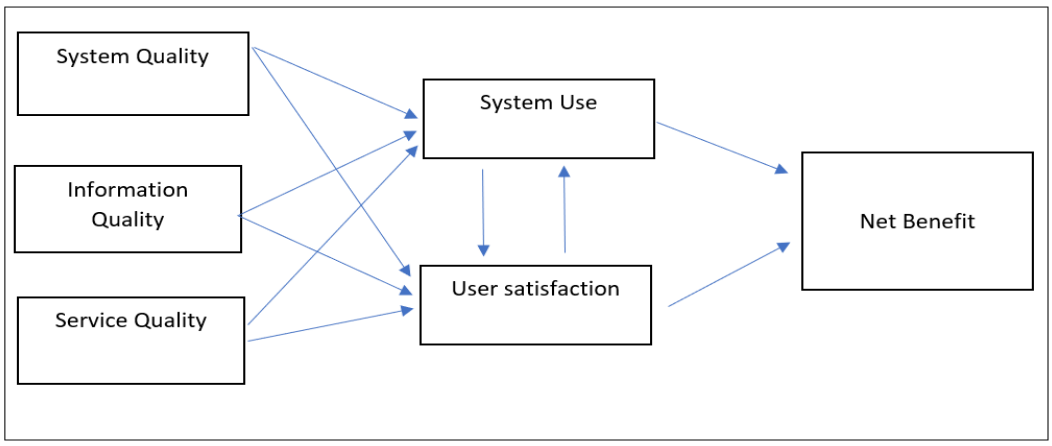

Figure 2.1. The Conceptual Framework of the Study

2.7 Summary

Health information systems must be periodically evaluated to recognize potential failures and make improvements and to guarantee that the objectives of their implementation are met. One of the popular models for assessing the successful application of health information systems is the DeLone and McLean Information Systems Success Model (D&M model), which offers classification metrics for health information systems success, it is applied in many settings and several nations; it was employed for assessment of HIS in several developed countries and low-resource

environments. In Palestine, an apparent lack of studies that evaluate HIS in governmental hospitals. Thus, this study is conducted. Additionally, there are several recommendations from previous studies to conduct such research that aims to implement an assessment of HIS from the perspective of health providers.

Chapter Three

Methodology

3.1 Introduction

This chapter provides details regarding the methodology of this research containing:

Study design, setting, population and sample, instrument, data collection, and analysis.

3.2 Study Design

A quantitative cross-sectional study was conducted using a self-administered questionnaire. More details on the study instrument and data collection are provided later in this chapter.

3.3 Study Setting

The study was conducted in the West Bank of Palestine in 2023. Researchers and data collectors visited health care providers (physicians, nurses, lab technicians, pharmacists, radiologists, midwives, and others) in their workplaces at Northern West Bank government hospitals, Jenin (Khalil Suliman hospital), in the Middle, Ramallah (Palestine Medical Complex), and the South, Beit Jala (Al Husein) hospital.

3.4 Population and Sample Size

Target population: Palestinian healthcare providers, which include (physicians, nurses, lab technicians, pharmacists, radiologists, midwives, and others (physiotherapists, occupational therapists, nutrition specialists, anesthesia specialists, and respiratory rehabilitation specialists) who use the HIS in governmental hospitals in West Bank. As specified by the ministry of Health, 1259 healthcare providers fulfilled the above

criteria in 2021 (target population); the needed sample size was 252 healthcare providers. The table below shows that the researcher takes the proportional numbers of the real numbers for each profession in the three governmental hospitals.

Table 3.1: Proportional Distribution of Human Resources Depending on Distribution of Human Resources in MoH Hospitals by Hospital and Profession, West Bank Palestine 2021.

Hospital	Physician		Pharmacist		Nurse		Midwife		Paramedical (Radiologist +others)		Lab technician		Population size	Sample size
Jenin (Khalil Suliman)	61	**12**	9	**2**	178	**36**	31	**6**	32	**6**	29	**6**	**340**	**68 (70)**
Palestine Medical Complex Ramallah (PMC)	125	**25**	8	**2**	335	**67**	26	**5**	58	**12**	41	**8**	**593**	**119 (120)**
Beit Jala (Al Husien)	89	**18**	6	**1**	155	**31**	18	**4**	35	**7**	23	**5**	**326**	**65**
													1259	**252**

3.5 Sampling Technique

Stratified simple random sample used simple random sample for each specialty (strata) of health care providers; the researcher and data collectors randomly visited each (strata) of health providers in their workplaces and made sure they fulfilled the inclusion criteria before enrolling them in this study.

3.6 Inclusion and Exclusion Criteria

- Inclusion criteria: Palestinian medical professionals who use HIS in the targeted governmental hospitals in the West Bank.

- Exclusion criteria: Administrative employees who use the HIS are excluded.

3.7 Data Collection Instrument

As the significant research instrument created especially for the study, the researcher had to gather primary data via a questionnaire, as it was distributed to a random survey sample consisting of (250) respondents from health care providers from governmental hospitals in West Bank. Our questionnaire build based on previous studies (Putri et al., 2022; DALLE et al., 2020;Yu & Qian, 2018; Business & Research, 2022; Emruli et al., n.d.; Abdullah et al., 2018; Urbach et al., n.d.;Ojo, 2017). used the Delone and Mclean Success Models for information systems success. It consists of two parts:

- Part 1: Demographics and background information: profession, age, gender, level of education, years of work experience, rate of computer proficiency, place of work (hospital), department of work, and position of either head of department or staff member.
- Part 2 consists of questions that evaluate health providers' opinions about the six parameters of the Delone and Mclean Success Model. System quality (consists of thirteen questions), information quality (seven questions), service quality (five questions), use (four questions), user satisfaction (five questions), and net benefit (eight questions). Each item is measured using a 5-point Likert scale ranging from "strongly agree (1)" to "strongly disagree (5)". The complete questionnaire is available in Appendix A

3.8 Questionnaire Validation and Reliability

The questionnaire is derived from validated questionnaires from several studies that use the framework of Delone and Mclean. However, the final version of the questionnaire was re-validated by five experts: Professor Mohammed Awad, Dean of Scientific Research AAUP, Professor of Computer Engineering/ Artificial Intelligence. Dr. Yousef Mimi, Ph.D. Head Department of Health Sciences, Faculty of Graduate Studies, AAUP. Dr. Shahnaz Najjar, Assistant Professor, Health Sciences Department Faculty of Graduate Studies, AAUP. Dr Mohamad Khleif is an assistant professor of the Faculty of Allied Medical Sciences, Palestine Ahliya University. Dr. Rami Hodrob, Arab American University.

3.9 Construct Validity:

The validity of the research instruments was confirmed by putting them in front of a team of highly qualified experts who provided feedback about the questionnaire's length, structure, and revisions, which was composed of 42 paragraphs divided into five fields. The correlation coefficient between the paragraphs and the total score for each item was calculated, as demonstrated in Table 3.1. The data in the table shows a high consistency between items and the total score of each construct. Additionally, the Pearson correlation was between (0.689 – 0.044) and was significant (0.00) for most items, which indicates internal validity.

Table 3.2: Pearson Correlation Coefficient and Statistical Construct Significance

Number	**Person**	**Sign**	**Number**	**Person**	**Sign**
1	.373**	.000	22	.490**	.000
2	.338**	.000	23	.406**	.000
3	.555**	.000	24	.525**	.000
4	.395**	.000	25	.562**	.000
5	.461**	.000	26	.591**	.000
6	.502**	.000	27	.689**	.000
7	.403**	.000	28	.481**	.000
8	.380**	.000	29	.610**	.000
9	.524**	.000	30	.678**	.000
10	.044	.491	31	.662**	.000
11	.477**	.000	32	.645**	.000
12	.378**	.000	33	.629**	.000
13	.482**	.000	34	.550**	.000
14	.594**	.000	35	.654**	.000
15	.606**	.000	36	.675**	.000
16	.390**	.000	37	.564**	.000
17	.516**	.000	38	.515**	.000
18	.575**	.000	39	.521**	.000
19	.592**	.000	40	.658**	.000
20	.639**	.000	41	.622**	.000
21	.525**	.000	42	.557**	.000

3.10 Construct's Reliability:

The researcher calculated the reliability using the internal consistency methodology and computed the Cronbach Alpha reliability equation, as shown in Table 3.2 below indicates that the value of the reliability of the questionnaire at the total score reached (87.3%) and the reliability of the questionnaire for IT employees at the total score reached (93.2%). Thus, the questionnaires have a high degree of reliability.

Table 3.3: Reliability Statics of the Instrument (N=250)

Variables	Cronbach's Alpha	No. of Items
System Quality	0.792	13
Information Quality	0.743	7
Service Quality	0.742	5
Use	0.729	4
User Satisfaction	0.820	5
Net Benefit	0.881	8
Total scale	0.932	42

3.11 Data Collection

The researcher distributed paper-based questionnaires in Jenin (Khalil Suliman Hospital) and in Ramallah (Palestine Medical Complex), the researcher distributed the questionnaire with five data collectors. While in Beit Jala (Al Husein) hospital, two data collectors helped distribute questionnaires. Data collectors were trained and educated about each question in the questionnaire and the study's objective. We were not provided with a list of names of health providers, data collectors randomly visited them

in their workplaces from various specialties (physicians, nurses, lab technicians, pharmacists, radiologists, midwives, and others). Three hundred questionnaires were distributed, 250 were fully fulfilled, and every questionnaire had a serial number from 1 to 250. Data collection was completed over two and a half months, from June 1st to August,15,2023.

3.12 Statistical Analysis

Data were analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 25.

1. Descriptive analysis of all the questionnaire items was performed where the Percentages, Frequencies, and Arithmetic Averages: This command is mainly used to know the frequency of the categories of an item; it is helpful to the researcher in describing the study sample.
2. Pearson Correlation Coefficient to measure the degree of correlation: This test is based on studying the relationship between two variables, and the researcher used it to calculate the internal consistency and the structural validity of the questionnaire.
3. Cronbach's Alpha test to determine the stability of the resolution items.
4. Linear regression analysis is used to find out if there is a relationship, effect, and statistical significance between the dependent and independent variables.
5. Relying on the Likert fifth scale in data analysis.

3.13 Ethical Consideration

The researcher obtained permission to conduct this research from the American Arab University, the institutional review board. See Appendix E. The Palestinian Ministry of

Health approval. See Appendix D. A consent form was attached to each questionnaire. Participants were informed that participation was optional, they had the right not to answer any question, and that the collected data would be used with high confidentiality and only for the stated research purposes. See Appendix A

3.14 Summary

This chapter presents the methodology of this study. It included the study design, setting, population, and sample size. It also presented the data collection instrument, data collection methods, and analysis, as well as critical ethical considerations. The next chapter provides a presentation of the results obtained.

Chapter Four

Results

4.1 Introduction

The data analysis is the topic of this chapter. Statistical methods allow the researcher to analyze, interpret, and conclude after converting the data into useful information that can be used to answer the study questions. Data analysis methods depend on the type of study, data collection methods, and research questions to be answered. In this chapter, the researcher analyzes, schedules, and interprets the data collected to get results.

4.2 Response Rate

The study sample consists of Palestinian healthcare providers in 3 governmental hospitals in the West Bank in Palestine. Three hundred questionnaires were distributed, 250 were fully fulfilled, so the response rate is 83.33%.

