FACTORS AFFECTING HEALTH MANAGEMENT INFORMATION SYSTEMS (HMIS) ADOPTION SUCCESS TOWARDS IMPROVING HEALTHCARE INSTITUTION'S PERFORMANCE IN KEDAH

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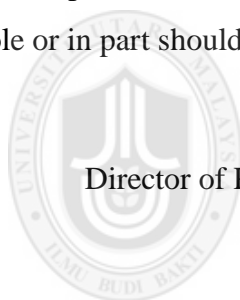
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ABSTRACT

Health Management Information Systems (HMIS) have been implemented in healthcare institutions to boost productivity, lower costs, enhance work processes, and elevate the standard of care. However, the Information System Success Model (ISSM) direct effects on organizational performance still need to be proven, and its applicability in the HMIS context still needs to be discovered. Therefore, this study aspires to analyze the importance of HMIS success factors and their influences on the organizational performance of healthcare institutions, specifically in Hospital Sultanah Bahiyah (HSB) and Hospital Sultan Abdul Halim (HSAH). The structured questionnaires used to collect the data were adapted from earlier ISSM-based research and covered four dimensions: information quality, system quality, service quality, and net benefits (organizational performance). The questionnaires with complete evaluations were returned by 368 healthcare professionals employed in HSB and HSAH. Data were analysed using the statistical software SPSS covering descriptive analysis, reliability of instruments, and inferential analysis (Pearson Correlation and Multiple Regression). The empirical findings primarily demonstrate that organizational performance is significantly influenced by information quality, system quality, and service quality, whereas system quality is the main contributing factor towards organizational performance. This study is expected to improve organizational performance regarding HMIS adoption positively.

Keywords: Health Management Information System, Organizational Performance, Healthcare Institutions, Information System, Success Factor

ABSTRAK

Sistem Maklumat Pengurusan Kesihatan (HMIS) telah dilaksanakan di institusi penjagaan kesihatan dengan tujuan untuk meningkatkan produktiviti, mengurangkan kos, meningkatkan proses kerja, dan meningkatkan taraf penjagaan yang disediakan. Kesan langsung Model Kejayaan Sistem Maklumat (ISSM) terhadap prestasi organisasi kekal tidak terbukti, dan kebolehgunaannya dalam konteks HMIS masih tidak diketahui. Oleh itu, kajian ini bertujuan untuk menganalisa kepentingan faktor kejayaan HMIS dan pengaruhnya terhadap prestasi organisasi institusi penjagaan kesihatan khususnya di Hospital Sultanah Bahiyah (HSB) dan Hospital Sultan Abdul Halim (HSAH). Soal selidik berstruktur yang digunakan untuk mengumpul data telah diubah suai daripada penyelidikan berasaskan ISSM terdahulu dan merangkumi empat dimensi: kualiti maklumat, kualiti system, kualiti perkhidmatan, dan faedah bersih (prestasi organisasi). Soal selidik dengan penilaian yg lengkap telah dikembalikan oleh 368 profesional penjagaan kesihatan yang bekerja di HSB and HSAH. Data dianalisis dengan menggunakan perisian statistik SPSS meliputi analisis deskriptif, kebolehpercayaan instrumen, dan analisis inferensi (Korelasi Pearson dan Regrasi Berganda). Penemuan empirikal terutamanya menunjukkan bahawa prestasi organisasi dipengaruhi dengan ketara oleh kualiti maklumat, kualiti sistem, dan kualiti perkhidmatan, manakala kualiti sistem adalah faktor penyumbang utama ke arah prestasi organisasi. Kajian ini diharap dapat menyumbang secara positif kepada peningkatan prestasi organisasi berkaitan penerimaan HMIS.

Kata kunci: Sistem Maklumat Pengurusan Kesihatan, Prestasi Organisasi, Institusi Penjagaan Kesihatan, Sistem Maklumat, Faktor Kejayaan

ACKNOWLEDGEMENT

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LIST OF ABBREVIATION

HMIS	Health Management Information System
HIS	Hospital Information System
THIS	Total Hospital Information System
IHIS	Intermediate Hospital Information System
BHIS	Basic Hospital Information System
HSB	Hospital Sultanah Bahiyah
HSAH	Hospital Sultan Abdul Halim
MOH	Ministry of Health
WHO	World Health Organization
IS	Information System
MIS	Management Information System
ISSM	Information System Success Model
D&M	DeLone and McLean
SPSS	Statistical Package for Social Science
ANOVA	Analysis of Variance

CHAPTER 1

INTRODUCTION

1.1 Chapter Overview

This chapter discussed the factors driving the adoption success factor of the Health Management Information System (HMIS) and how this can help the organization's performance of a healthcare institution. Background of the research, problem statement, objectives and questions, the study's scope, and the research's relevance to the state of knowledge and industry discussed. The definitions of the key terms used in this study and the structure of the study are also explained at the end of this chapter.

1.2 Background of Study

Healthcare institutions have significant and ongoing responsibilities for people's health. The World Health Organization (WHO) stated that healthcare institutions should achieve three common goals: good health, meeting population expectations, and equity in financial contributions (Donev et al., 2013). However, healthcare institutions continue to face enormous challenges that will increase in the years to come as they serve patient populations. In such a complex and ever-changing environment, healthcare institutions must improve quality by applying innovative tools, technologies, and approaches to improve healthcare institutions' outcomes.

In Malaysia, the Ministry of Health (MOH) primarily provides healthcare services. Healthcare institutions, without a doubt, remains one of the essential sectors

in Malaysia, with the government's latest allocation of RM36.14 billion for the MOH listed among the highest allocation in Budget 2023. Compared to RM32.41 billion in Budget 2022, the higher allocation looks promising in the government's efforts to strengthen the country's health services. Malaysia needs better accessibility and affordability for its healthcare system in general. The Malaysian healthcare system is divided into two institutions which are public and private healthcare institutions, and both institutions are growing and have a lot of room for expansion (Ahmed et al., 2017).

Indeed, most Malaysian citizens depend on the public healthcare institutions managed by the Malaysian government to get their treatments. The reason is that medical treatments and consultations at public healthcare institutions are cheaper than private ones. For 2021, data shows that the total number of patients admitted to public healthcare institutions is 2,512,777, while the total number of patients who received treatments as an outpatient is 51,067,903 as illustrated in Table 1.1. These statistics show that Malaysian public healthcare institutions are vital in providing medical treatments and consultations for most of the population.

Table 1.1
Number of Patients Received Treatment

Type of Treatment Received	Number of Patients
Patients' Admission	2, 512, 777
Outpatients	51, 067, 903
Total	53, 580, 680

Source: Health Informatics Centre, Ministry of Health Malaysia (2022)

During its first three decades of independence, Malaysia established public healthcare institutions that were fairly extensive and offered free healthcare services to all Malaysians. However, many healthcare institutions have not realized their potential due to a lack of the right and balanced mix of resources, poor structuring, poor organization, and inadequate management systems (Institute of Medicine, 2003). As seen in today's environment, most healthcare institutions have undergone many reforms. They are driven in part by economic, political, technological, and simply ideological forces to meet ever-changing healthcare needs, also undergoing continuous transformations to meet demands and expectations. Although Malaysian healthcare institutions have been successful among countries of similar socio-economic status, the country still faces several challenges, as shown in Table 1.2.

Table 1.2
Perceived Healthcare Challenges

Challenges	Year	
	2021	2022
Long waiting time to access for treatment (%)	43	47
Not enough staff (%)	38	37
Poor quality treatment (%)	18	19

Source: Ipsos Global Health Monitor (2022)

The issue of public healthcare institutions comes under the spotlight with local media reports of overflowing patients and long waiting lines at the emergency department. Based on Table 1.2, almost half of Malaysians view access to treatment and long waiting times as significant challenges for Malaysian healthcare institutions,

receiving more attention than other issues. In Malaysian public healthcare institutions, overcrowding in outpatient departments and speciality clinics is not a rare situation. This phenomenon is proved by Manaf (2006), who reported that outpatient clinics in Malaysian public healthcare institutions are overwhelmed. Besides, according to Zhu et al. (2009), waiting times for outpatients become one of the important highlights as it assesses organizational competence. This is because longer waiting times for outpatient services lead to patient dissatisfaction. Moreover, additional waiting time does not add value that can be used to upgrade patient well-being (Kujala et al., 2006).

Regarding healthcare professionals, it was reported that Malaysia still faces insufficient staff, which indirectly impacts the quality of treatment; as shown in Table 1.2, the percentage for both issues is pretty high. According to the Association of Private Hospitals Malaysia (APHM), President Datuk Dr Kuljit Singh, Malaysia requires more positions for medical talents and a reduction of supporting workers such as nurses and specialist doctors in the field. Additionally, as reported by National Audit Department (2019), the Malaysian healthcare institutions' emergency and trauma departments (EDT) are overcrowded, understaffed, and deficient in equipment to satisfy patients' needs. Therefore, integrating technology and using resources across public healthcare institutions must be more effectively and efficiently utilized to enhance the quality of care.