4.3 Sociodemographic Characteristics of the Participants

A total of 250 responses were collected. Table (4.1) illustrates the characteristics of participants according to the demographic distribution. (56.4%, n=141) of the responders were females, while (43.6%, n=109) were male. The age groups of the participants are grouped into four segments: 20-29 years (39.2%), 30-39 years (40.8%), 40-49 years (12.0%), and 50 years and above (8.0%), the highest proportion was in the age range 30-39 (40.8%). Various professions of the respondents fulfill the questionnaire, including physicians (21.6%), nurses (43.6%), lab technicians (9.6%), pharmacists (4.4%), radiologists (6.4%), midwives (4.4%), and others (10.0%), which means that more than half of respondents were physicians and nurses. The participants'

years of professional experience are classified into four groups: less than five years (31.2%), 5-10 years (28.8%), 11-15 years (19.6%), and more than 15 years (20.4%). (64.4%, n=161) rated their computer proficiency as average, and (35.6%, n=89) had an advanced rate. The majority of the participants have a bachelor's degree (68.0%, n=170), and (76.8%, n=192) work in the inpatient department; majority of respondents are staff members (84.8%, n=212). This column identifies the hospitals where the respondents work, which included respondents from Palestine Medical Complex Ramallah (43.2%, n=108), (29.2%, n=73) from Beit Jala (Al Husein) Hospital, while (27.6%, n=69) of them from Jenin (Khalil Suliman) Hospital.

Table 4.1: The Characteristics of Respondents Based on the Demographic Distribution.

Variable		**Frequency**	**Percent**
Profession	Physician	54	21.6%
	Nurse	109	43.6%
	Lab technician	24	9.6%
	Pharmacist	11	4.4%
	Radiologist	16	6.4%
	Midwife	11	4.4%
	Others	25	10.0%
Gender	Male	109	43.6%
	Female	141	56.4%
Age	20-29	98	39.2%
	30-39	102	40.8%
	40-49	30	12.0%
	+50	20	8.0%

Variable	Frequency	Percent	Variable
Level of education	Diploma or (undergraduate)	19	7.6%
	Bachelor's Degree	170	68.0%
	Master's Degree/post-grad diploma	47	18.8%
	Ph.D	14	5.6%
Years of experience	Less than five years	78	31.2%
	5-10 years	72	28.8%
	11-15 years	49	19.6%
	More than 15 years	51	20.4%
How would you rate your computer proficiency	None	0	0.0%
	Average	161	64.4%
	Advanced	89	35.6%
Where is your work (hospital)?	Jenin (Khalil Suliman)	69	27.6%
	Palestine Medical Complex Ramallah	108	43.2%
	Beit Jala (Al Husein)	73	29.2%
Department of work	Inpatient	192	76.8%
	Outpatient	23	9.2%
	Both	35	14.0%
Position	In charge/ head of department	38	15.2%
	Staff member	212	84.8%

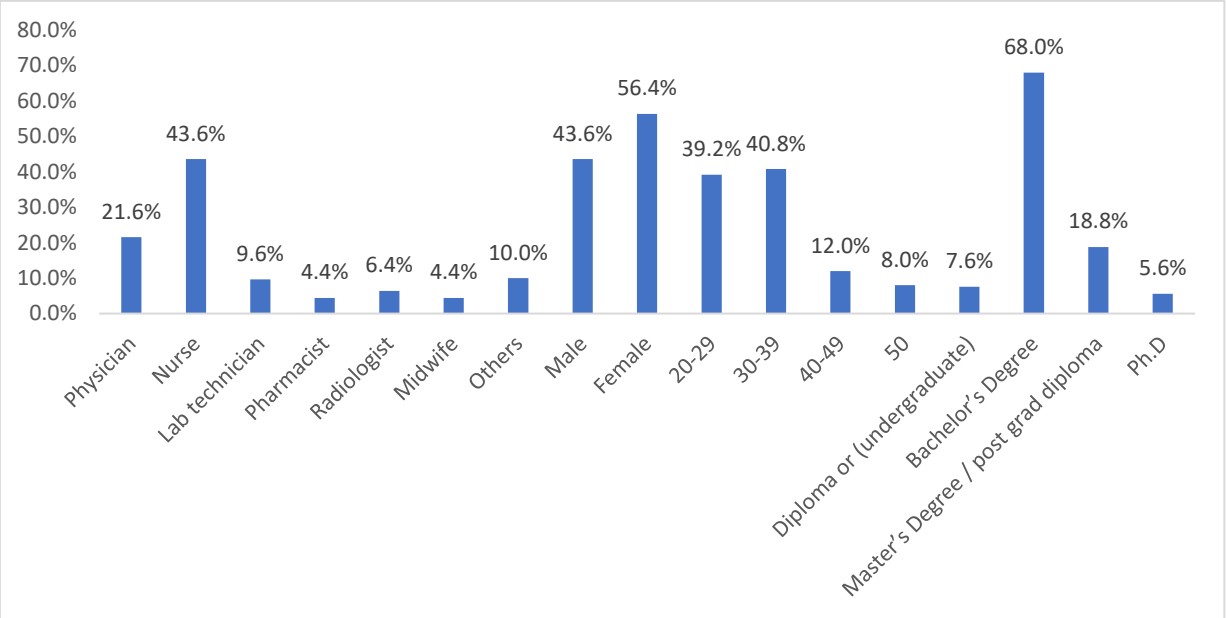

Figure 4.1: The Characteristics of Respondents Based on the Demographic Distribution.

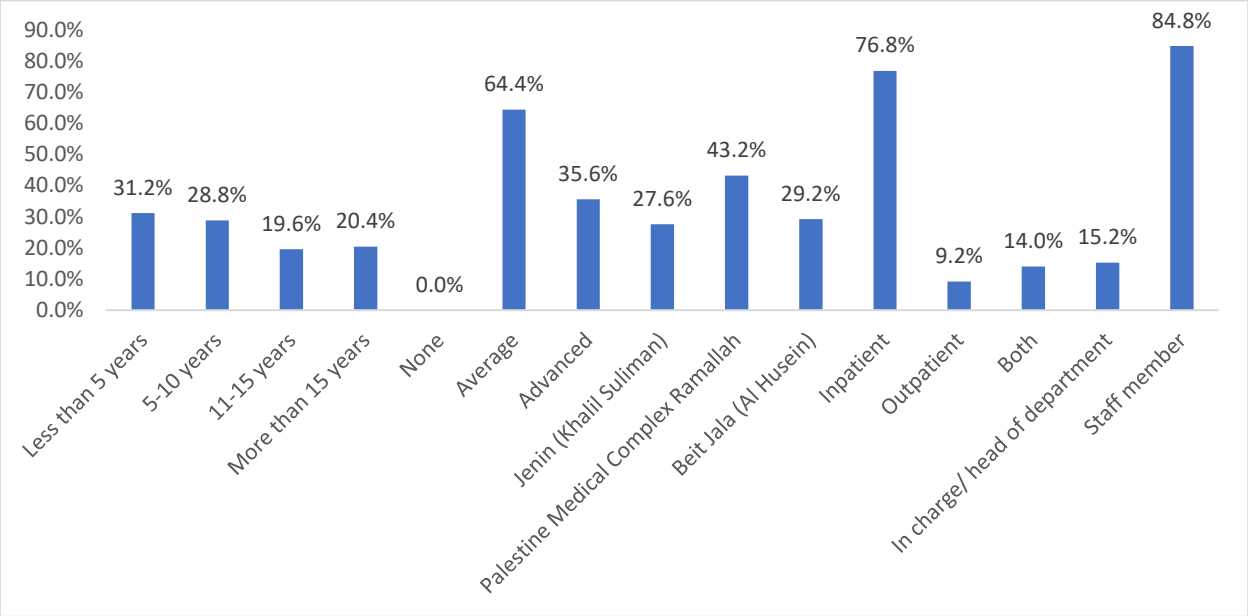

Figure 4.2: The Characteristics of Respondents Based on the Demographic Distribution.

4.4 Associations of Delone and McLean Model Components and Socio-Demographic Characteristics

The table (4.2) shows the p-values associated with each sociodemographic variable, it found that only Gender has a p-value = 0.020. Males have significantly higher mean scores than females. While the other variable (Profession, Age, Level of Education, Years of Experience, Department of Work, Computer Proficiency, Hospital Location, Position) were non-Significant Associations. There are no significant differences in the mean scores of the Delone and McLean model components across various sociodemographic characteristics of healthcare professionals and hospitals except for gender variable.

Table 4.2: The Associations of Delone and Mclean Model Components with Sociodemographic Characteristics of Healthcare Professionals, and Hospitals.

Variable		**Mean**	**Standard Deviation**	**P-value**
Profession	Physician	3.49	0.63	0.064
	Nurse	3.68	0.47	
	Lab technician	3.48	0.39	
	Pharmacist	3.35	0.53	
	Radiologist	3.74	0.30	
	Midwife	3.67	0.41	
	Others	3.65	0.31	
Gender	Male	3.69	0.48	0.020
	Female	3.54	0.49	
Age	20-29	3.54	0.50	0.341
	30-39	3.67	0.45	
	40-49	3.60	0.54	
	+50	3.63	0.52	

Variable	Mean	Standard Deviation	P-value	Variable
Level of education	Diploma or (undergraduate)	3.71	0.31	0.149
	Bachelor's Degree	3.63	0.51	
	Master's Degree/post-grad diploma	3.47	0.47	
	Ph.D	3.59	0.46	
Years of experience	Less than five years	3.54	0.54	0.198
	5-10 years	3.59	0.47	
	11-15 years	3.72	0.39	
	More than 15 years	3.63	0.52	
How would you rate your computer proficiency	None			0.139
	Average	3.57	0.48	
	Advanced	3.67	0.50	
Where is your work (hospital)?	Jenin (Khalil Suliman)	3.70	0.45	0.185
	Palestine Medical Complex Ramallah	3.56	0.52	
	Beit Jala (Al Husein)	3.58	0.48	
Department of work	Inpatient	3.60	0.50	0.834
	Outpatient	3.63	0.37	
	Both	3.64	0.50	
Position	In charge/ head of department	3.59	0.50	0.789
	Staff member	3.61	0.49	

The One-Way ANOVA & Independent T Tests is significant at the .05 level.

4.5 Descriptive Statistics of the Second Part of the Questionnaire

Five ranks of the Likert Scale for answers strongly agree (5 points), agree (4 points), neutral (3 points), disagree (2 points), strongly disagree (1 point)), and the scores were calculated for the arithmetic averages as follows:

Table 4.3: The Levels of Respondents' Answers to the Questionnaire Questions Based on the Mean.

Degree	The arithmetic mean range
Very high	4.21 -5.00
High	3.41- 4.20
Medium	2.61 – 3.40
low	1.81 - 2.60
Very low	1.00 - 1.80

4.5.1 First Field (System Quality)

For System Quality, the mean scores and standard deviations were computed for all variables (questions) to evaluate the health information system success by health providers. Data from table (4.2) showed that there was a high degree of (System Quality) according to respondents' point of view, where the total degree was (3.51) with (70.2%) acceptance, the highest answer came in favor of statement number (2), which stated that (The HIS system is easy to learn) with a high degree of acceptance (mean=4.16) that represented (83.1%). In contrast, the lowest answer came in favor of statement number (4), which stated that (The response time from the HIS system is acceptable), with a medium degree of acceptance (mean=2.66) that represented (53.3%), it is evident that statement number (6) (The availability of the HIS system is continuous)

scoring a medium degree of acceptance (mean=2.86) that represented 57.3%. More than half of the respondents have a medium acceptance of integrating HIS with other systems, using new technologies updated of HIS, production of registered errors, and overall satisfaction with the HIS development process.

Table 4.4: Means, Standard Deviations, Percentages, and Respondents' Scale Toward the Field (System Quality).

No.	Statement	Mean	StD	Percentage	Scale
1.	A.1 The HIS system is easy to use.	4.11	0.69	82.2	High
2.	A.2 The HIS system is easy to learn.	4.16	0.63	83.1	High
3.	A.3 The HIS system is reliable in its performance.	3.82	0.83	76.5	High
4.	A.4 The response time from the HIS system is acceptable.	2.66	1.20	53.3	Medium
5.	A.5 The HIS system adequately provides for the privacy and security of patients' information.	3.75	1.01	75.0	High
6.	A.6 The availability of the HIS system is continuous.	2.86	1.19	57.3	Medium
7.	A.7 The HIS system is integrated with other health systems (automated database sharing with other HIS systems, transfer of data to other HIS systems (	3.23	1.05	64.6	Medium

No.	Statement	Mean	StD	Percentage	Scale
8.	A.8 The HIS system supports the decision support system features CDSS. (Provides timely information, usually at the point of care, to help inform decisions about a patient's care. CDSS tools and systems help clinical teams by taking over some routine task	3.41	0.91	68.3	High
9.	A.9 I use the new technologies of the updated HIS system.	3.37	0.94	67.4	Medium
10.	A.10 The HIS system produces registered errors.	3.33	0.96	66.6	Medium
11.	A.11 The HIS is flexible to interact with.	3.71	0.88	74.2	High
12.	A.12 Learning and training to use the HIS system were easy.	4.03	0.77	80.6	High
13.	A.13 I am satisfied with the HIS system development process.	3.21	1.28	64.2	Medium
The total of the System Quality field		3.51	0.52	70.2	High

4.5.2 Second Field (Information Quality)

For Information Quality, the mean scores and standard deviations were computed for all variables (questions to evaluate the health information system success by health providers). Data from table (4.3) represented that there was a high degree of (Information Quality) according to respondents' point of view, where the total degree

was (3.82) with (76.3%) acceptance, the highest answer came in favor of statement number (3), which stated that (The information from the HIS system is presented in a helpful format) with a high degree of acceptance (mean=3.97) that represented (79.4%). In contrast, the lowest answer came in favor of statement number (7), which stated that (The HIS system generates information on time) (mean=3.45) that represented (69.0%).

Table 4.5: Means, Standard Deviations, Percentages, And Respondents' Scale Toward The Field (Information Quality).

No.	Statement	Mean	StD	Percentage	Scale
1.	B.1 The information I get from the HIS system is accurate.	3.95	0.78	79.0	High
2.	B.2 The information from the HIS system is available when I need it.	3.86	0.83	77.3	High
3.	B.3 The information from the HIS system is presented in a helpful format.	3.97	1.92	79.4	High
4.	B.4 I can easily retrieve the information I need from the HIS system.	3.78	0.86	75.7	High
5.	B.5 The information from the system allows me to make patient care decisions and recommendations more quickly.	3.81	0.79	76.2	High
6.	B.6 I trust the information output of the HIS system.	3.88	0.74	77.7	High
7.	B.7 The HIS system generates information on time.	3.45	1.07	69.0	High
The total of the Information Quality field		**3.82**	**0.67**	**76.3**	**High**

4.5.3 Third Field (Service Quality)

For Service Quality, the mean scores and standard deviations were computed for all variables (questions to evaluate the health information system success of health

providers. The data of Table (4.4) showed that there was a medium degree of (Service Quality) according to respondents' point of view, where the total degree was (3.22) with (64.5%) acceptance. The highest answer came in favor of statement number (3), which stated that (I have access to ongoing training on HIS) with a high degree of acceptance (mean=3.75) that represented (75.0%), while the lowest answer came in favor of statement number (2), which stated that (The overall infrastructure in place is adequate to support the HIS system. (As internet connection, computers, the system cut off), with a low degree of acceptance (mean=2.58) that represented (51.6%). Medium degree of acceptance (mean=2.98) that represented (59.5%) of adequate support from the HIS system's providers. Overall support services on HIS received from the IS department and IT support scored a medium acceptance (mean 3.28) (65.6%).

Table 4.6: Means, Standard Deviations, Percentages, and Respondents' Scale Toward the Field (Service Quality).

No.	Statement	Mean	StD	Percentage	Scale
1.	C.1 There is adequate technical support from the HIS system's provider.	2.98	1.11	59.5	Medium
2.	C.2 The overall infrastructure is adequate to support the HIS system. (As internet connection, computers, system cut off)	2.58	1.21	51.6	Low
3.	C.3 I have access to ongoing training on HIS	3.75	1.06	75.0	High

No.	Statement	Mean	StD	Percentage	Scale
4.	C.4 The training I received was relevant to how I should use the HIS system.	3.53	0.99	70.6	High
5.	C.5 Overall, the support services on the HIS that I receive from the IS department and IT support personnel, such as training, hotline, or helpdesk, meet my needs.	3.28	1.04	65.6	Medium
The total of the Service Quality field		**3.22**	**0.76**	**64.5**	**Medium**

4.5.4 Fourth Field (System Use)

For the field of (System Use), the mean scores and standard deviations were computed for all variables (questions to evaluate the health information system success by health providers. The data of Table (4.5) showed that there was a high degree of (System Use) according to respondents' point of view, where the total degree was (3.85) with (77.0%) acceptance. The highest answer came in favor of statement number (4) which stated that (I find the HIS valuable system in my job) with a high degree of acceptance (mean=4.15) that represented (83.0%). In contrast, the lowest answer came in favor of statement number (1), which stated that (Using the HIS system enables me to accomplish tasks more quickly), with a high degree of acceptance (mean=3.51) that represented (70.2%).

Table 4.7: Means, Standard Deviations, Percentages, and Respondents' Scale Toward the Field (Use).

No.	Statement	Mean	StD	Percentage	Scale
1.	D. 1 Using the HIS system enables me to accomplish tasks more quickly.	3.51	1.07	70.2	High
2.	D.2 Using the HIS system has improved my job performance.	3.72	0.83	74.5	High
3.	D.3 My knowledge and skills in using technology are suitable for the HIS system.	4.02	0.74	80.3	High
4.	D.4 I find the HIS valuable system in my job.	4.15	0.71	83.0	High
The total of the Use field		**3.85**	**0.63**	**77.0**	**High**

4.5.5 Fifth Field (User Satisfaction)

For User Satisfaction, the mean scores and standard deviations were computed for all variables (questions to evaluate the health information system success of health providers. The data of Table (4.6) showed that there was a high degree of (User Satisfaction) according to respondents' point of view, where the total degree was (3.54) with (70.9%) acceptance. The highest answer came in favor of statement number (4) which stated that (The HIS system helps to improve workflow /makes the job easier) with a high degree of acceptance (mean=3.79) that represented (75.8%), while the lowest answer came in favor of statement number (5), which stated that (I am satisfied

with the hardware used for the HIS system), with a medium degree of acceptance (mean=3.02) that represented (60.3%).

Table 4.8: Means, Standard Deviations, Percentages, and Respondents' Scale Toward the Field (User Satisfaction).

No.	Statement	Mean	StD	Percentage	Scale
1.	E.1 I am generally satisfied using the HIS.	3.54	1.05	70.9	High
2.	E.2 I am satisfied with the functions of the HIS system.	3.59	0.94	71.8	High
3.	E.3 The HIS system has eased work processes.	3.78	0.95	75.6	High
4.	E.4 The HIS system helps to improve workflow /makes the job easier.	3.79	0.93	75.8	High
5.	E.5 I am satisfied with the hardware used for the HIS system.	3.02	1.15	60.3	Medium
The total of the User Satisfaction field		**3.54**	**0.77**	**70.9**	**High**

4.5.6 Sixth field (Net Benefit)

For Net Benefit, the mean scores and standard deviations were computed for all variables (questions to assess the health information system success by health providers. The data of Table (4.7) showed that there was a high degree of (Net Benefit) according to respondents' point of view, where the total degree was (3.76) with (75.2%) acceptance. The highest answer came in favor of statement number (4), which stated that (The HIS system helps overcome the limitations of a paper-based system) with a high degree of acceptance (mean=3.91) that represented (78.2%). In contrast, the lowest answer came in favor of statement number (3), which stated that (The HIS system

reduced medical errors), with a high degree of acceptance (mean=3.58) that represented (71.6%).

Table 4.9: Means, Standard Deviations, Percentages, and Respondents' Scale Toward the field (Net Benefit).

No.	Statement	Mean	StD	Percentage	Scale
1.	F.1 The HIS system increases work productivity.	3.60	0.92	72.0	High
2.	F.2 The HIS system improves the quality of care for patients.	3.77	0.86	75.4	High
3.	F.3 The HIS system reduced medical errors.	3.58	0.88	71.6	High
4.	F.4 The HIS system helps overcome the limitations of a paper-based system.	3.91	0.77	78.2	High
5.	F.5 The HIS system enhances communication among workers.	3.84	0.84	76.8	High
6.	F.6 The HIS system improved clinical management (diagnosis and treatment).	3.79	0.89	75.8	High
7.	F.7 The HIS system facilitated the development of a care plan.	3.80	0.82	76.0	High
8.	F.8 The HIS system causes improvement in decision-making.	3.80	0.87	76.1	High
The total of the Net Benefit field		**3.76**	**0.63**	**75.2**	**High**

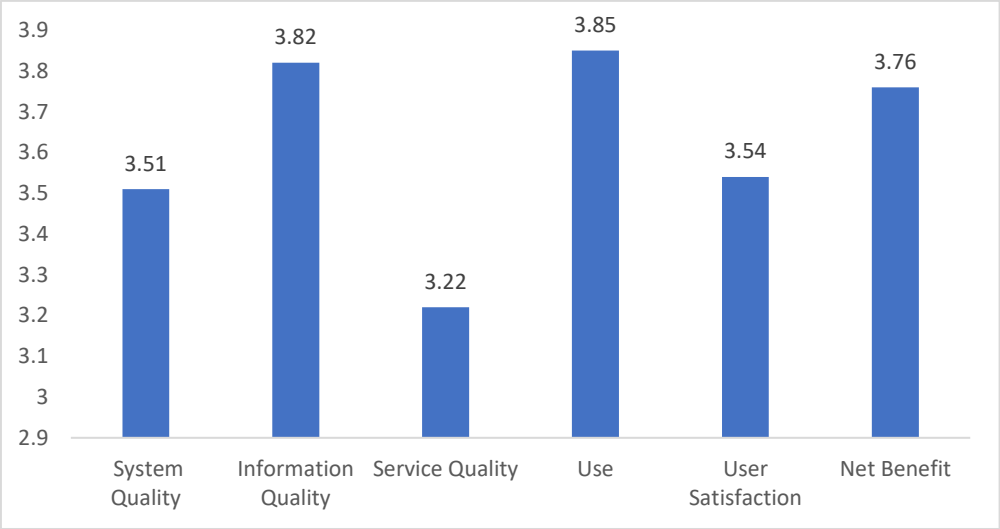

Figure 4.3: The Total Means of Assessed Variables of Study.