Backed by strong demand for public healthcare institutions' services, overwhelming population growth will eventually strain public healthcare institutions, decreasing the performance of institutions and burdening the management team in managing the increasing number of patients. Figure 1.1 represents the Department of

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Statistics Malaysia data regarding the population change in Malaysia from 1960 to 2080. The statistical figures clearly illustrate that the population has increased over the years. Furthermore, as the absolute and relative number of populations grows, the number of hospital admissions is expected also to increase. Intrinsically, this evolving climate poses enormous challenges for healthcare administrators to manage the data for registered patients either as inpatient or outpatient. Hence, healthcare institutions should have a reliable system to ensure that all the data is accurate and accessible.
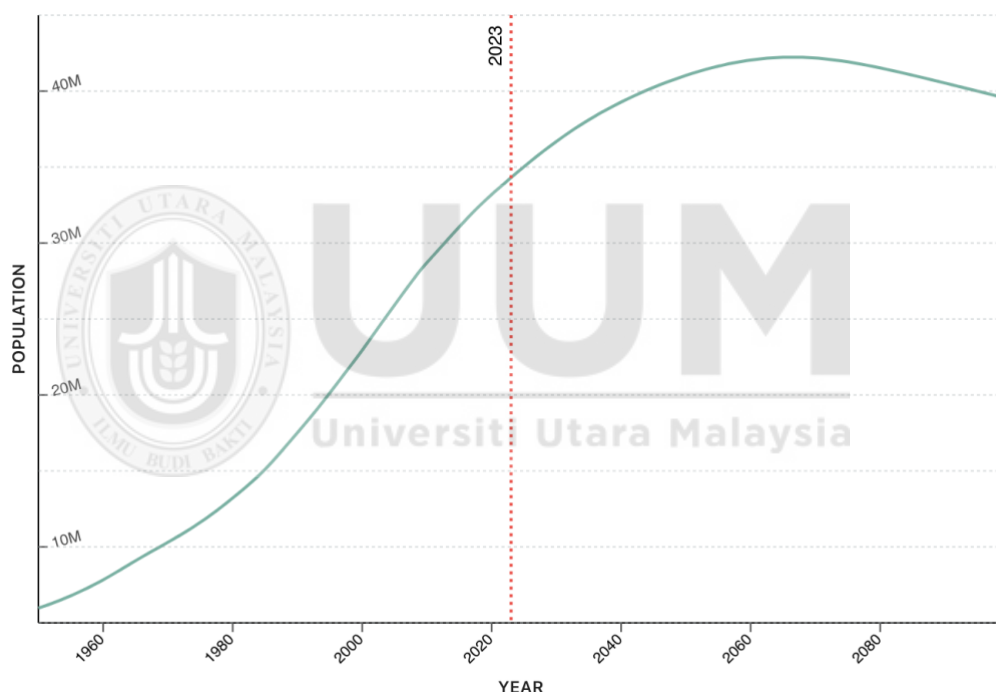
Figure 1.1
Population Change in Malaysia
Source: Department of Statistic Malaysia (2023)

Within such a context, strategies to improve information systems management in healthcare institutions are necessary. Implementing Hospital Information Systems (HIS) is one of the WHO initiatives to enhance healthcare institutions' efficiency and effectiveness in line with the various threats that attacked the institutions. Typically, the HIS helps healthcare institutions process information, data, and knowledge to

enhance patient care's quality and effectiveness (Hodge, 2012). Therefore, a well-functioning HIS is essential to providing excellent care and reimbursement for the care provided, as the HIS is considered a significant component of the entire healthcare system (Tummers et al., 2021).

In addition, HIS not only supports office automation functions but is also used to manage routine hospital data management, such as maintaining records of patient admissions and registration information, patient billing data, medical record management, patient care management, and general financial management (Zakaria & Mohd Yusof, 2016). Besides, an integrated HIS can provide the following technical advantages: system-wide data validation, application software parameterization, multi-level security, and multi-level authentication. Such technical benefits improve processing efficiency as data is entered only once, and there should be no duplicate or redundant data (Mohammadpour et al., 2021). According to Einbinder et al. (2010), healthcare professionals believed HIS offered many advantages over paper-based methods. In particular, the efficiency of processes in healthcare institutions has increased.

The development of HIS has seen great activity and innovation over the past ten years. This is primarily driven by the advancement of technology, including the interest they have generated in healthcare institutions. As a result, systems are being created to address the issues of patients and medical care experts. However, several obstacles in their implementation frequently result in system failure. In addition, healthcare professionals may have a negative impression of the HIS if it is unstable and difficult to use (Mohamadali & Aziz, 2017). Additionally, healthcare professionals

have difficulties in switching from manual processes because staff and patients are familiar with the process, hence making them slow to adapt to the new systems. Also, the large influx of patients visiting public health facilities makes transitioning to automated processes difficult.

Recently, the COVID-19 pandemic has spread rapidly and significantly strained many nations' healthcare institutions. The Chinese health informatics community, which includes clinical, public, consumer, and clinical research informatics, has actively utilized health information technology for various scopes, such as monitoring, detection, early warning, prevention, and control of epidemics (Reeves et al., 2020). Besides, the rising demand for COVID-19 treatment threatens global healthcare institutions. Concerns are growing about the healthcare institutions' ability to meet the immediate and compelling needs of COVID-19 patients. Hence, the recent COVID-19 pandemic serves as a sobering reminder of the unpredictable world.

The consequences of the COVID-19 pandemic are causing the efficiency of healthcare institutions in many countries worldwide to face various challenges, including Malaysia. According to Hing et al. (2022), the COVID-19 pandemic impacted Malaysian healthcare institutions regarding service operations, patient care capacity, and time spent with patients. As a developing country, Malaysia has issues like a shortage of healthcare professionals, strain on existing infrastructure and facilities as a result of long-term workload increases, poor service quality, low motivation among healthcare professionals, and the rate of information and communication technology usage is low (Shah et al., 2020; Hamzah et al., 2021).

Inadequate authority and management can thin out entire healthcare institutions (Hashim et al., 2021).

Based on the MOH's 2021 Annual Report, the number of healthcare institutions is increasing yearly, as shown in Table 1.3. For example, on January 27, 2021, Malaysia reached 190,434 COVID-19 cases, and about 59 hospitals owned by MOH screened patients under investigation and suspected COVID-19-positive patients. As a result, these hospitals have equipped more than 400 intensive care unit (ICU) beds, plus about 1,000 ventilators specifically for COVID-19 patients. Meanwhile, according to the COVIDNOW portal, Malaysia's previous record of daily COVID-19 cases was 24,599 on August 26, 2021, with 1,494 people admitted into the ICUs. Considering this situation, the explosive growth in health data volumes requires appropriate and effective data management.

Table 1.3
Health Facilities, Number of Bed Complement, and Bed Occupancy Rate in MOH

Facility	Year				
	2017	2018	2019	2020	2021
Number of Hospital	144	144	144	146	146
Number of Bed Complement	42,302	42,434	42,936	44,117	44,849
Bed Occupancy Rate (%)	60.75	68.75	70.01	64.72	77.52

Source: Health Informatics Centre, Ministry of Health Malaysia (2018, 2019, 2020, 2021, 2022)

In such circumstances, healthcare institutions must continue to modernize themselves to keep up with the fluidity of the industry, where breakthroughs are

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continuously being uncovered. On July 15, 2020, during the opening ceremony of the KPJ Healthcare Conference, former Deputy Health Minister, Datuk Dr Noor Azmi Ghazali, said the unprecedented COVID-19 pandemic over the past two years was indeed a wake-up call for healthcare institutions to acknowledge the gaps that need to be filled and work together towards the common goal of strengthening Malaysia's healthcare institutions. Granting that, HIS stand-alone could not correctly manage the healthcare institutions as it lacks some necessary helpful functionality. Hence, healthcare professionals are aware of the need for management information systems (MIS) as a potential full-fledged functionality to be embedded to overcome the shortcomings in healthcare institutions' management. Therefore, Health Management Information Systems (HMIS) is one of the subsystems in healthcare institutions that can improve individual and organizational performance.

Proper data storage and management in healthcare institutions can help the industry drive prevention initiatives, improve patient engagement, and reduce costs. Patients can also benefit from improved health record management in terms of more accessible access to data that can increase patient engagement and improve record accuracy. Consistent with Hussein et al. (2021), by ensuring that data is stored in a digital environment, HMIS aims to strengthen internal communication networks, improve patient satisfaction, raise the quality of care, and reduce costs. Most importantly, according to Demirel (2017), HMIS ensures data collection in a dependent manner, complete, and correct. Ultimately, the HMIS used to help healthcare professionals and managers make essential decisions must be redesigned through data integration, information, and knowledge.

In a world where rapidly changing technology and maturing organization performance increase competition to deliver healthcare services, it is crucial to understand how evolving HMIS technology works and the key factors impacting successful HMIS adoption. In other words, how the HMIS is built or acquired, how it is managed and maintained, how its functions are performed to support day-to-day operations, and finally, how the HMIS is used by the healthcare institutions and helps improve the organization's performance. Nevertheless, the HMIS must fit into the organisation's culture and work environment. As a result, in the context of adaptive and integrated management, the adaptive and integrated HMIS approach illustrated a holistic conception of the compatibility of various institutional components.

Therefore, this study investigates the influence of HMIS adoption's success factors derived from the Information System Success Model (ISSM) by DeLone and McLean (2003) towards improving healthcare institutions' performance. The public healthcare institutions in Malaysia equipped with HMIS were chosen. This study defines it as Health Management Information System. It refers to it an integrated system of computer systems throughout a healthcare institution developed to improve healthcare institutions' clinical and administrative functions (Kim et al., 2002). Nevertheless, the HMIS application is likewise evolved to coordinate with the significant clinical branches of the Ministry of Health, mainly regarding personnel, finance, and procurement.

1.3   Problem Statement

Malaysia has made great strides in improving health for a low-cost healthcare system funded by general revenue and providing universal and comprehensive services. Like many other nations in the region, Malaysia has strived to provide the highest quality patient care to achieve patient satisfaction. Poor service quality can lead to poor patient satisfaction, discourage the general public from using the health services provided, and have adverse health consequences (Ng, 2022). The increasing amount of patients in public healthcare institutions indirectly creates poor service quality, such as long waiting times, long response times, and overcrowded patients. As depicted in Table 1.4, the number of admissions and outpatient attendance in Malaysian public healthcare institutions recorded a high number yearly, even before the COVID-19 pandemic. Therefore, MIS is vital in ensuring that healthcare institutions can manage and organise patient data, leading to smooth operations and improving the service quality.