4.6 Testing Hypothesis

4.6.1 Relationship between User Satisfaction and System Quality

H1. System quality positively affects users' satisfaction in West Bank governmental hospitals.

Regression

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	System Quality	.	Enter

a. Dependent Variable: User Satisfaction

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.554[a]	.307	.304	.63941

a. Predictors: (Constant), System Quality

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.943	1	44.943	109.928	.000[b]
	Residual	101.393	248	.409		
	Total	146.336	249			

a. Dependent Variable: User Satisfaction

b. Predictors: (Constant), System Quality

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.659	.278		2.371	.019
	System Quality	.821	.078	.554	10.485	.000

a. Dependent Variable: User Satisfaction

The above model summary shows that the overall regression model is significant at the 0.05 level with an F-value of 109.928. This means that the System Quality explains the variation in User Satisfaction. The R-square value of 0.307 indicates that the System Quality explains nearly 31.7% of their User Satisfaction.

The positive coefficient signs for System Quality means that the System Quality positively impacts User Satisfaction.

The result: we can say, "System Quality has a significant impact on User Satisfaction at the level ≤0.05.

4.6.2 Relationship between User Satisfaction and Information Quality

H2. Information quality positively affects users' satisfaction in West Bank governmental hospitals.

Regression

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Information Quality	.	Enter

a. Dependent Variable: User Satisfaction

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.546[a]	.298	.295	.64376

a. Predictors: (Constant), Information Quality

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	43.559	1	43.559	105.107	.000[b]
	Residual	102.777	248	.414		
	Total	146.336	249			

a. Dependent Variable: User Satisfaction

b. Predictors: (Constant), Information Quality

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.174	.235		5.001	.000
	Information Quality	.621	.061	.546	10.252	.000

a. Dependent Variable: User Satisfaction

The above model summary shows that the overall regression model is significant at the 0.05 level with an F-value of 105.107. This means that the Information Quality explains the variation in User Satisfaction. The R-square value of 0.298 indicates that the Information Quality explains nearly 29.8% of their User Satisfaction.

The positive coefficient signs for Information Quality means that the Information Quality positively impacts User Satisfaction.

The result: we can say, "There is a significant impact of Information Quality on User Satisfaction at the level ≤0.05.

4.6.3 Relationship between User Satisfaction and Service Quality

H3. Service quality positively affects user satisfaction in West Bank governmental hospitals.

Regression

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Service Quality	.	Enter

a. Dependent Variable: User Satisfaction

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.441[a]	.195	.192	.68931

a. Predictors: (Constant), Service Quality

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.500	1	28.500	59.980	.000[b]
	Residual	117.836	248	.475		
	Total	146.336	249			

a. Dependent Variable: User Satisfaction

b. Predictors: (Constant), Service Quality

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.105	.191		11.032	.000
	Service Quality	.446	.058	.441	7.745	.000

a. Dependent Variable: User Satisfaction

b. Predictors: (Constant), Service Quality

The above model summary shows that the overall regression model is significant at the 0.05 level with an F-value of 59.980. This means that Service Quality explains the variation in User Satisfaction. The R-square value of 0.195 indicates that Service Quality explains nearly 19.5% of their User Satisfaction. The positive coefficient signs for Service Quality means that the Service Quality positively impacts User Satisfaction.

The result: we can say, "There is a significant impact of Service Quality on User Satisfaction at the level ≤0.05.

4.6.4 Relationship between User Satisfaction and System Use

H4. System use positively affects user satisfaction in West Bank governmental hospitals.

Regression

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Use[b]	.	Enter

a. Dependent Variable: User Satisfaction

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.594[a]	.353	.350	.61807

a. Predictors: (Constant), Use

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.597	1	51.597	135.068	.000[b]
	Residual	94.739	248	.382		
	Total	146.336	249			

a. Dependent Variable: User Satisfaction

b. Predictors: (Constant), Use

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.754	.243		3.100	.002
	Use	.725	.062	.594	11.622	.000

a. Dependent Variable: User Satisfaction

The above model summary shows that the overall regression model is significant at the 0.05 level with an F-value of 135.068. This means that the system explains the variation in user satisfaction. The R-square value of 0.353 indicates that the system use explains nearly 35.3% of their User Satisfaction. The positive coefficient signs for system use mean that the system use positively impacts User Satisfaction.

The Result: we can say, "There is a significant impact of system use on User Satisfaction at the level ≤0.05.

4.6.5 Relationship between User Satisfaction and Perceived Net Benefit of HIS.

H5. User satisfaction positively affects the perceived net benefit of HIS in West Bank governmental hospitals.

Regression

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	User Satisfaction	.	Enter

a. Dependent Variable: Net Benefit

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.680[a]	.462	.460	.46607

a. Predictors: (Constant) User Satisfaction

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.250	1	46.250	212.918	.000[b]
	Residual	53.870	248	.217		
	Total	100.120	249			

a. Dependent Variable: Net Benefit

b. Predictors: (Constant) User Satisfaction

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.770	.140		12.668	.000
	User Satisfaction	.562	.039	.680	14.592	.000

a. Dependent Variable: Net Benefit

The above model summary shows that the overall regression model is significant at the 0.05 level with an F-value of 212.918. This means that they explain the variation in Net Benefits. The R-square value of 0.462indicates that User Satisfaction explains nearly 46.2% of their Net Benefit. The positive coefficient signs for User Satisfaction means that User Satisfaction positively impacts the Net Benefit.

The result: we can say, "User Satisfaction has a significant impact on the Net Benefit at the level ≤0.05.

4.7 Summary

This chapter provided an overview of the sociodemographic characteristics of the participants. It also presented descriptive statistics of the items that were assessed and the results of hypothesis testing where all hypotheses were confirmed. These results will be discussed in the coming part of the study.

Chapter Five

Discussion & Conclusion

5.1 Introduction

This chapter discusses the study's results in terms of causes and the proximity of these results to previous international studies. Also, this chapter presents the conclusion, recommendations, strength of the study, limitations, and future studies.

5.2 Reflection on the Highlights of the Descriptive Findings of this Study

The study aims to assess the success of health information systems in West Bank governmental hospitals by identifying the perception of health providers, depending on DeLone and McLean's model for information system success. Healthcare providers who currently use the health information system were included. It revealed that there is a high degree of (System Quality) according to respondents' point of view, where the total degree was (3.51) with (70.2%) acceptance, which is consistent with a study that assessed the factors affecting health management information systems in Malaysia (MUSA, 2023). A study in Iran showed the same results (Ebnehoseini et al., 2019).Despite that the general evaluation is high for system quality, some items have medium quality; the users evaluate their acceptance of the response time of the HIS with medium (53.3%) acceptance when they were asked about the availability of the HIS system, if it is continuous or not, they scoring a medium degree of acceptance and that represented 57.3% of acceptance. More than half of the respondents have a medium acceptance of integration of HIS with other systems, using new technologies updated of HIS, and overall satisfaction with the development process of the HIS; the reason for this evaluation could be the lack of development process in the HIS, and the knowledge

for users that there is no integration between HIS and other systems, in addition to the absence of new technologies that added to the system. On the other side, the system scores a high degree of ease of use by the health providers; a study in Greece revealed this result (Aggelidis & Chatzoglou, 2012). This scored fairly well in a study that assessed the HIS in Indonesia (Cucus & Halim, 2019). That means the HIS in our research is user-friendly.

Respondents assessed the information quality of the HIS with a high degree of quality; the grand total degree was (3.82) with (76.3%) acceptance, and the highest degree of acceptance was recorded for the item asking about the presentation of information in a valid format, it represented (79.4%) of a high degree of acceptance. In comparison, generation of information on time represented the lowest degree of acceptance that represented (69.0%) of acceptance with high degree of quality. These results are consistent with a study (MUSA, 2023) and oppose results in a study (Cucus & Halim, 2019) that evaluates the accuracy, format, and timeliness of the HIS information with a quite good. For Service Quality, there was a medium degree of (Service Quality) according to the respondents' point of view, users have a high degree of acceptance for ongoing training on HIS; in a study in Greece users evaluated the training with a medium score, while results of the same survey revealed our results for supporting system from system providers that scored medium degree (Aggelidis & Chatzoglou, 2012). while low acceptance came in favor of overall infrastructure to support the HIS system, like internet connection, computers, system cut-off, Medium degree of acceptance for adequate support from the HIS system's providers, and the overall support services on HIS that received from IS department and IT support score a medium acceptance, these results are consistent with results of a study in Hospital

Information Systems (HIS) Acceptance and Satisfaction of a Tertiary Care Hospital in Saudi Arabia (Khalifa & Alswailem, 2015).

The most significant measure of sustainability for the entire company was user satisfaction with information systems. This might be explained by the fact that contented workers are more inclined to take part in company events and adhere to best practices for organizational sustainability. This is true for the systems we use daily as well as for our workplace (Almuqrin et al., 2023). Results on overall satisfaction showed that there was a high degree of (User Satisfaction) according to respondents' point of view, testing user Satisfaction of end-user Computing Satisfaction. The user satisfaction was reasonable (Cucus & Halim, 2019), and that was consistent with this study. Among the attributes of satisfaction, "The HIS system helps to improve workflow /makes the job easier" and "satisfaction with hardware used for the HIS system" gained the highest and lowest scores, respectively. Therefore, it can be claimed that the system under research suffers from some limitations and drawbacks in the hardware used, consistent with the results of a study in Isfahan, Iran (Saghaeiannejad-Isfahani et al., 2014).

Health providers evaluate the net benefit of the system with a high score, where the total degree was (3.76) with (75.2%) acceptance (Ebnehoseini et al., 2019). The highest answer came in favor of the statement which stated that (The HIS system helps overcome the limitations of a paper-based system) with a high degree of acceptance (mean=3.91) that represented (78.2%), which reflects the awareness of health providers with importance of information systems, about 40% of users have work experience of more than ten years that means that they may work in paper-base period, and they aware of the importance of the HIS. The system improves the quality of care for patients that

don’t match results in a study in Saudi Arabia (Khalifa & Alswailem, 2015). The lowest answer came in favor of reducing medical errors, which should have a higher score since its sensitivity and importance.

5.3 Correlations between User Satisfaction and Other Delone and McLean Framework

This study examined the effects of three system qualities (System Quality, Information Quality, and Service Quality) on user satisfaction. It was found that all three quality factors had a positive and significant influence on User Satisfaction and that User Satisfaction strongly influenced Net Benefits. The findings support DeLone and McLean's study (2003) and are consistent with the results of several studies (Zheng et al., 2023; Bahari & Mahmud, 2018;Ngurah et al., 2022b). Total user satisfaction with health information systems and general information systems would increase with the adoption of improvements and developments in information systems (Sebetci, 2018). System quality had a significant direct effect on the HIS and healthcare professionals' satisfaction with using this system. This suggests that increased system quality should result in greater user satisfaction and beneficial impact on personal productivity, results of a study in a significant Saudi Government hospital, and Wuhan, China, and Indonesia were consistent with this result (Alharthi et al., 2014;Ahmad et al., 2023; Iskandar & Amriani, 2021).

A higher information system quality means higher user satisfaction, which is tested and is significant in this study, and the result was consistent with the studies done in Canada and Indonesia (McGinn et al., 2011; Widiastuti et al., 2019). Assessing the hospital information system user’s satisfaction in Brazil (Nunes & Javier, 2014). This revealed that

decision-makers should, therefore emphasize the following factors when implementing the district health information system: making enough and accurate information available when it is needed, quickly retrieving the information from the HIS, generating information on time and presented in a helpful format. A study in Bahrain showed that the most influential factors affecting user satisfaction with EHR are service quality and technical support (Ebrahim Abdulla et al., 2019). Other studies (Betty Yel et al., 2020;J. M. Palm et al., 2006) showed a significant relationship between service quality and user satisfaction, consistent with this study.

Since service quality scores the lowest degree of acceptance (Medium acceptance), and it has a significant positive relationship with user satisfaction, adequate technical support from the HIS system's providers should be improved, and the overall infrastructure in place is sufficient to support the HIS system. (As internet connection, computers, system cut off), and the support services on the HIS that I receive from the IS department and IT support personnel must be reviewed.

Although all three qualities are all significantly positively related to User Satisfaction, the value of the Beta coefficient shows that System Quality has the most potent effect on User Satisfaction (B =0.554), where the weakest effect on User Satisfaction among healthcare professionals in governmental hospitals in West Bank is Service Quality effect (B =0.441), that is consistent with a study in Bahrain that assess the Success of Hospital Information System across Multispecialty Hospitals in Bahrain (Al-Hashimi et al., 2018). User satisfaction is affected by system use. Studies in Ethiopia, Tanzania, and Iran revealed that system use influences user satisfaction (Walle et al., 2023; Ayebazibwe et al., 2019; Ranandeh-Kalankesh et al., 2017). The relationship between user satisfaction and net benefits has a positive result with a strong level of influence.

The same results were obtained in a study in Yemen that evaluated electronic medical records by using the Delone and Mclean Model for information system success (Tilahun & Fritz, 2015b). several studies evaluating the success of HIS by using the Delone and Mclean Model were consistent with the results of this study in Indonesia (Sardjono et al., 2022), a study in Paris (J. M. Palm et al., 2006), and Iran (Kargari & Shayan, 2017).

5.4 Conclusion

This study may be used as a starting point for enhancing the adoption of HIS in Palestine in particular, as well as the country's healthcare system generally. It also motivates other researchers to look into other possible elements that could help enhance HIS in the nation. Despite the generally high level of user satisfaction with the HIS in West Bank governmental hospitals, specific components of the system and service qualities should be revised by policymakers, mainly availability, development process, new technologies, and integration with another HISs. Sufficient technical support from the HIS system provider and general infrastructure for supporting the HIS should be revised.

5.5 Recommendation

Based on these Findings, we Recommend:

- Focusing on the system quality items like response time, availability of the system, improving hardware used in hospitals, integration with other health information systems, registered errors, and adding new technologies for the system.

- The findings suggest that hospitals should consistently enhance service quality to raise user satisfaction in addition to concentrating on information and system quality.
- Improving technical support from HIS system provider.
- Improving general infrastructure to be enough to support HIS, like computers used, internet connection, and problems of cutting off the system.
- Providing more support for healthcare system users from IT support personnel working in hospitals.

5.6 Practical Implications

Based on this project, the following actions should be taken:

- Stakeholders in MOH should understand the key considerations affecting HIS improvement and use this research as a reference for finding the lower-grade assessed items. Therefore, the result of this project will soon be disseminated to all interested parties, and a mutual meeting will be scheduled to address future steps.
- Serious and effective communication with system providers to find solutions to the system's problems.

5.7 Future Research

- Further studies utilizing qualitative methods assessing health providers' perceptions can be conducted to have an in-depth understanding of this issue.
- Another area of focus for future study is to compare findings and identify distinctions between public and private sectors in the adoption of HIS.

- Suggestions for research focusing on variables influencing patients' satisfaction can be specified to provide a general model to evaluate the success of the hospital information system.
- Assessing of Hospital Information System subsystems depending on more users' viewpoints.

5.8 Strengths

This is the first study to address healthcare providers' perception using a Delone and Mclean information system success framework model. Results of this study reflect the entire target population in the West Bank. The size of the sample was adequate, and participants from different regions of the West Bank were included.

5.9 Limitations

The Gaza Strip was omitted. The large workload of the staff in governmental hospitals limited the ability of healthcare providers to fill out the questionnaire; some providers refused to fill the questionnaire since they didn't have enough time. Time and some resource limitations faced by the researcher. Additionally, this study covered a single period, which might not show factors that have an impact over the long run.

References

Abdullah, S., Zahdeh, M., & Shaheen, M. (2018). *Assessment of electronic health records (e-health) implementations in UNRWA clinics. A survey of health providers perceptions*.

Aggelidis, V. P., & Chatzoglou, P. D. (2012). Hospital information systems: Measuring end user computing satisfaction (EUCS). *Journal of Biomedical Informatics*, *45*(3), 566–579. https://doi.org/10.1016/J.JBI.2012.02.009

Ahmad, N., Du, S., Ahmed, F., ul Amin, N., & Yi, X. (2023). Healthcare professionals satisfaction and AI-based clinical decision support system in public sector hospitals during health crises: a cross-sectional study. *Information Technology and Management 2023*, 1–13. https://doi.org/10.1007/S10799-023-00407-W

Alharthi, H., Youssef, A., Radwan, S., Al-Muallim, S., & Zainab, A. T. (2014). Physician satisfaction with electronic medical records in a major Saudi Government hospital. *Journal of Taibah University Medical Sciences*, *9*(3), 213–218. https://doi.org/10.1016/J.JTUMED.2014.01.004

Al-Hashimi, M., Al-Hashimi, M. S., & Aqleh, M. M. (2018). Measuring the Success of Hospital Information System across Multispecialty Hospitals in Bahrain Medical informatics View project Measuring the Success of Hospital Information System across Multispecialty Hospitals in Bahrain. *Journal of Health Science*, *6*, 132–138. https://doi.org/10.17265/2328-7136/2018.02.009

Al-Kofahi, M. K., Hassan, H., Mohamad, R., Intan, T. P., & Com, M. (n.d.). Information Systems Success Model: A Review of Literature. *International Journal of*

Innovation, Creativity and Change. Www.Ijicc.Net, *12*(8), 2020. Retrieved July 8, 2023, from www.ijicc.net

Almuqrin, A., Mutambik, I., Alomran, A., & Zhang, J. Z. (2023). Information System Success for Organizational Sustainability: Exploring the Public Institutions in Saudi Arabia. *Sustainability 2023, Vol. 15, Page 9233*, *15*(12), 9233. https://doi.org/10.3390/SU15129233

Alnashmi, M., Salman, A., Alhumaidi, H., Yunis, M., & Al-Enezi, N. (2022). Exploring the Health Information Management System of Kuwait: Lessons and Opportunities. *Applied System Innovation 2022, Vol. 5, Page 25*, *5*(1), 25. https://doi.org/10.3390/ASI5010025

Al-Sanjary, O. I., & Desi Hertin, R. (2018). Performance of Hospital Information System in Malaysian Public Hospital: a Review. *Conference Paper in International Journal of Engineering & Technology*, *7*(4), 24–28. https://doi.org/10.14419/ijet.v7i4.11.20682

Arana, L., Medina, L., Pol, E., & Tun, N. (2019). *Measuring the Success of Hospital Information System (HIS) at La Loma Luz Adventist Hospital*.

Ariyanto, R., Rohadi, E., & Lestari, V. A. (2020). The effect of information quality, system quality, service quality on intention to use and user satisfaction, and their effect on net benefits primary care application at primary health facilities in Malang. *IOP Conference Series: Materials Science and Engineering*, *732*(1), 012084. https://doi.org/10.1088/1757-899X/732/1/012084

Ayebazibwe, I., Kimaro, H. C., & Kaasbøll, J. J. (2019). System use and user satisfaction in the adoption of electronic medical records systems: A case of DHIS2 tracker implementation in Tanzania. *IFIP Advances in Information and Communication Technology*, *551*, 63–75. https://doi.org/10.1007/978-3-030-18400-1_6/COVER

Bahari, A., & Mahmud, R. (2018). *Impact of System Quality, Information Quality and Service Quality on Performance*. http://en.wikipedia.org/wiki/Information_systems

Bashiri, A., Shirdeli, M., Niknam, F., Naderi, S., & Zare, S. (2023). Evaluating the success of Iran Electronic Health Record System (SEPAS) based on the DeLone and McLean model: a cross-sectional descriptive study. *BMC Medical Informatics and Decision Making*, *23*(1), 1–7. https://doi.org/10.1186/S12911-023-02100-Y/TABLES/4

Betty Yel, M., Sfenrianto, S., Doni Anugrah, R., Ariyanto, R., Rohadi, E., & Lestari, V. A. (2020). The effect of information quality, system quality, service quality on intention to use and user satisfaction, and their effect on net benefits primary care application at primary health facilities in Malang. *IOP Conference Series: Materials Science and Engineering*, *732*(1), 012084. https://doi.org/10.1088/1757-899X/732/1/012084

Business, G., & Research, M. (2022). Quality, Trust and Health Information System Use in Kuwait Public Hospitals During Pandemic Covid19. *An International Journal*, *14*(3s).

Cucus, A., & Halim, G. (2019). *Testing User Satisfaction Using End-User Computing Satisfaction (EUCS) Method in Hospital Management Information System (SIMRS) (Case Study at the Regional Public Hospital dr. A. Dadi Tjokrodipo)*. *9*(5). https://doi.org/10.7176/JIEA

DALLE, J., HASTUTI, D., Mahmud, M., PRASETIA, I., & Baharuddin, B. (2020). *DeLone and McLean Model Evaluation of Information System Success: A Case Study of Master Program of Civil Engineering Universitas Lambung Mangkurat*. https://repo-dosen.ulm.ac.id//handle/123456789/14135

DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Https://Doi.Org/10.1287/Isre.3.1.60*, *3*(1), 60–95. https://doi.org/10.1287/ISRE.3.1.60

Delone, W. H., & Mclean, E. R. (1992). *Information Systems Success: The Quest for the Dependent Variable*.

Delone, W. H., & Mclean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Information Systems Research, Journal of Management Information Systems*, *19*(4), 9–30.

Ebnehoseini, Z., Tabesh, H., Deldar, K., Mostafa Mostafavi, S., & Tara, M. (2019). Determining the Hospital Information System (HIS) Success Rate: Development of a New Instrument and Case Study the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0). *Macedonian Journal of Medical Sciences*, *7*(9), 1407–1414. https://doi.org/10.3889/oamjms.2019.294

Ebrahim Abdulla, A., Yousif Ahmed, S., Abdulrahman Alnoaimi, M., & Ali, H. (2019). *Users' Satisfaction With the Electronic Health Record (EHR) in the Kingdom of Bahrain*. https://doi.org/10.4018/978-1-5225-6198-9.ch017

Emruli, B., Kajtazi, M., Ekelund, D., & Ekwall, A. (n.d.). *Healthcare Professionals' Usage of eHealth Systems A Qualitative User Evaluation Study of eHealth Systems Compared to the Information Systems Success Model and Intended Outcomes Healthcare Professionals' Usage of eHealth Systems: A Qualitative User Evaluation Study of eHealth Systems Compared to the Information Systems Success Model and Intended Outcomes*.