Table 1.4

Admissions and Outpatient Attendances in Public Healthcare Institutions, Malaysia

Category	Year				
	2017	**2018**	**2019**	**2020**	**2021**
Admission					
Hospital	2,337,291	2,581,708	2,687,181	2,336,400	2,258,022
Special Medical Institution	50,267	66,372	72,352	104,491	108,642

Table 1.4 (Continued)

Category	Year				
	2017	**2018**	**2019**	**2020**	**2021**
Day Care Attendance					
Hospital	1,523,325	1,561,638	1,731,545	1,690,302	1,609,041
Special Medical Institution	25,892	38,819	42,604	74,093	65,678
Outpatient Attendances					
Hospitals	20,764,242	21,392,212	21,590,312	16,635,350	14,505,623
Special Medical Institutions	341,078	335,631	358,428	250,427	443,156
Public Health Facilities	42,882,285	45,216,232	45,750,286	36,835,750	33,849,826

Source: Health Fact, Ministry of Health Malaysia (2018, 2019, 2020, 2021, 2022)

Data has been broadly used for a couple of pivotal errands, including the dispersal of public cautions, the sharing of case information, the tracing of contacts, and the preparation of facilities and supplies expected to oversee clinical and other general well-being assets, specifically throughout the strike of COVID-19 (Kalgotra et al., 2021). With the continued rise in hospital admissions during that time, as stated by Tan Sri Dr Noor Hisham Abdullah on June 27, 2022, the figure of admitted to hospitals per 100,000 people had increased by 28 per cent in Category 1, 14 percent in Category 2, and 45 percent in Categories 3, 4, and 5. Such a situation leads to a severe scarcity issue confronting health systems because of the unavoidable constraint of limited resources when demand rises. Through explicit or implicit admission and

discharge criteria, providing hospital care, particularly critical care, wastes time, money, or other demand management mechanisms. Healthcare institution is scarce in most nations, even during regular times. Due to an unprecedented increase in demand, the COVID-19 pandemic poses a challenge to existing rationing mechanisms, particularly for critical care and respiratory support, which may exceed supply in many countries, particularly during the pandemic's peak. Thus, proper data management is necessary to ensure that all patients are acknowledged for their presence.

Information technology's development and progress are exceedingly rapid; for an organization to use data as a foundation for management and information processing, application systems within various fields are essential, including hospitals. Most healthcare institutions have implemented HIS to facilitate information sharing, simplify record keeping, and improve decision-making. The implementation of HIS fulfils one of the dimensions as it can ensure the hospital's business procedures are always responsive, effective, and efficient. In addition, it comprehends the epidemiological situation and develops appropriate control measures; the existing HIS's capabilities to gather, transmit, and analyse critical health data in real-time is needed to quickly adapt and use for the operational response to the COVID-19 pandemic (Liu, 2021). According to the study by Herryawan et al. (2021), the effectiveness of HIS enhances Indonesia's healthcare efficiency. The researchers discovered that innovative information system (IS) development could increase a hospital's effectiveness and efficiency while reducing health services' complexity.

Nevertheless, more than this, HIS stand-alone is needed to provide a full-fledge of functionality within the health management environment. Effective management

largely depends on the availability and utilization of information for planning and decision-making within an organization. As a result, inappropriate decision-making, poor corporate planning, and irregular task schedule will occur if the important information required for organizational planning or decision-making are unavailable at the right time. Hence, it entails a further comprehensive system to be integrated into affecting its success, like Management Information Systems (MIS). Integrating HIS with MIS is known as Health Management Information System (HMIS).

In healthcare institutions, information management involves creating, utilizing, and integrating MIS into the health management environment to help the institutions systematically organise and improve their services. Such as receiving valuable data that can be used to improve services, diagnose, archive, and evaluate both communicable and non-communicable diseases. As a result, the Malaysian government has taken several measures to accommodate the rising number of patients in public medical facilities, including improving MIS applications in Malaysian Public Hospitals. In addition, it helps to record critical care and keep medical records to a maximum. From a broader perspective, HMIS enhances the overall effectiveness of healthcare institutions. This provides surmountable cost efficiencies for each hospital environment and enables efficient intra-facility response through the correct movement of information via the chain of command, timely communication between stakeholders, information sharing internally, and interagency with healthcare professionals (Balaraman et al., 2013).

Meanwhile, many studies and research, such as Luo et al. (2022); Arifin et al. (2020); Munz et al. (2020); Hwang et al. (2020); and Martins et al. (2019) have been

conducted regarding MIS adoption in organizations. However, these studies focused on different organization fields and limited empirical studies among healthcare institutions, especially in the Malaysian context. Thus, this situation fills a critical void in the existing literature by exploring Malaysian healthcare institution settings. Nevertheless, Malaysian healthcare institutions have started to embrace a successful technology strategy as recommended by the central government to enhance the effectiveness and efficiency of process workflow.

Besides, the nature of the research design used in congruent studies that investigated HMIS adoption and its impacts on organizational performance has yet to account for the factors that influence HMIS adoption success entirely. For example, previous studies regarding HMIS have been conducted by Chatterjee et al. (2022); Moukénet et al. (2021); Meghani et al. (2021); Gebre-Mariam et al. (2019); and Umezuruike et al. (2017) were in broad perspectives and not limited to the success factors of HMIS adoption. More importantly, little research has investigated the factors affecting HMIS adoption success towards improving healthcare institutions' performance. Further, not enough theories are used for a particular kind of HMIS study and a specific context of adoption in a healthcare institution.

Therefore, this study sheds light on the factors (information quality, system quality, and service quality) that influence the successful implementation of HMIS at Hospital Sultanah Bahiyah (HSB) and Hospital Sultan Abdul Halim (HSAH) of HMIS and thus affect the performance of healthcare institutions. A well-developed, implemented, and designed system is a prerequisite for improving an organization's performance. For context, this study builds on DeLeon and McLean's (2003)

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Information Systems Success Model (ISSM) to examine the factors that influence the success of adopting HMIS to improve the performance of healthcare institutions. The variables were focused on four items: information quality, system quality, service quality, and net benefits (impact on organizational performance).

1.4   Research Objectives

i.   To examine the influence of information quality on healthcare institutions' performance.

ii.   To determine the influence of system quality on healthcare institutions' performance.

iii.   To investigate the influence of service quality on healthcare institutions' performance.

iv.   To investigate the main contributing success factor of HMIS adoption among information quality, system quality, and service quality that influence healthcare institutions' performance.

1.5   Research Questions

i.   To what extent does information quality influence the healthcare institution's performance?

ii.   To what extent does system quality influence the healthcare institution's performance?

iii.   To what extent does service quality influence the healthcare institution's performance?

iv.   What is the main success factor of HMIS adoption among information, system, and service quality influencing healthcare institutions' performance?

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1.6   Scope of Study

This study examined the factors affecting the HMIS adoption success towards healthcare institutions' performance. Whilst the characteristics and impacts of MIS integration success in other industries have been well documented, the study related to success factors of HMIS adoption in healthcare institutions is poorly understood, specifically in the Malaysian context. Given the situation, the study will evaluate the factors influencing HMIS adoption success that will benefit healthcare institutions' performance.

The scope of respondents is limited only to healthcare professionals coordinating with HMIS in their daily tasks. Therefore, the empirical study in this research is restricted to the major hospitals in Kedah that fully adopted HMIS in their service operation; Hospital Sultanah Bahiyah (HSB) and Hospital Sultan Abdul Halim (HSAH), wherein the recruitment period will last no more than two weeks and will come to an end when either the number of respondents reaches the specified threshold.

1.7   Significance of Study

Healthcare institutions can be regarded as a significant and pertinent industry in which nations or societies can acquire knowledge of information systems (IS) and produce experiences relevant to local settings. In this regard, this study will give awareness to the institutions that aim to adopt and integrate MIS into their business management. Besides, adopting HMIS in healthcare institutions will help practitioners comprehend the connection between IS success and organizational performance. They will also show how quality infrastructure can improve decision-making and all other

aspects that influence an organization's capacity to implement its strategies and achieve high-performance levels.

In addition, reviewing this study based on the net benefit of organizational performance through the success of HMIS adoption in healthcare institutions may also benefit the government in continually enhancing healthcare institutions. Furthermore, the study will help researchers and scholars by adding knowledge in the IS field in healthcare institutions. Specifically, this study will benefit the academicians that intend to examine improving current health IS in healthcare institutions.

The researcher can gain valuable experience, and expand knowledge and skills, gaining through presented analysis. Indirectly, the researcher is not only examining the factors that influence the HMIS adoption success, which will eventually benefit the organizational performance, but this study also provides the opportunity for the researcher to give some recommendations for further improvement. Moreover, it can contribute to the growing body of knowledge as groundwork to further support researchers in evaluating the significant factors influencing information success in healthcare institutions.

1.8   Definition of Key Terms

Hospital Information System (HIS): enormous, computerised information systems that are built to handle all of a hospital's information needs, including patient, financial, clinical, and ancillary management. According to (Yang et al., 2021), an image communication system, a digital office system, a clinical information system, and a hospital management information system comprise a typical comprehensive HIS.

Management Information System (MIS): a system that transforms data into information and distributes it to managers at various organisational levels in the appropriate format. For effective management operations and business planning in any firm, Hasan Al-Mamary and Shamsuddin (2013) claimed that MIS's core is the collection, storage, retrieval, and broadcast of pertinent information.

Health Management Information System (HMIS): a system for better decision-making that records, stores, retrieves, and processes health data. According to Endriyas et al. (2019), HMIS is one of the six fundamental components of the health system. In addition, it provides the data necessary for other components like service delivery, the health workforce, access to essential medicines, financing, and leadership.

Healthcare Institution: organizations that provide inpatient and outpatient health care and related services like diagnostic or therapeutic services, laboratory services, pharmaceuticals, and other health services. Whether run for profit or not, a healthcare facility is typically called a hospital, nursing home, rehabilitation centre, or another single-site entity.