Getachew, N., Erkalo, B., & Garedew, M. G. (2022). Data quality and associated factors in the health management information system at health centers in Shashogo district, Hadiya zone, southern Ethiopia, 2021. *BMC Medical Informatics and Decision Making*, *22*(1), 1–9. https://doi.org/10.1186/S12911-022-01898-3/TABLES/4

Hasan, M., & Uk, A. (2019). *Barriers and Success Factors for Implementation and Adoption of Healthcare Information Systems in Developing Countries: A Systematic Literature Review CORE View metadata, citation and similar papers at core*.

Iskandar, A., & Amriani, T. N. (2021). DETERMINANT ANALYSIS OF THE NET BENEFITS OF THE USE OF SAKTI: USER SATISFACTION MEDIATION. *International Journal of Economics, Business and Accounting Research (IJEBAR)*, *5*(2). https://www.jurnal.stie-aas.ac.id/index.php/IJEBAR/article/view/2418

Jad, K. A. M., & Zainol, Z. (2023). Validating Delone and Mclean Success Model in Hospitals of United Arab Emirates. *European Journal of Natural Sciences and Medicine*, *6*(2), 1–12. https://revistia.org/index.php/ejnm/article/view/6073

Kargari, M., & Shayan, M. (2017). *Identification of parameters affecting the success of the hospital information system & presentation of a model for user satisfaction improvement*.

Karitis, K., Gallos, P., Triantafyllou, I. S., & Plagianakos, V. (2021). Chios Hospital Information System Assessment. *Studies in Health Technology and Informatics*, *287*, 158–162. https://doi.org/10.3233/SHTI210837

Khalifa, M., & Alswailem, O. (2015). Hospital Information Systems (HIS) Acceptance and Satisfaction: A Case Study of a Tertiary Care Hospital. *Procedia Computer Science*, *63*, 198–204. https://doi.org/10.1016/J.PROCS.2015.08.334

Khoumbati, K., Dwivedi, Y. K., Srivastava, A., & Lal, B. (2009). Handbook of research on advances in health informatics and electronic healthcare applications: Global adoption and impact of information communication technologies. *Handbook of Research on Advances in Health Informatics and Electronic Healthcare Applications: Global Adoption and Impact of Information Communication Technologies*, 1–595. https://doi.org/10.4018/978-1-60566-030-1

Lourenço, C. M. P. (2023). *Users Satisfaction Regarding Nursing Information and Documentation In Electronic Health Records: A Study At The Health Centers Group Tâmega II - Vale Do Sousa Sul*. https://repositorio-aberto.up.pt/handle/10216/156444

Luna, D., Almerares, A., Mayan, J. C., de Quirós, F. G. B., & Otero, C. (2014). Health Informatics in Developing Countries: Going beyond Pilot Practices to Sustainable Implementations: A Review of the Current Challenges. *Healthcare Informatics Research*, *20*(1), 3–10. https://doi.org/10.4258/HIR.2014.20.1.3

Makalesi, A., Research, /, Türkmen, A. İ., & Özkara, B. (2021). Evaluation of Hospital Information Management System with Information Systems Success Model. *Journal of Information Technologies*, *14*(4), 403–410. https://doi.org/10.17671/gazibtd.830213

McGinn, C. A., Grenier, S., Duplantie, J., Shaw, N., Sicotte, C., Mathieu, L., Leduc, Y., Légaré, F., & Gagnon, M. P. (2011). Comparison of user groups' perspectives of barriers and facilitators to implementing electronic health records: A systematic review. *BMC Medicine*, *9*(1), 1–10. https://doi.org/10.1186/1741-7015-9-46/TABLES/1

Mimi, Y. (2015). *The Routine Health Information System in Palestine: Determinants and Performance*.

MUSA, N. K. B. (2023). *FACTORS AFFECTING HEALTH MANAGEMENT INFORMATION SYSTEMS (HMIS) ADOPTION SUCCESS TOWARDS IMPROVING HEALTHCARE INSTITUTION'S PERFORMANCE IN KEDAH NURUL KHAIRIAH BINTI MUSA MASTER OF SCIENCE (MANAGEMENT) UNIVERSITI UTARA MALAYSIA APRIL 2023*.

Nemer, M., Khader, Y. S., Alyahya, M. S., Pirlot de Corbion, A., Sahay, S., & Abu-Rmeileh, N. M. E. (2023). Personal data governance and privacy in digital

reproductive, maternal, newborn, and child health initiatives in Palestine and Jordan: a mapping exercise. *Frontiers in Digital Health*, *5*, 1165692. https://doi.org/10.3389/FDGTH.2023.1165692/BIBTEX

Ngurah, G., Dharma, A., Sukadarmika, G., & Pramaita, N. (2022a). Application of DeLone and McLean Methods to Determine Supporting Factors for the Successful Implementation of Electronic Medical Records at Bali Mandara Eye Hospital. *Journal of Applied Science, Engineering, Technology, and Education*, *4*(2), 146–156. https://doi.org/10.35877/454RI.ASCI1287

Ngurah, G., Dharma, A., Sukadarmika, G., & Pramaita, N. (2022b). Application of DeLone and McLean Methods to Determine Supporting Factors for the Successful Implementation of Electronic Medical Records at Bali Mandara Eye Hospital. *Journal of Applied Science, Engineering, Technology, and Education*, *4*(2), 146–156. https://doi.org/10.35877/454RI.ASCI1287

Nunes, G. S., & Javier, M. G. F. (2014). Hospital Information System Satisfaction in Brazil: Background and Moderating Effects. *International Journal of Research Foundation of Hospital and Healthcare Administration*, *2*(1), 1–9. https://doi.org/10.5005/JP-JOURNALS-10035-1007

Ojo, A. I. (2017). Validation of the DeLone and McLean Information Systems Success Model. *Healthcare Informatics Research*, *23*(1), 60–66. https://doi.org/10.4258/HIR.2017.23.1.60

Oshegbo, G. (2022). *Relationship Between Information System Success Model Dimensions and Electronic Health Records Use*. https://scholarworks.waldenu.edu/dissertations

Palm, J. M., Colombet, I., Sicotte, C., & Degoulet, P. (2006). Determinants of User Satisfaction with a Clinical Information System. *AMIA Annual Symposium Proceedings*, *2006*, 614. /pmc/articles/PMC1839744/

Palm, J.-M., Dart, T., Dupuis, I., Leneveut, L., & Degoulet, P. (2010). *Clinical Information System Post-Adoption Evaluation at the Georges Pompidou University Hospital*. https://www.researchgate.net/publication/49967719

Petter, S., & Fruhling, A. (2011). Evaluating the success of an emergency response medical information system. *International Journal of Medical Informatics*, *80*(7), 480–489. https://doi.org/10.1016/J.IJMEDINF.2011.03.010

Putri, K. A., Setyanto, R. P., & Aji, B. (2022). Relationship Of System Quality To User Satisfaction Through The Implementation Of Electric Medical Record At RSGM Unsoed. *Sustainable Competitive Advantage (SCA)*, *12*(1). http://jp.feb.unsoed.ac.id/index.php/sca-1/article/view/3279

Ranandeh-Kalankesh, L., Asghari-Jafarabadi, M., & Nasiri, Z. (2017). User Satisfaction Regarding Hospital Information Systems: Structural Equation Modeling. *Health Information Management*, *14*(2), 51–57. https://him.mui.ac.ir/article_11571_en.html

Saghaeiannejad-Isfahani, S., Jahanbakhsh, M., Habibi, M., Mirzaeian, R., Nasirian, M., & Rad, J. S. (2014). *A Survey on the Users' Satisfaction with the Hospital Information Systems A Survey on the Users' Satisfaction with the Hospital Information Systems (HISs) based on DeLone and McLean's Model in the Medical-Teaching Hospitals in Isfahan City*. *22*(3), 179–182. https://doi.org/10.5455/aim.2014.22.179-182

Salameh, B., Eddy, L. L., Batran, A., Hijaz, A., & Jaser, S. (n.d.). *Nurses' Attitudes Toward the Use of an Electronic Health Information System in a Developing Country*. https://doi.org/10.1177/2377960819843711

Sardjono, W., Maya Kristin, D., Rama Putra, G., Salim, G., & Subiyantoro, S. (2022). *ICIC Express Letters ICIC International ⓒ2022 ISSN*. *16*(2), 205–213. https://doi.org/10.24507/icicel.16.02.205

Sebetci, Ö. (2018). Enhancing end-user satisfaction through technology compatibility: An assessment on health information system. *Health Policy and Technology*, *7*(3), 265–274. https://doi.org/10.1016/J.HLPT.2018.06.001

Septiani, R., & Mairani, T. (2021). THE EVALUATION OF ELECTRONIC HEALTH RECORD ADOPTION AMONG HEALTH PROFESSIONALS IN HOSPITAL SETTING. *Jukema (Jurnal Kesehatan Masyarakat Aceh)*, *7*(1), 69–75. https://doi.org/10.37598/JUKEMA.V7I1.1068

Shao, M., Fan, J., Huang, Z., & Chen, M. (2022). The Impact of Information and Communication Technologies (ICTs) on Health Outcomes: A Mediating Effect

Analysis Based on Cross-National Panel Data. *Journal of Environmental and Public Health*, *2022*. https://doi.org/10.1155/2022/2225723

Shawar, W. A., & Jaabari, M. (2023). *College of Graduate Studies Information Technology and Management System Department Assessment of the Automating Levels of Pharmacy Information System Used in Hospital Pharmacy in the District of Hebron*.

Sood, S. P., Nwabueze, S. N., Mbarika, V. W. A., Prakash, N., Chatterjee, S., Ray, P., & Mishra, S. (2008). Electronic Medical Records: A Review Comparing the Challenges in Developed and Developing Countries. *Proceedings of the Annual Hawaii International Conference on System Sciences*. https://doi.org/10.1109/HICSS.2008.141

Subaeki, B., Rahman, A. A., Putra, S. J., & Alam, C. N. (2019). Success model for measuring information system implementation: Literature review. *Journal of Physics: Conference Series*, *1402*(7), 077015. https://doi.org/10.1088/1742-6596/1402/7/077015

Sullivan, G. B., Howitt, D., & Cramer, D. (2008). Review: Dennis Howitt & Duncan Cramer (2005). Introduction to Research Methods in Psychology. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *9*(1). https://doi.org/10.17169/FQS-9.1.368

Tilahun, B., & Fritz, F. (2015a). Comprehensive Evaluation of Electronic Medical Record System Use and User Satisfaction at Five Low-Resource Setting Hospitals in Ethiopia. *JMIR Med Inform 2015;3(2):E22*

Https://Medinform.Jmir.Org/2015/2/E22, *3*(2), e4106. https://doi.org/10.2196/MEDINFORM.4106

Tilahun, B., & Fritz, F. (2015b). Modeling antecedents of electronic medical record system implementation success in low-resource setting hospitals Healthcare Information Systems. *BMC Medical Informatics and Decision Making*, *15*(1), 1–9. https://doi.org/10.1186/S12911-015-0192-0/TABLES/4

Urbach, N., Urbach, N., & Müller, B. (n.d.). Abbreviations D&M DeLone & McLean ICIS International Conference on Information Systems Ind. Individual IS Information systems The Updated DeLone and McLean Model of Information Systems Success. *Integrated Series in Information Systems*, *1*. https://doi.org/10.1007/978-1-4419-6108-2_1