Organizational Performance: refers to the quality and way the organization's mission, tasks, and organizational activities are carried out. Organizational performance is also described as a group's ability to accomplish its goals and produce the best results. Organizational performance in today's workforce is the ability of a business to achieve objectives in the face of ongoing change.

1.9   Thesis Organization

Introduction, literature review, methodology, data analysis, and discussion and conclusions are the five chapters that make up this thesis. The research objectives for this study were described in Chapter 1 and a summary of the anticipated research. A literature review is presented in Chapter 2 to provide a broader context of the research question, objectives, and theory. This chapter's reviews include an overview of factors affecting HMIS adoption success that will impact organizational performance in healthcare institutions and the literature on each independent and dependent variable. Besides, this chapter also discussed the study's hypothesis and theoretical framework.

Next, the methodology of conducting this study is presented in Chapter 3. Selected quantitative methods are justified in this chapter, along with descriptions of selected embedded case study approaches. This chapter also discusses the ethical aspects necessary for data collection. Further, this study analyses and interprets research findings, including response rates, respondent profiles and descriptive results in Chapter 4. It provides respondents' survey results and highlights expected outcomes, emerging issues, and critical findings. Finally, Chapter 5 presents study considerations and conclusions, discussing the study's main findings, the study's limitations, and recommendations for the researcher in conducting further research regarding this topic.

CHAPTER 2

LITERATURE REVIEW

2.1 Chapter Overview

This chapter provides a comprehensive overview of the literature relevant to this study. Specifically, it is a literature review that includes an analysis of previous studies by various authors, definitions of terms, discussions, and critical assessments of past and current studies. This chapter also discusses the factors that influence the success of adopting HMIS to improve the performance of healthcare institutions. Based on the Information Systems Success Model (ISSM), this study addresses information, system, and service quality as determinants of organizational performance in healthcare institutions. This study's model and main concepts are explained in detail in the current chapter.

2.2 Healthcare Institutions in Malaysia

Malaysia's healthcare system is divided into two parts: public and private. The medical services were approximately 80% supplied by the government sector and accounted as the best services roughly. Figure 2.1 depicts the hierarchical pyramid-based structure of Malaysia's public healthcare system. At the bottom of the pyramid, various primary medical benefits (health centers, polyclinics, mobile clinics, obstetrics, pediatric clinics, etc.) are scattered throughout the country. One district hospital in each of the 120 districts will be supplied to the next level of state general hospitals in each state capital. Hospital Kuala Lumpur, the National Tertiary Reference

Center, is at the top of the pyramid and provides professional and ultra-professional services nationwide (Ministry of Health Malaysia, 2000).
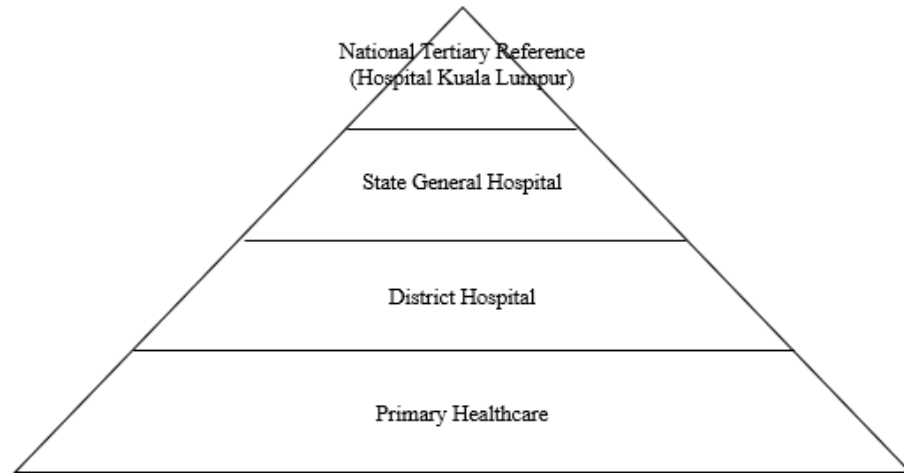
Figure 2.1
Hierarchical Health Structure in Malaysia
Source: Ministry of Health (2000)

Malaysians have accustomed themselves to readily available public healthcare services, which are highly subsidized, and hope it will continue to benefit the citizen (Lee, 2015). Access to healthcare is essential in ensuring good healthcare services for the general public, as depicted in Table 2.1.

Table 2.1
Newspaper/Media Reports on Accessibility of Healthcare in Malaysia

Date	Highlighted Issues	Sources
1 July, 2019	A quote from Datuk Dr Noor Hisham Abdullah on access to healthcare in Malaysia: "Ensuring that everyone, everywhere can access essential quality health services without facing financial hardship."	Twelfth Malaysian Plan (2021)

Table 2.1 (Continued)

Date	Highlighted Issues	Sources
2 February, 2020	The Malaysian government appears to be very committed to providing access to high-quality healthcare to everyone in Malaysia, which the Ministry of Health provides through clinics and hospitals nationwide.	MHTC (2020)

In Malaysia, under the public healthcare institutions, there are 146 hospitals and medical institutions under the government, with a total of 44,849 beds available. Meanwhile, in the private sector, there are 209 hospitals with 17,628 units of beds. The number of admissions in government hospitals is 2,440,891, and for private hospitals is 774,197 (see Table 2.2).

Table 2.2
Number of healthcare Institutions with Number of Beds and Admission for the Year 2021

Type of Healthcare Service	Public	Private
Units	146	209
Beds Quantity	44,849	17,628
Admissions	2,440,891	774,197

Source: Health Informatics Centre (2022)

2.3 Organizational Performance in Healthcare Institutions

Malaysia's public health system is plagued by increasing demand for better healthcare, changing demographics and the disease burden. Major healthcare reforms were debated within the government, involving social health insurance, single purchasers, and both public and private companies, but no definitive decisions were made (Croke et al., 2019). Like others worldwide, Malaysian hospitals face new challenges to improve equity and efficiency, ensure universal access, and enhance the quality of life of the general public. According to Ong et al. (2022), Malaysian public healthcare institutions face numerous obstacles, as approximately 80% of Malaysian require medical attention. As a result, this contributed to high healthcare costs, poor institution performance, and limited resources. Moreover, Rahman et al. (2021) and San (2022) stated that the most common issues encountered by Malaysian healthcare institutions are the quality of healthcare services provided, the availability of medical services, wait times, customer service, and a lack of drug prescriptions. Hence, there is a need for essential services for future healthcare systems, is information and personal education to support wellness paradigms, advice to stay healthy, or early treatment of illness.

Recently, specifically during the hit of the COVID-19 pandemic, healthcare institutions are increasingly receiving attention. The increasing patient flow intentionally puts more pressure on healthcare institutions' management to operate effectively. This situation in healthcare institutions brings an increasing number of specializations in the types and categories of tasks within healthcare practitioners and an increase in demand for distinct and individualized services that can be provided with the highest possible level of care. The number of resources available for each

patient or service, bed occupancy, and the average length of stay is the most common indicators in this situation.

To bring ease to healthcare practitioners, HIS was used as one of the most significant concepts in healthcare institutions. Ahani et al. (2016) asserted that several scholars have attempted to provide a clear understanding of the term 'Hospital Information System' by offering various definitions. As defined by Sneider (1987), HIS is just a network that allows information movement across all departments easier. Fiesch (2017), on the other hand, defined HIS as a computer-based system built to make it easier to manage medical and administrative information and make healthcare delivery easier. The definitions contrast with Vegoda (1987), who defined HIS as an integrated system that enables rational decisions based on the information provided; hence, it expands the user's knowledge and reduces uncertainty.

In addition, according to Adebisi et al. (2015), HIS is a collection of automated systems utilized in hospital administration and patient data management. They claimed that HIS includes data collection, processing, storing, and generating a report to speed up healthcare delivery and improve the hospital's efficiency. The statement was strengthened with the definition by Olusanya et al. (2015) as he indicated that HIS is an automated application of management information system to manage the administrative, clinical, and financial aspects of a healthcare institution to facilitate timely access to patient and departmental information as an aid in activity control. Therefore, the primary goal of HIS is to automate tasks like entering healthcare practitioners' orders and reporting test results, as well as to meet patients' needs, conduct research, improve quality care, and reduce costs (Hekmat et al., 2016).

In recent times, HIS has assisted in managing data or information about various departments, including paediatrics, dental, maternity, claim to process, and the laboratory (Thakare and Khire, 2014). Adebisi et al. (2015) insisted that healthcare institution that uses HIS have quick access to accurate data that explains in detail patients' demographic, medication distribution, and even patients' diets to help in monitoring the condition of patients and improve the healthcare institution's effectiveness. Nevertheless, Grandia (2017) stressed that the use of HIS in financial management started to gain attention in the 21st century, and the utilization for reimbursement-related billing purposes is increasing. Consequently, adopting MIS in healthcare institutions improves the health outcomes for the patients, thus ensuring quality and efficient services.

2.4 Hospital Information System (HIS) in Malaysia

The Total Hospital Information System (THIS), Intermediate Hospital Information System (IHIS), and Basic Hospital Information System (BHIS) were introduced by a Malaysian telehealth project (Ismail, 2013). The number of beds at a hospital will determine which HIS will be used. These criteria will classify hospitals with more than 400 beds as THIS hospital, 200 to 400 beds as IHIS hospitals, and hospitals with fewer than 200 beds as BHIS hospitals. Figure 2.2 illustrates different types of HIS in Malaysia.

BHIS	**IHIS**	**THIS**
Patient Management System + Clinical information System + Order Management and Reporting System + Billing System	Basic HIS + Pharmacy Information System + Laboratory Information System	Intermediate HIS + Radiology InformationSystem + Administration +Financial + Inventory + Personnel +Kitchen + Operating Room Management Systems + Decision Support + Case Mix System
Teleradiology and Teleconsultation Systems, Longitudinal Health Record System and Health Information Management Reporting System linkage to National Smart card system and E-government application and Lifetime Health Record application		

Figure 2.2
Scope of Different Types of HIS in Malaysia
Source: Suleiman (2008)

Currently, most hospitals in Malaysia are classified as THIS. Due to the Prime Minister's goal of making Malaysia a developed nation by 2020, the THIS project was first launched in Malaysia at the end of 1999 (Bakar, 2009). Hospital Selayang became the first hospital in Malaysia to incorporate IS into its structure in 1999, following with Prime Minister's vision (Hadis et al., 2004). In addition, Malaysia wanted to be the first hospital in the world to have a single HIS that covered all clinical and non-clinical aspects of hospital operations. This was created by incorporating various products or vendors into a comprehensive HIS for hospitals. CERNER and SIEMENS were the two vendors coordinated in the creation and execution of THIS.

The primary objective is to offer an integrated healthcare system capable of sharing data, automating work processes, boosting productivity, better-storing data, and utilizing data for pertinent medical statistics or research. By making it simple for healthcare professionals to access and exchange data, THIS also aimed to transform work processes, increase patient safety in disease management, improve record management and security, and improve workflow (Kumar et al., 2008). Furthermore, THIS is intended to give many qualities to the local clinical area and benefit patients such as knowledge transfer and knowledge management through technology, allowing trainee physicians to learn from experts anytime, anywhere, using the tools available (Li, 2010).

2.5   Management Information System (MIS)

Management information systems (MIS) produces timely, organized, and accurate data for managers and other users to use in decision-making, problem-solving, and activity control (Al-Zhrani, 2010). This is further supported by Sekhar (2007), that defined MIS as a system that gathers, processes, and provides managers at all levels with data for decision-making, planning, program execution, and control. For instance, based on the data extracted and summarized from the institutions, MIS helps to produce fixed and regularly scheduled reports to the users as the goal of MIS is offering management a solution to a problem.

On the other hand, David (2009) stated that MIS produces information to support management functions within an institution. Similarly, O'Neil and Adiya (2007) emphasized that institutions without formal information-sharing practices cannot utilize managers' intellectual capital for innovation and growth. This suggests

that MIS influences decision-making to improve service quality by facilitating the exchange of experience and transferring the necessary information to management levels to maintain a competitive advantage. In a nutshell, MIS is the link between the institution's components to improve efficiency and remain competitive in the market.

Currently, MIS dominates a permanent position of importance and is the institution's focal point attributable to the competitive advantage factor in various fields. By delivering information to users during the decision-making process, the MIS is a fully functional tool that greatly aids institutions in achieving their goals and objectives. Specifically, it can provide management with a new perspective on knowledge management and help implement and maximize initiatives to harmonise appropriate short-term and long-term planning strategies (Edmonson, 2022). As depicted in Table 2.3, several studies have been conducted to examine the influence of MIS adoption in a different field.

Table 2.3
Summary of Previous Study regarding MIS Adoption

Author (s)	Scope of Study	Research Field
Luo et al. (2022)	Knowing how to employ efficient data warehousing and data mining techniques in Electronic Bank Management Information Systems to give decision-makers accurate information and the quickest response times.	Bank
Arifin et al. (2020)	Evaluate seven factors that influenced personnel's use of the HRMIS to examine the impact of the adoption of the HRMIS in the Malaysian Armed Forces.	Military

Table 2.3 (Continued)

Author (s)	Scope of Study	Research Field
Munz et al. (2020)	Examining the features and applications of Farm Management Information Systems, as well as the roles that these systems play at the level of agricultural enterprises.	Farm
Hwang et al. (2020)	With the introduction of future mandatory hospitalisation policies and Admission Management Information Systems, an overview of the existing situation of mandatory hospitalisation and the growth of the mental health and welfare system is provided.	Hospital
Martins et al. (2019)	Predictors of net benefit include an understanding of student satisfaction with the use of Education Management Information Systems and student usage. In addition to ensuring student satisfaction and consistent use of the Education Management Information System, institutions must ensure its high quality.	Education

On the other hand, the development of MIS has significantly affected Malaysia's various financial institutions, and one of the institutions that have seen a significant application of MIS is healthcare institutions (Aghazadeh et al., 2012). In healthcare institutions, information is utilized by healthcare professionals in everyday work-related decision-making such as planning, staffing, coordination, and clinical

management for the creation of reports and budgets. The statement is further strengthened by Ujan et al. (2011), who highlighted that healthcare professionals in various units require information from other departments such as hospitals' facilities, human resources, inpatients and outpatients' data, and finance and billing to address the issues of patients by providing complex care with specialized knowledge and equipment.

To guarantee the day-to-day operations of healthcare institutions, adopting MIS consequently offered solutions to the challenges faced by the healthcare institution, such as performing manual tasks in medical records management. Besides, other significant reasons for adopting MIS in healthcare institutions are inefficiencies in manual data management due to the increase in health insurance coverage that need a healthcare institution to reimburse; hence the situation indirectly leads to slow workflow processes (Ahadzadeh et al., 2017). In consonance with Malliarou (2018), introducing MIS in healthcare institutions can reduce errors, speed up care delivery, increase accuracy, and potentially reduce healthcare costs by coordinating services and improving care.

As a result, adopting MIS has dramatically improved organizational performance. A study by Mathis (2006) revealed that MIS had become one of the most critical technologies to enhance organizational performance. It has been claimed that MIS accounts for more than 70% of the capital invested in the service industry. Most institutions face critical challenges in today's environments regarding high-quality performance, efficiency, and effectiveness. In light of these difficulties, Kaplan et al. (1992) stated that MIS emerges as a significant strategic independence that aids in

developing a competitive advantage and supports the survival of organisation. The adoption of MIS contributes to organizational performance improvement through its ability to efficient decision-making and strategic planning. Hence, Williams (2005) stressed that institutions must develop an innovative strategy that uses new technologies, particularly MIS, to compete in today's high-tech environments.

2.6   The Emerging Health Management Information System (HMIS)

The Health Management Information System, or HMIS, is emerging with the integration of MIS. It is a crucial component of strengthening the healthcare system because it enables healthcare professionals and managers to make sound decisions about improving healthcare services. According to Measure (2010), the HMIS was created to help healthcare institutions and organizations plan, manage, and make decisions. It can provide healthcare institutions with support and tools by producing high-quality data. HMIS is a broader system that encompasses the entire healthcare system. It involves collecting, processing, analysing, and disseminating healthcare data and information to support decision-making for healthcare policies and programs. HMIS seeks to improve health outcomes by providing timely and accurate information that enables effective planning, monitoring, and evaluation of healthcare services. Therefore, healthcare professionals can find the required resources straightforwardly in daily operations.

Situational, system, and medical complexity are just a few challenges healthcare institutions face in each dimension of healthcare facilities (Rahimi et al., 2018). Additionally, the HMIS is a unified whole comprising five essential components related to and interacting with one another: registration, order entry and

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reporting, clinical documentation, scheduling, and patient billing. Indirectly, these parts set the conditions for achieving the established objectives. In the meantime, space, time, or location at the right time and place, as well as data transmission and processing, including data analysis, manipulation, and presentation, are all factors that determine whether the information is valid or invalid (Ebnehoseini et al., 2019).

The HMIS of healthcare institutions can be used strategically to offer both outpatient and inpatient treatments to ensure patients are satisfied. Following the function that specifically involves patients, the HMIS facilitates the exchange of patient care and administration data and focuses primarily on the patients. At the point of care, the system gathers and records patient demographics and visits, and registration data will be displayed consistently and automatically. Hence, the information derived from the system is accurate, relevant, up-to-date, and in a format that can be used in various places and easily accessible to healthcare professionals. Febrita et al. (2021) claimed that regarding using HMIS, all departments must exchange high-quality data as the collection, storage, processing, and documentation of service transaction data contribute to the healthcare institution's performance and the quality of patient care. Based on Table 2.4, over the past years, several studies have been conducted in different scopes exploring the adoption of HMIS to ensure that HMIS is always relevant and beneficial to the organisation.

Table 2.4
Summary of Previous Study regarding HMIS

Author (s)	Scope of Study	Area of Study
Chatterjee et al. (2022)	Analyse the completeness and reliability of HMIS for India on fertility and infant mortality as key indicators of population health and the extent to which HMIS overlooks fertility and infant mortality.	Reliability of HMIS
Moukénet et al. (2021)	Analyse the validity of the HMIS data as it is today to determine its usefulness for decision-making..	Factors influencing HMIS's data accuracy
Meghani et al. (2021)	By studying organisational and organisational culture issues, look into the implementation of HMIS policy reforms to enhance the quality and use of HMIS data in decision making.	Organizational Factors
Gebre-Mariam et al. (2019)	Examine the random chains underlying HMIS digitization in developing countries. Four generative mechanisms of HMIS digitization have been identified: Project planning, computerization, built-in labelling and scaling.	Mechanisms of HMIS
Umezuruike et al. (2017)	A precise audit and work area approach was adopted to distinguish the different challenges that avoided the complete usage of HMIS in Uganda.	Challenges in HMIS implementation

Additionally, HMIS provides organized notes and flowcharts for online recording of clinical encounters in which healthcare institutions will eventually share the data, for instance, scheduling a patient for a doctor's appointment, test, and other related treatments. All billable health services, including private rooms and coverage outside the country, will be accessed and processed by this system (Hade et al., 2019). In terms of support from management, the implementation of HMIS is frequently well-received by managers because it helps manage healthcare institutions. Prior empirical studies on the benefits of HMIS for health services management are presented in the following section:

i. **Reduce cost**

The integration of MIS has contributed to reduced healthcare costs while simultaneously improving the quality of healthcare service delivery by eliminating double tasks and automating processes to allow employees to work more efficiently. The information flow accelerates when integrated system components communicate (Walker et al., 2005; Aghazadeh et al., 2012). Utilizing and implementing MIS is an effective method for reducing healthcare costs and can reduce the implicit and explicit costs of manually handling data and workflow with MIS. Additionally, Bardhan and Thourin (2013) found that using a financial management system is linked to lower operating costs for healthcare institutions when conducted a three-year longitudinal study in United States referred to the use of hospital information technology's archived data. Similarly to this, Borzekowski (2009) found that in a study on eight-year panel data from 1987 to 1994, the operational cost could be reduced by using financial and clinical information technologies, while Oliveira et al. (2011)

agreed to the same way in their descriptive study conducted in the United States.