Walle, A. D., Demsash, A. W., Ferede, T. A., & Wubante, S. M. (2023a). Healthcare professionals' satisfaction toward the use of district health information system and its associated factors in southwest Ethiopia: using the information system success model. *Frontiers in Digital Health*, *5*, 1140933. https://doi.org/10.3389/FDGTH.2023.1140933/BIBTEX

Walle, A. D., Demsash, A. W., Ferede, T. A., & Wubante, S. M. (2023b). Healthcare professionals' satisfaction toward the use of district health information system and its associated factors in southwest Ethiopia: using the information system success model. *Frontiers in Digital Health*, *5*, 1140933. https://doi.org/10.3389/FDGTH.2023.1140933/BIBTEX

Widiastuti, R., Haryono, B. S., & Said, A. (2019). Influence of System Quality, Information Quality, Service Quality on User Acceptance and Satisfaction and Its Impact on Net Benefits (Study of Information System Users Lecturer Performance Load (BKD) in Malang State University). *HOLISTICA – Journal of Business and Public Administration*, *10*(3), 111–132. https://doi.org/10.2478/HJBPA-2019-0032

Wiersema, M. F., & Bowenz, H. P. (2009). The use of limited dependent variable techniques in strategy research: issues and methods. *Strategic Management Journal*, *30*(6), 679–692. https://doi.org/10.1002/SMJ.758

Yu, P., & Qian, S. (2018). *Developing a theoretical model and questionnaire survey instrument to measure the success of electronic health records in residential aged care*. https://doi.org/10.1371/journal.pone.0190749

Zheng, F., Wang, K., Wang, Q., Yu, T., Wang, L., Zhang, X., Wu, X., Zhou, Q., & Tan, L. (2023). Factors Influencing Clinicians' Use of Hospital Information Systems for Infection Prevention and Control: Cross-Sectional Study Based on the Extended DeLone and McLean Model. *J Med Internet Res 2023;25:E44900 Https://Www.Jmir.Org/2023/1/E44900*, *25*(1), e44900. https://doi.org/10.2196/44900

Appendices

Appendix A: Questionnaire in Arabic

نموذج الموافقة

عزيزي المشارك :

أنت مدعو للمشاركة في هذا الاستبيان حول

تقييم تطبيقات نظام المعلومات الصحية في المستشفيات الحكومية في الضفة الغربية: مسح تصورات مقدمي الخدمات الصحية

الهدف من الدراسة:

يهدف هذا البحث إلى تقييم نجاح نظام المعلومات الصحية (HIS) في المستشفيات الحكومية في الضفة الغربية من خلال تحديد تصور مقدمي الخدمات الصحية، بناء على استخدام اطار Delone and Mclean لنجاح أنظمة المعلومات.
وهو من أكثر النماذج شهرة وتطبيقا لتقييم نظم المعلومات بما فيها نظم المعلومات الصحية حيث يقوم هذا الاطار بتقييم ستة أبعاد مترابطة لنجاح نظم المعلومات وهي: جودة النظام ، وجودة المعلومات ، وجودة الخدمة ، و الاستخدام ، ورضا المستخدم ، والفوائد الاجمالية من استخدام نظام المعلومات. اضافة الى أن الاطار يدرس العلاقات بين الأبعاد المختلفة المستخدمة في تقييم النظام.

طريقة اجراء الدراسة:

الدراسة تشمل اجراء الاستبيان التالي والذي يستهدف مزودي الخدمات الصحية في المستشفيات الحكومية في الضفة الغربية.
تجري هذا البحث ريما أبو كحيل طالبة في الجامعة العربية الأمريكية في فلسطين تخصص معلوماتية صحية تحت اشراف البروفيسور محمد عوض.
سيتم التعامل مع المعلومات بسرية تامة ولن يتم استخدامها خارج إطار البحث
إذا كان لديك أي استفسارات يمكنك التواصل معنا من خلال:
رقم جوال: 0599220402
ايميل: reema@inash.org

موافقة المشارك في البحث

☐ - أوافق على أن أشارك في هذه الدراسة

☐ - لا أوافق

التاريخ:_____

المتغير	
1- ما هو تخصصك ؟	o طبيب o ممرض o فني مختبر o صيدلاني o أخصائي أشعة o قابلة o تخصص آخر: ----------
2- الجنس	o ذكر o أنثى
3- العمر	o 20-29 o 30-39 o 40-49 o +50
4- أعلى شهادة علمية	o دبلوم o بكالوريوس o ماجستير o دكتوراة
5- عدد سنوات الخبرة	o أقل من 5 سنوات o 5-10 سنوات o 11-15 سنة

	o أكثر من 15 سنة
6- كيف تقيم مهاراتك في استخدام الكمبيوتر	o لا يوجد مهارة o مهارة متوسطة o مهارة متقدمة
7- مكان العمل (المستشفى)	o مستشفى الشهيد خليل سليمان (جنين) o مجمع فلسطين الطبي (رام الله) o مستشفى بيت جالا الحكومي (الحسين)
8- قسم العمل	o قسم المرضى الداخليين o قسم العيادات الخارجي
9- المنصب	o مسؤول /رئيس قسم o موظف

المتغير	البند	أوافق بشدة	أوافق	محايد	أعارض	أعارض بشدة
A جودة النظام	**1A**. نظام HIS سهل الاستخدام					
	2A. نظام HIS سهل التعلم.					
	3A. نظام HIS موثوق في أدائه.					
	4A. وقت الاستجابة من نظام HIS مقبول.					
	5A. يوفر نظام HIS بشكل مناسب وكافي خصوصية وأمان لمعلومات المرضى.					
	6A. توافر نظام HIS بشكل مستمرودائم.					
	7A. تم دمج نظام HIS مع أنظمة صحية أخرى. (أي بمعنى مشاركة قاعدة البيانات الآلية ونقل البيانات إلى أنظمة HIS أخرى.)					
	8A. يدعم نظام HIS ميزات نظام دعم القرار السريري CDSS (يقدم نظام دعم القرار السريري معلومات في الوقت المناسب ، عادة في نقطة الرعاية ، للمساعدة في اتخاذ قرارات مدروسة بشأن رعاية المريض. تساعد أدوات وأنظمة CDSS في تولي بعض المهام الروتينية ، والتحذير من المشاكل المحتملة ، أو تقديم اقتراحات للفريق الطبي للنظر فيها)					
	9A. أستخدم التقنيات الجديدة لنظام HIS المحدث.					

	10A. ينتج عن نظام HIS أخطاء مسجلة.					
	11A. نظام HIS مرن للتفاعل معه.					
	12A. كان التعلم والتدريب على استخدام نظام HIS سهلاً بالنسبة لي.					
	13A. أنا راضٍ عن عملية تطوير نظام HIS.					
	البند	**أوافق بشدة**	**أوافق**	**محايد**	**أعار ض**	**أعار ض بشدة**
B **جودة المعلومات** (خصائص المعلومات والمخرجا ت التي يتم الحصول عليها من النظام مثل التقارير النهائية)	**1B**. المعلومات التي أحصل عليها من نظام HIS دقيقة.					
	2B. المعلومات من نظام HIS متاحة عندما أحتاج إليها.					
	3B. يتم عرض المعلومات من نظام HIS بتصميم مفيد.					
	4B. يمكنني استرجاع المعلومات التي أحتاجها من نظام HIS بسهولة.					
	5B. تتيح لي المعلومات الواردة من نظام HIS باتخاذ قرارات و / أو توصيات تخص رعاية المرضى بسرعة أكبر.					
	6B. أثق في مخرجات المعلومات التي أحصل عليها من نظام HIS.					
	7B. يقوم نظام HIS بتزويدي بالمعلومات اللازمة في الوقت المناسب.					
C **جودة الخدمة**	**1C**. هناك دعم فني مناسب من مزود أو مطور نظام HIS.					
	2C. البنية التحتية العامة الموجودة كافية لدعم نظام HIS (مثل اتصال الإنترنت وأجهزة الكمبيوتر وانقطاع النظام)					
	3C. لدي حق في الحصول على التدريب المستمر على نظام HIS.					
	4C. كان التدريب الذي تلقيته ذا صلة بكيفية استخدام نظام HIS.					
	5C. بشكل عام ، فإن الخدمات المساندة لاستخدام نظام HIS والتي أتلقاها من قسم نظم المعلومات وموظفي دعم تكنولوجيا المعلومات ، مثل الدعم الفني والتدريب على استخدام النظام أو مكتب المساعدة ، تلبي احتياجاتي.					
D **الاستخدام**	**1D**. استخدام نظام HIS يتيح لي المجال لانجازالمهام بسرعة أكبر.					
	2D. أدى استخدام نظام HIS إلى تحسين أداء وظيفتي.					
	3D. معرفتي ومهاراتي في استخدام التكنولوجيا مناسبة لاستخدام لنظام HIS					

	البند	أوافق بشدة	أوافق	محايد	أعارض	أعارض بشدة
	4D. أجد أن استخدام نظام HIS مفيدًا في عملي.					
E **رضا المستخدم**	**1E.** أنا راضٍ بشكل عام عن استخدام HIS.					
	2E. أنا راضٍ عن وظائف نظام HIS.					
	3E. لقد سهل نظام HIS إجراءات العمل.					
	4E. يساعد نظام HIS على تحسين سير العمل / يجعل المهمة أسهل.					
	5E. أنا راضٍ عن الأجهزة المستخدمة في نظام HIS.					
الفوائد الاجمالية	**1F.** يزيد نظام HIS من إنتاجية العمل.					
	2F. يعمل نظام HIS على تحسين جودة الرعاية للمرضى.					
	3F. قلل نظام HIS من الأخطاء الطبية.					
	4F. يساعد نظام HIS في التغلب على محددات ومشاكل النظام الورقي.					
	5F. يعزز نظام HIS التواصل بين العاملين.					
	6F. حسّن نظام HIS الإدارة السريرية (التشخيص والعلاج).					
	7F. سهّل نظام HIS تطوير خطة الرعاية للمرضى.					
	8F. يؤدي نظام HIS إلى تحسين عملية صنع القرار					

انتهت الأسئلة

Appendix B: Questionnaire in English

موافقة المشارك في البحث:

- أوافق على أن أشارك في هذه الدراسة ☐
- لا اوافق ☐

التاريخ:_____

Variable	
1- What is your profession?	o Physician o Nurse o Lab technician o Pharmacist o Radiologist o Midwife o Others: ----------
2- Gender	o Male o Female
3- Age	o 20-29 o 30-39 o 40-49 o +50
4- Level of education	o Diploma or (undergraduate) o Bachelor's Degree o Master's Degree/post-grad diploma

	○ Ph.D.
5- Years of experience	○ Less than 5 years ○ 5-10 years ○ 11-15 years ○ More than 15 years
6- How would you rate your computer proficiency?	○ None ○ Average ○ Advanced
7- Where is your work (hospital)?	○ Jenin (Khalil Suliman) ○ Palestine Medical Complex Ramallah ○ Beit Jala (Al Husein)
8- Department of work	○ Inpatient ○ Outpatient
9- Position	○ Incharge/ head of department ○ Staff member

Variable	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
	A.1 The HIS system is easy to use.					