ii.   Reduce Errors and Redundancy

With the adoption of HMIS, medical record redundancy and errors can be reduced. The advantages of HMIS include, but are not limited to, data completeness, timeliness, reliability, and correctness, according to a cross-sectional study by Takhti et al. (2021). Also, Maroofi (2016) added that HMIS provide high-quality data delivery whereby the use of HMIS turns the hospital operation into an environmentally friendly workplace by reducing waste from manual operations (Muno, 2010). In addition, in a thorough review of the literature, Waneka and Spetz (2010) argued that HMIS are essential for providing health care because they help enhance documentation quality by lowering prescription administration errors. Yet, research by Mahoney et al. (2007) on how integrated clinical information technology affects medical mistakes concluded that adopting HMIS in medicines management reduces both medical and prescribing errors.

iii.   Improve Patients Outcomes

A study by Aghazadeh et al. (2012) on the advantages of implementing MIS in healthcare institutions revealed that the use and implementation of MIS can improve patients' outcomes, hence improving the timely and accurate management of healthcare patients. On the other hand, Monu (2010) claimed that adopting MIS shortens patients' waiting time and thus improves patient health outcomes, in addition to customer service and patient satisfaction.

Besides, in a three-year longitudinal study employing comprehensive panel data, Bardhan and Thouin (2013) discovered a positive link between using clinical information systems and patient scheduling software and adhering to the best practises for managing heart attacks, heart failure, and pneumonia. Moreover, McCullough et al. (2016) conducted qualitative study and the result showed that HMIS helps patients with chronic medical issues.

iv. Improve Efficiency and Productivity

Patients' satisfaction is said to be improved by introducing MIS in healthcare institutions. The HMIS can generate a diagnosis report for patients with a single click, suggesting that HMIS can boost the productivity and efficacy of healthcare practitioners (McCullough et al., 2016). In addition, with the implementation of HMIS, patients can be better followed up even when they are at home, which better management of patient healthcare in a timely and accurate manner (Aghazadeh et al., 2012). Furthermore, Oliveira et al. (2011) descriptive study in the United States demonstrated that HMIS adoption improves patient care services and the quality of health practitioners. In addition, Waneka and Spetz (2010) argued in a systematic review of the literature that HMIS is crucial to the provision of health services because it contributes to the improvement of quality documentation, reduces errors in medication administration, and encourages health professionals to have a positive attitude and a high level of satisfaction.

2.7   DeLone and McLean (D&M) Model

The topic of IS success has been mentioned over the years by several researchers, such as Chen et al. (2022); Martono et al. (2020); Yoo (2020); and Alzahrani et al. (2019). Various organizational performance indicators as dependent variables were used empirically and through case studies to examine the success of IS. For instance, the studies conducted by Mehta et al. (2022); Al-Okaily (2021); and Hwang and Lim (2021) postulate that IS successful only if it contributes to organizational effectiveness. However, such attempts are infrequent due to the inherent difficulty of isolating IS's contribution to organizational performance from other contributions. Many studies have adopted or adapted DeLone and McLean (D&M) models in their studies to assess and measure the success of IS in different settings. Furthermore, IS success is most often defined very subjectively. For example, from a user's perspective, a successful IS responds quickly to requests and improves user performance. On the other hand, Dahr et al. (2022) and Garousi Mokhtarzadedeh et al. (2022) see success from an organizational perspective in terms of profit, competitive advantage realization, and user acceptance.

It is worth noting that considering for use the D&M model is the most plausible in the context of IS success or effectiveness. The first reason is that it is a comprehensive assessment framework in which multiple empirical studies have validated the proposed associations (Urbach et al., 2010). Second, proposed success dimensions can be evaluated using a variety of validated measures (Petter et al., 2008). Moreover, it is currently the most widely used measurement model in the IS success field (Wu & Wang, 2006). Lastly, some scholars contend that, depending on the objectives and goals of the proposed study, models can be applied to multiple levels

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of analysis (Gorla et al., 2010). Therefore, previous studies have examined some or all of the models or modified and extended them by adding some factors. Table 2.5 below summarizes the primary empirical studies that apply the D&M model to organizational-level analysis.

Table 2.5
Summary of Previous Study regarding D&M Model

Author (s)	Scope of Study
Al-Okaily et al. (2021)	Positive effects of high-quality data, systems, and services on user satisfaction and perceived usefulness as precursors to advantages for Jordanian ERP companies.
Ali et al. (2016)	Analysing the organisational performance allows for an empirical investigation of the three success indicators of system, service, and information quality in the context of accounting information systems.
Ifinedo et al. (2010)	Investigated empirically factors influencing the ERP post-implementation. Established a theoretical framework for ERP success that excluded the D&M Model's intermediate dimension (use and user satisfaction), as well as adding the impact on workgroups.
Pérez-Mira (2010)	Website level analysis was used to examine the validity of the D&M model, and direct paths from the quality factor to the net benefits were included (sales). The study's findings back up the use of the D&M model to describe the dimension at the organisational level of analysis.
Petter et al. (2008)	Examining issues related to the measurement of different structures within the D&M model, assess inconsistencies between studies in terms of context and structure, and thus examine levels of analysis between individuals and organizations.

However, all of these review studies used D&M models to validate the success of various ISs, and none focused on validating D&M IS success models in relation to healthcare institutions. Equally important, especially in light of the use of HMIS in healthcare institutions, there is currently a lack of clear proof regarding the net benefit prior at the organisational level of the study.

The relevant theory of the Information System Success Model (ISSM) will be discussed in the following section. The HMIS is regarded as a specific component of the IS in this study and is essential for all healthcare institutions; therefore, the researcher chose an ISSM-based theoretical model that was designed by DeLone and McLean to investigate the HMIS's success. The model is discussed in further detail in this section:

2.7.1 Information System Success Model (ISSM)

The DeLone and McLean (D&M) model, which was modified in 2003, is one of the Information Systems Success Models (ISSMs) that is used most commonly in information systems research. As seen in Figure 2.3 below, this model seeks to capture the interconnected process character of the IS success components. The system, information, and service quality; (intention to) use; user satisfaction; and net benefits are the six interrelated characteristics of IS success that make up the model. The arrows denote the suggested connections between the success metric dimensions.
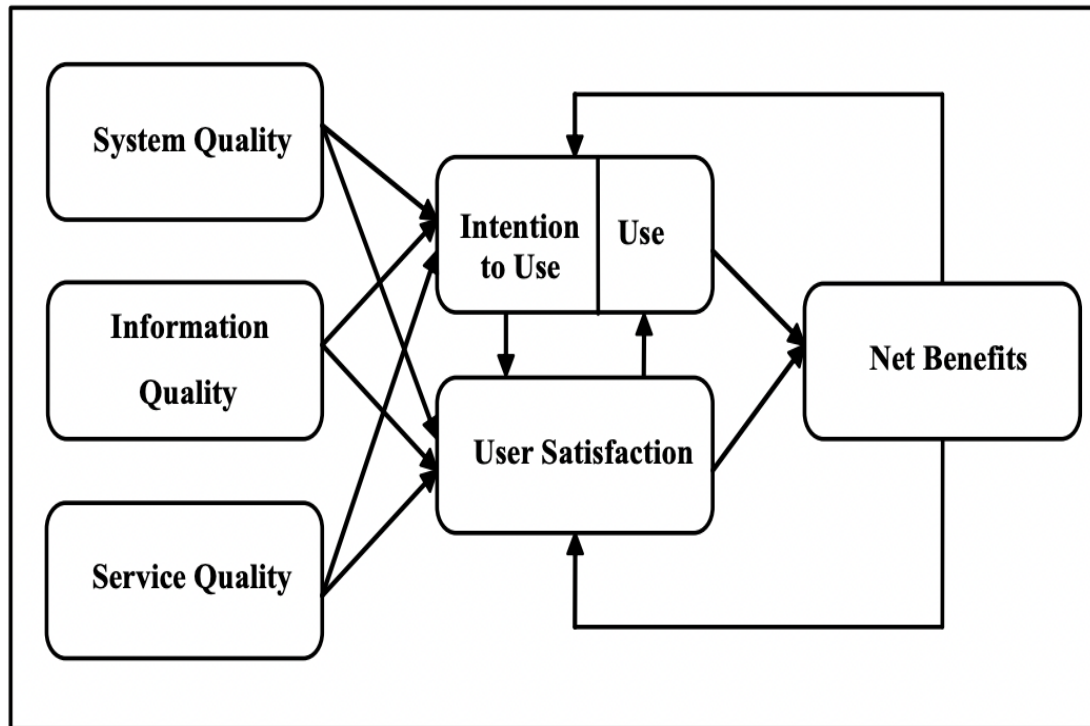
Figure 2.3
DeLone and McLean Information System Success Model
Source: DeLone and McLean (2003)

The model can be understood as a system that can be assessed in terms of the
quality of information, systems, and services by looking at its structure and linkages.
User satisfaction and subsequent use or intention to use are influenced by these
characteristics. Using the system results in a specific benefit, and the net benefit has
an effect (positive or negative) on user satisfaction and ongoing IS use. The following
defines the ISSM categories:

i. **System quality**

According to DeLone and McLean (2016), an information system's desirable
features are desirable for ease of use, system adaptability, system
dependability, learnability, intuition, maturity, flexibility, and responsive
system characteristics. According to Bharati and Chaudhury (2004), other