A System Quality	**A.2** The HIS system is easy to learn.					
	A.3 The HIS system is reliable in its performance.					
	A.4 The response time from the HIS system is acceptable.					
	A.5 The HIS system adequately provides for the privacy and security of patients' information.					
	A.6 The availability of the HIS system is continuous.					
	A.7 The HIS system is integrated with other health systems (automated database sharing with other HIS systems, transfer of data to other HIS systems)					
	A.8 The HIS system supports the decision support system features CDSS. (Provides timely information, usually at the point of care, to help inform decisions about a patient's care. CDSS tools and systems help clinical teams by taking over some routine tasks, warning of potential problems, or providing suggestions for the clinical team and patient to consider.)					
	A.9 I use the new technologies of the					

	updated HIS system.					
	A.10 The HIS system produces registered errors.					
	A.11 The HIS is flexible to interact with.					
	A.12 Learning and training to use the HIS system were easy for me.					
	A.13 I am satisfied with the HIS system development process.					
B Information Quality (Desired characteristics of the system output like final reports)	**B.1** The information I get from the HIS system is accurate.					
	B.2 The information from the HIS system is available when I need it.					
	B.3 The information from the HIS system is presented in a useful format.					
	B.4 I can retrieve the information I need from the HIS system easily.					
	B.5 The information from the system allows me to make patient care decisions and/or recommendations more quickly.					
	B.6 I trust the information output of the HIS system.					
	B.7 The HIS system generates information on time.					

C **Service** **Quality**	**C.1** There is adequate technical support from the HIS system's provider.					
	C.2 The overall infrastructure in place is adequate to support the HIS system. (As internet connection, computers, system cut off)					
	C.3 I have access to ongoing training on HIS					
	C.4 The training I received was relevant to how I should use the HIS system.					
	C.5 Overall, the support services on the HIS that I receive from the IS department and IT support personnel, such as training, hotline, or helpdesk meet my needs.					
D **Use**	**D. 1** Using the HIS system enables me to accomplish tasks more quickly.					
	D.2 Using the HIS system has improved my job performance.					
	D.3 My knowledge and skills in using technology are suitable for the HIS system.					
	D.4 I find the HIS system useful in my job.					
E	**E.1** I am generally satisfied using the HIS.					
	E.2 I am satisfied with the functions of the HIS system.					

User Satisfaction	**E.3** The HIS system has eased work processes.					
	E.4 The HIS system helps to improve workflow /makes the job easier.					
	E.5 I am satisfied with the hardware used for the HIS system.					
F Net Benefit	**F.1** The HIS system increases the productivity of work.					
	F.2 The HIS system improves the quality of care for patients.					
	F.3 The HIS system reduced medical errors.					
	F.4 The HIS system helps overcome the limitations of a paper-based system.					
	F.5 The HIS system enhances communication among workers.					
	F.6 The HIS system improved clinical management (diagnosis and treatment).					
	F.7 The HIS system facilitated the development of a care plan.					
	F.8 The HIS system causes improvement in decision-making.					

End of Questions

Appendix C: AAUP Approval

Arab American University
Deanship of Scientific Research
Tel: 04-241-8888, ext 1196
mail: src@aaup.edu-E

الجامعة العربية الامريكية
عمادة البحث العلمي
تلفون: 04-241-8888, ext 1196
البريد الالكتروني: src@aaup.edu

4/5/2023

حضرة الدكتور عبد الله القواسمة المحترم
رئيس وحدة التعليم الصحي والبحث العلمي في وزارة الصحة الفلسطينية

تحية طيبة وبعد،

الموضوع: تسهيل مهمه بحثية

تهديكم الجامعة العربية الامريكية أطيب التحيات، وبالإشارة الى الموضوع أعلاه يرجى من حضرتكم التعاون بتسهيل مهمة طالبة الماجستير في تخصص المعلوماتية الصحية "ريما أبو كحيل" للتمكن من جمع البيانات اللازمة لتقييم تطبيقات نظام المعلومات الصحية في المستشفيات الحكومية في الضفة الغربية: مسح تصورات مقدمي الخدمات الصحية، من خلال دراسة حالة 3 مستشفيات (مجمع فلسطين الطبيّ/رام الله ،ومستشفى الدكتور خليل سليمان الحكومي (مستشفى جنين الحكومي)، ومستشفى بيت جالا الحكومي) ؛ حيث ستقوم الطالبة باستخدام البيانات لأغراض البحث العلمي فقط.

مرفق:
المشروع البحثي
الاستبانة (باللغتين:العربية والإنجليزية)
IRB Approval

عمادة البحث العلمي
DEANSHIP OF SCIENTIFIC RESEARCH

شاكرين لكم حسن تعاونكم،،،

عميد البحث العلمي

أ.د. محمد عوض

Appendix D: MOH Approval

State of Palestine
Ministry of Health
Education in Health and Scientific
Research Unit

دولة فلسطين
وزارة الصحة
وحدة التعليم الصحي
والبحث العلمي

Ref.: .....
Date:.....

الرقم: ٢٠٢١/٩٢٦/١٢٤
التاريخ: ٢٠٢٢/٠٥/٩

عطوفة الوكيل المساعد لمجمع فلسطين الطبي المحترم،،،

ق. أ. الوكيل المساعد لشؤون المستشفيات والطوارئ المحترم،،،

تحية واحترام،،،

الموضـــوع: تسهيل مهمة بحث

يرجى تسهيل مهمة الطالبة: **ريما ابو كحيل – ماجستير المعلوماتية الصحية**– الجامعة العربية الامريكية، بعنوان:

"تقييم تطبيقات نظام المعلومات الصحية في المستشفيات الحمومية في الضفة الغربية: مسح تصورات مقدمي الخدمات الصحية"

حيث ستقوم الطالبة بجمع معلومات عن طريق تعبئة استبانة الدراسة من قبل العاملين الذين يستخدمون النظام المحوسب (بعد اخذ موافقتهم)، وذلك في:

- **مجمع فلسطين الطبي**
- **مستشفى جنين – مستشفى بيت جالا**

مع العلم ان مشرف الدراسة: د. محمد عوض.
على ان يتم الالتزام بالمحافظة على اخلاقيات البحث العلمي وسرية المعلومات.
على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر لحين الحصول على موافقة وزارة الصحة.

مع الاحترام،،،

د. عبد الله القواسمي
رئيس وحدة التعليم الصحي والبحث العلمي

دولة فلسطين وزارة الصحة
وحدة التعليم الصحي والبحث العلمي

نسخة: عميد البحث العلمي المحترم/ الجامعة العربية الامريكية

Appendix E: IRB

Arab American University- Palestine
Deanship of Scientific Research
IRB committee
Tel: 04-241-8888, ext 1196
E-mail: irb.aaup@aaup.edu

الجامعة العربية الامريكية- فلسطين
عمادة البحث العلمي
لجنة أخلاقيات البحث العلمي
تلفون: 1196 ext 04-241-8888
البريد الالكتروني: irb.aaup@aaup.edu

IRB Approval Letter

Study Title: Assessment of Health Information systems implementations in West Bank governmental hospitals: A survey of health providers perceptions.

Submitted by: Reema Abu Kheel

Date received: 03/04/2023

Date reviewed: 19/04/2023

Date approved: 19/04/2023

Your Study titled "**Assessment of Health Information systems implementations in West Bank governmental hospitals: A survey of health providers perceptions**" With archived number 2023/A/61/N was reviewed by the Arab American University IRB committee and was approved on 19/04/2023.

Reham Khalaf-Nazzal, MD, PhD
IRB committee chairman
Arab American University of Palestine

General Conditions:

1. Valid for four months from date of approval.
2. It is important to inform the committee with any modification of the approved study protocol.
3. The committee appreciates a copy of the research when accomplished.

ملخص الدراسة

الخلفية: يعد اعتماد أنظمة المعلومات الصحية (HIS) بنجاح إجراءً معقدًا. يجب أن يؤثر النظام أولاً بنجاح على مستخدميه حتى يكون فعالاً ويفيد المؤسسة الصحية. اعتمدت وزارة الصحة الفلسطينية نظام معلومات صحي في مستشفياتها في الضفة الغربية، لذلك لابد من اجراء التقييم لهذا النظام لقياس مدى نجاح النظام بناء على تصورات المستخدمين ورضاهم عن جودة النظام فوائده الاجمالية.

هدف هذه الدراسة: تهدف هذه الدراسة إلى تقييم مدى نجاح نظام المعلومات الصحية في المستشفيات الحكومية في الضفة الغربية من خلال التعرف على تصورات مقدمي الخدمات الصحية استناداً إلى إطار DeLone وMcLean لنجاح نظام المعلومات، والتعرف على خصائص النظام من خلال تقييم مكوناته من وجهة نظر مقدمي الرعاية الصحية وهي: جودة النظام، جودة المعلومات، جودة الخدمة، الاستخدام، رضا المستخدم، الفائدة الاجمالية.

طرق الدراسة : كانت هذه دراسة مقطعية أجريت بين مقدمي الخدمات الصحية الفلسطينيين في المستشفيات الحكومية الثلاثة، جنين (مستشفى خليل سليمان)، رام الله (مجمع فلسطين الطبي)، ومستشفى بيت جالا (الحسين). تم جمع البيانات عن طريق استبيان ذاتي يعتمد على إطار DeLone وMcLean لنجاح نظام المعلومات من عينة عشوائية طبقية بسيطة مكونة من 250 من مقدمي الخدمات الصحية. تم تحليل البيانات باستخدام الإصدار 25 من حزمة IBM الإحصائية للعلوم الاجتماعية (SPSS). يهدف التحليل الوصفي وتحليل الانحدار الخطي إلى معرفة ما إذا كانت هناك علاقة وتأثير وأهمية إحصائية بين المتغيرات التابعة والمتغيرات المستقلة.

النتائج: أشارت النتائج إلى وجود درجة عالية من (رضا المستخدم) من وجهة نظر أفراد العينة، حيث بلغت الدرجة الكلية (المتوسط=3.54) وبنسبة قبول (70.9%). حصلت جودة المعلومات على أعلى جودة (المتوسط=3.82) بنسبة قبول (76.3%)، تليها جودة النظام (المتوسط=3.51) بنسبة قبول (70.2%)، جودة الخدمة هي الأدنى (المتوسط=3.22) بنسبة قبول (64.5%). بينما حصل عامل استخدام النظام على (متوسط 3.85) بنسبة (77.0%) للقبول، بينما الفائدة الاجمالية للنظام (المتوسط=3.76) بنسبة (75.2%) للقبول. وتم الكشف عن وجود علاقة معنوية وإيجابية

بين عوامل الجودة الثلاثة ورضا المستخدم، وبين استخدام النظام ورضا المستخدم، وبين رضا المستخدم وصافي فائدة النظام.

الاستنتاج: على الرغم من أن رضا المستخدمين عالي عن نظام المعلومات الصحية في المستشفيات الحكومية في الضفة الغربية، إلا أنه يجب مراجعة مكونات محددة للنظام وجودة الخدمة من قبل صانعي السياسات، مثل مدى توفر النظام، وعملية التطوير، واستخدام تقنيات جديدة للنظام ، اضافة لتكامل النظام مع أنظمة HISs الأخرى. الدعم الفني المناسب من مزود نظام HIS، و البنية التحتية العامة يجب أن تكون كافية، وخاصة الاتصال بالإنترنت والأجهزة، وتحسين خدمات الدعم الشاملة لنظام HIS التي يقدمها موظفو دعم تكنولوجيا المعلومات.