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sources define system quality as the overall performance of an information system, while DeLone and McLean (1992) defined system quality as the preferred characteristics of information systems that produce information that users need to use.

ii. Information quality

DeLone and McLean (2016) state that the ideal qualities of information include relevance, understandability, accuracy, conciseness, completeness, timeliness, and simplicity of use for system output (administrative reports and web pages). Information organisation, accuracy of accuracy, relevance, completeness, and timeliness are frequently used qualities of information quality. Petter et al. (2008) describe information quality as the necessary criteria demonstrated by information created through IS.

iii. Service quality

Service quality refers to the calibre of assistance provided by the IT support team and IS organisation to system users. For instance: the IT staff's responsiveness, correctness, dependability, technical know-how, and empathy (DeLone and McLean, 2016). Additionally, studies of IS success have demonstrated a connection between IS success inside an organisation and the services offered by IS support persons or departments (Jiang et al., 2012; Petter et al., 2008).

iv. System use

System use refers to how customers and employees use information systems, including their degree of use, frequency, type of use, appropriateness, extent of

use, and purpose (DeLone and McLean, 2016). The broad idea of measuring IS usage can be approached from various angles. Actual use of IS may be a good indicator of success for voluntary use. Previous research by Wang (2008), Al-Mutairi et al. (2005), and DeLone and McLean (2003) recorded connection time, features used, or frequency of use to measure the system usage.

v.   User satisfaction

User satisfaction, according to DeLone and McLean (2016), is a purely subjective indicator of how satisfied a user is with reports, websites, and support services. This is one of the most crucial signs of IS's success. When IS is mandatory to use, measuring user satisfaction is useful, whereas the frequency of use is not a good indicator of system success.

vi.   Net benefits

The net benefit is how an information system promotes the success of people, groups, organisations, businesses, and nations. DeLone and McLean (2016) list some advantages as decision-making, productivity, higher sales, lower costs, higher profits, corporate performance, and economic growth. The impact will depend on the assessed system, the study's purpose, and the analysis level. For example, usage and user satisfaction correlate with net benefit, but net benefit should be measured directly.

2.8   Organizational Performance in the Service Industry (Hospital)

An organization is regarded as an entity with goals, a set of members, behaviour rules, and a degree of authority dispersion. On the other hand, Carton and Hofer (2006)

defined the term 'performance' as the degree to which a company's designated activities meet the expectations of its stakeholders. Alternatively, organizational performance is a process that uses planned interventions to improve an organization's effectiveness and members' well-being by increasing organizational development to affect performance (Jon and Randy, 2009).

However, because performance is still a constant issue, organizational researchers have divergent opinions about it. For example, Cascio (2014) defines organisational performance as measured work performance, intangibles, customer retention, and service quality. The idea is quite similar to Richard (2009) as he found that the key indicators of the performance in business were profitability, customer satisfaction, product performance, and market share. To the same degree, García-Morales (2008) stated that organizational performance must contain the 3E aspects: economy, efficiency, and effectiveness. These definitions legitimize that associations should be directed by accurate execution measures while assessing employees' work-based execution. Additionally, it aids in developing strategic plans for the organization's future performance and evaluating the achievement of organizational goals (Ilies and Metz, 2012).

In this context, managers must know the factors influencing organizational performance to initiate that (Victoria et al., 2021). Managers are responsible for finding methods that specifically approach organizational performance with knowledge of employee skills and competencies. In addition, organizational performance examines how an organization's actual output compares to its intended output. Another way to gauge an organization's performance is to look at how well it

differentiates itself from the competition in cost and customer satisfaction. Improving organizational performance is a management control function that entails devising plans to guarantee that the objectives and missions of an organization are met with the resources at their disposal.

Therefore, healthcare institutions must measure and manage their performance to guide decision-making and motivate practitioners. Decision-making in healthcare development is heavily influenced by the quality of care provided by healthcare institutions, which has evolved into a common strategic objective for healthcare institutions and practitioners. In healthcare institutions, micro-level performance measurement can be used to measure the level of performance by evaluating using various criteria and dimensions. Improving organizational performance in healthcare requires identifying the fundamental values that underpin service delivery. The World Health Organization (WHO) and the Organization for Economic Co-operation and Development (OECD) work together to determine the health status of different countries and account for differences in performance between similar countries to improve the performance of all systems.

In addition, different key performance indicators are helpful for other strategies (Hyvonen, 2007). However, many arguments exist in the performance measurement literature that objective or subjective measurements yield the most valuable results. For example, according to Richard et al. (2009), objective (financial) measurements tend to be more specific but are often restricted to financial data. It also often limits the range of companies that can be included in a study, as objective measurements for valid comparative purposes require companies from a single industry (Allen et al.,

2007). Yet, compared to competition statistics, subjective (perceptual or non-financial) measurements frequently give researchers a more thorough account of an organization's effectiveness (Richard et al., 2009; Allen et al., 2007). Based on this defence, this study chose subjective evaluations of company performance over objective ones. This was because the unavailable objective data and research sample included sectors such as finance, services and industry.

2.9   Research Framework

DeLone and McLean's (2003) model is the theoretical framework for this study because it is the most comprehensive model for studying information system success and measuring IS evaluation. However, the researcher modified the D&M model by excluding intermediate variables of the model; system use and user satisfaction. The reason is that Gable et al. (2008) stated that system use is not a dimension, but it serves as an antecedent of IS success. Furthermore, regarding organizational performance, several analysis by Infinedo et al. (2010); Gorla et al. (2010); and Hseih et al. (2007) discovered that system use is not an appropriate indicator of success as in adopting organization, it is mandatory to use the system. The same applies to the case of the HMIS, as the system is compulsory to adopt in the selected healthcare institutions used for this study. Thus, this study involved the research framework as illustrated in Figure 2.4.

Independent Variable   **Dependent Variable**
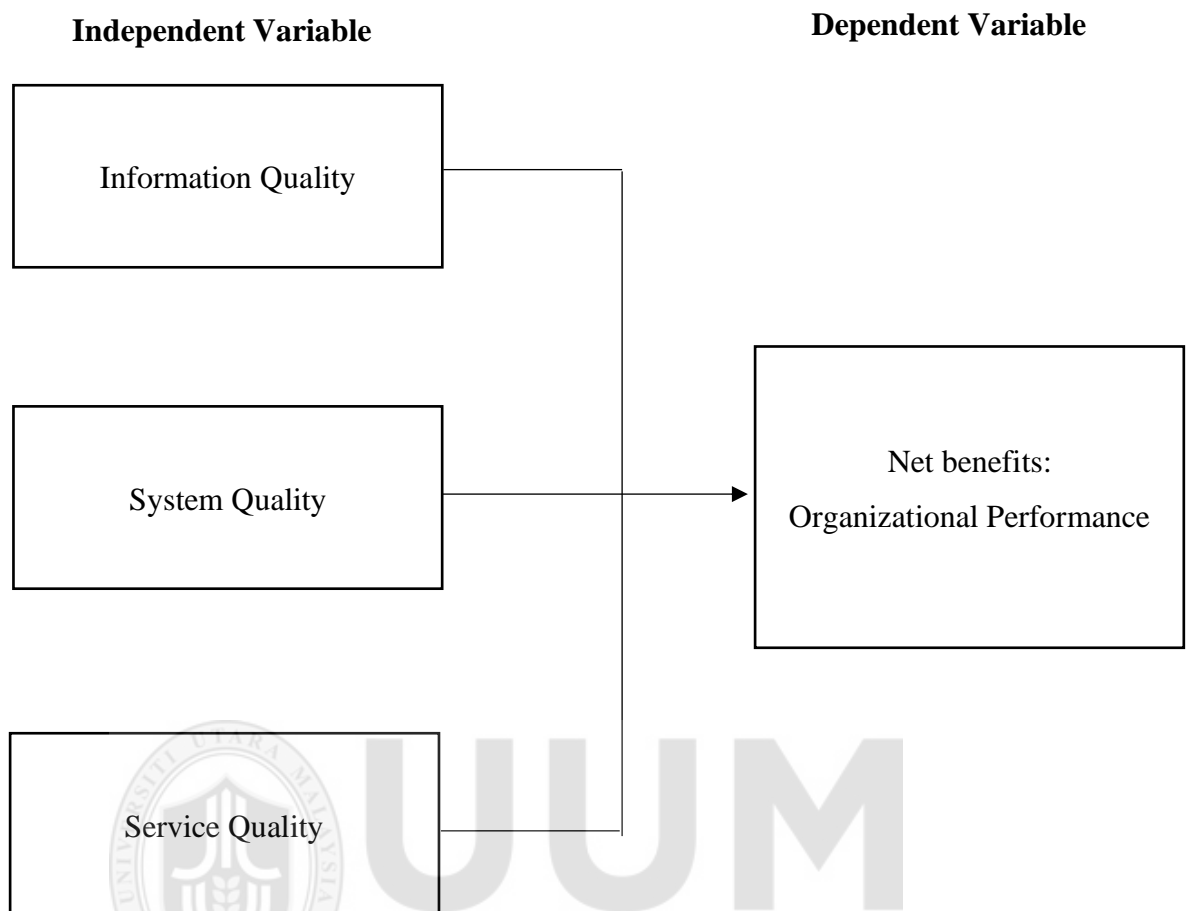
Figure 2.4
Research Framework

2.9.1   Information Quality and Organizational Performance

Information quality has received high interest from researchers in the IS domains. DeLone and McLean (2016) defined information quality as the desired characteristics of an information system's output in accuracy, understandability, relevance, concision, completeness, timeliness, and usability. Besides, Gorla et al. (2010) claimed that information is an essential aspect of any IS system, so it ought to have the fundamental qualities of idealness and dependability that influence execution. This is because poor information quality will harm the users, making it difficult to

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achieve strategic goals and decision-making (Mukred et al., 2017). Then again, high information quality regarding information content can prompt high hierarchical advantages regarding market data support and inward authoritative proficiency (Ali et al., 2016). Therefore, the researcher proposed the hypotheses (H1) as follows:

H1: Information quality has a significant influence on the organizational performance of healthcare institutions.

2.9.2 System Quality and Organizational Performance

DeLone and McLean (2016) viewed system quality as technical regarding accessibility, reliability, system functionality, response time, ease of navigation, sophistication and flexibility. An essential prerequisite for generating profit for an organization is a properly designed, developed and implemented system. Systems that improve user performance are expected to correlate positively with organizational performance (Argyropoulou et al., 2015). The statement is further supported by Hendrick et al. (2007) as they claimed that the business process improvement resulted from a well-designed system, and software consolidation increases profitability, thus helping companies gain a competitive advantage. In contrast, poorly designed and built systems are more likely to lead to occasional system crashes that adversely affect business operations, increasing organisation costs and driving away corporate clients (Shagari et al., 2017). Thus, this leads to the hypothesis (H2) formation as follows.

H2: System quality has a significant influence on organizational performance of healthcare institutions.

2.9.3 Service Quality and Organizational Performance

Using the revised model presented by DeLone and McLean, service quality is the third quality dimension to measure IS success. It exemplifies the accuracy, responsiveness, technical competence, dependability, and empathy users receive from technical support staff and departments (Petter et al., 2013). According to Bernroider (2018), as a prerequisite for IS success, it is worth noting the characteristics of a good IS provider, which have been widely discussed. The right provider must deliver high-quality services because they are linked favourably to client retention, increased profitability, higher revenue, and competitive advantage (Shagari et al., 2017). Moreover, users can be better served by anticipating their wants and offering quick, dependable service while being aware of their unique requirements. Hence, the researcher put up the following hypothesis (H3).

H3: Service quality has a significant influence on the organizational performance of healthcare institutions.

CHAPTER 3

METHODOLOGY

3.1   Chapter Overview

The methodology chapter is a foundation for answering fundamental research questions. Research design, population, sample, and data collection procedure are discussed in-depth in this chapter. The details of how the data were analysed using statistical methods also discussed.

3.2   Research Design

The current study aims to understand the factors influencing HMIS adoption success toward the organizational performance of healthcare institutions. This study employs a quantitative research methodology to accomplish the stated objectives. Quantitative study tests relationships between variables and proves hypotheses to investigate objective theories (Creswell, 2011). This study employs a quantitative research method because the primary objective is to test hypotheses regarding the relationships between the research variable. Besides, Creswell (2011) considered this approach formal, objective, and systematic. Zikmund et al. (2010) claimed that researchers could accurately and confidently summarize numerical statistics using a quantitative approach. In addition, the researcher selects quantitative research to reach many respondents, which helps the survey itself. Many respondents can indirectly help gather the targeted respondents required for the survey. Finally, quantitative methods allow researchers to test theories and models that explain behaviour and the effects

between variables rather than developing theories (Hair et al., 2016). Researchers, therefore, have rational reasons to choose a quantitative approach for this study.

3.3 Data Sources

Data sources are primary and secondary sources. According to Sekaran and Bougie (2016), primary data refers to data collected by researchers for research. In contrast, secondary data refers to earlier data collection, such as government reports, institutional reports, and publications from corporations and departments. Primary data collection was used to gather information regarding the subject of this study. For instance, questionnaires were used to gather data from professionals at selected healthcare institutions. The respondents to this survey have direct evidence of how business performance is affected by HMIS adoption success factors.

3.4 Population and Sampling

A focused group on the purpose of investigation and collecting the information known as the population. One of the most critical decisions that must be made for any research project is who the study's target population is. The targeted population is healthcare employees at Hospital Sultanah Bahiyah (HSB), Alor Setar and Hospital Sultan Abdul Halim (HSAH), Sungai Petani. These two healthcare institutions were selected because they are among the largest hospitals in Kedah that fully integrate HMIS into their operation. Besides, the researcher considered this area an excellent location to get the information needed for this research because of the hospital's ability to accommodate vast numbers of patients and even became a full COVID-19 hospital. Hence, these hospitals can provide a view regarding HMIS adoption in a standard and pandemic situation.

This study utilized the data of the entire target population to determine the number of participants that would constitute an adequate sample size, as exhibited in Table 3.1.

Table 3.1
Total Number of Staff at HSB and HSAH

Healthcare Institutions	Number of Staff
Hospital Sultanah Bahiyah	4, 392
Hospital Sultan Abdul Halim	2, 815
Total	7, 207

Source: Annual Report HSB and HSAH

Based on the total healthcare employees of both healthcare institutions of around 7,207 employees. Krejcie and Morgan's (1970) formula and table were referred to determine the sample size.

$$n = \frac{(\chi 2)(N)(P)(1-P)}{[(d^2)(N-1) + (\chi 2)(P)(1-P)]}$$

where,
n = the required sample size
χ^2 = table value of chi square for 1 *df* at desired confidence (generally 95%) level
N = the population size
P = the population proportion (generally assumed to be .50 to maximize sample size)
d = the level of accuracy of the estimate expressed as a proportion

Figure 3.1
Krecjie and Morgan (1970) Formula
Source: Johnson and Shoulders (2019)

Hence, by using the formula as illustrated in Figure 3.1, assuming a desired margin of error of 5% (e = 0.05) and a 95% confidence level (alpha = 0.05), we can

consult Krejcie and Morgan's (1970) table to find the corresponding value for the sample size. In this case, the minimal sample size of 364 was obtained from the table for a population size of 7,207 and a margin of error of 5%.

The sampling technique relies on a non-probability sampling design. It is a purposive sampling that deliberately chooses respondents based on how well they can explain a particular idea, phenomenon, or theme (Piaw, 2005). The rationale for using purposive sampling because that easy to reach the person correlated to the topic of study (Palinkas et al., 2013). Hence, the sample was chosen among healthcare employees but not limited to the one handling patient care only; staff from management departments were also included.

3.5   Unit of Analysis

A research unit must be designated to address the research questions. Information system success reveals that the relationship between IS success factors and business performance still needs to be more conclusive. Therefore, researchers should be able to assess and answer relevant questions for those assessing the impact of IS success on organizational performance (Peter et al., 2008; DeLone & McLean, 2012). The most common unit of analysis in this study is the individual. Therefore, a healthcare professional serves as this study's analysis unit.

3.6   Instrumentation

A questionnaire was generated to gather data based on research questions and objectives. This is done so that the researcher can gather the information they need to conclude at the end of this study. As a result, the questionnaires have three sections,

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with a cover sheet that includes the study's title, logo, university name, purpose, and target group. Demographic data comprise the questionnaire's first section; The study's main variables—information quality, system quality, and service quality—are measured in the second section, and organizational performance is measured in the third section. The questionnaire for this study included the research objective, conceptual framework, hypothesis, and literature review. This study measures the organizational performance of Malaysian healthcare facilities by employing established and validated questionnaires. As shown in Table 3.2, the questionnaires for this study were adapted from previous research.

Table 3.2
Constructs and Sources of Instrumentations

Variables	No. of Items	Scales	Sources
Information quality	8	5-point Likert scale	Chang et al. (2012) Laumer et al. (2017)
System quality	9	5-point Likert scale	Azeez et al. (2019) Chang et al. (2012)
Service quality	7	5-point Likert scale	Chang et al. (2012) Laumer et al. (2017)
Organizational performance	10	5-point Likert scale	Alene (2018) Awan et al. (2016) Azeez et al. (2019) Chang et al. (2012)
Demographic factor	8		Author
Total	**42**		

The study employed 5 points of the Likert scale (Likert, 1932). Due to their adaptability, reliability, and simplicity, Likert scales are frequently utilized in

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quantitative research (Hodge & Gillespie, 2003). Validity and reliability can be enhanced by increasing the number of evaluation points, Preston and Colman (2000). In this manner, the polls in the review were estimated utilizing a 5-point Likert scale, which was evaluated from 1 (strongly disagree) to 5 (strongly agree) for each survey variable question. Table 3.3 shows each point on the scale for illustration.

Table 3.3
Five-Point Likert Scale

1-point	2-point	3-point	4-point	5-point
Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree

3.7   Variables Measurement

Based on previous research, the questionnaire included 34 measurement points (see Table 3.4). Some items have been slightly rewritten to fit the HMIS context.

Table 3.4
Variables Measurement Items

Construct		Items Description	Adapted
Information Quality (IQ)	IQ1	The information presented by the HMIS is accurate.	Chang et al. (2012)
	IQ2	The information generated by HMIS is always in a timely manner.	Laumer et al. (2017)
	IQ3	The information presented by HMIS is easy to understand.	
	IQ4	The information provided by HMIS is essential for the decision-making process.	

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Table 3.4 (Continued)

Construct		Items Description	Adapted
Information Quality (IQ)	IQ5	The HMIS provides more current (up-to-date) information.	Chang et al. (2012)
	IQ6	The HMIS generates information that instantly and rapidly responds to users' demands.	Laumer et al. (2017)
	IQ7	The information presented within the HMIS is well laid out.	
	IQ8	The content and information in the HMIS are beneficial to the organizational business processes.	
System Quality (SQ)	SQ1	The HMIS is easy to use.	Azeez et al. (2019)
	SQ2	The user interface designed in HMIS is human-oriented.	Chang et al. (2012)
	SQ3	The functions of the HMIS meet users' requirements.	
	SQ4	The HMIS is always available.	
	SQ5	The HMIS is regularly maintained and examined by the IT department.	
	SQ6	The HMIS responded fairly and quickly to commands.	
	SQ7	The HMIS makes information easily accessible.	
	SQ8	Users are aware and clear about every hospital health management information system (HMIS) function.	
	SQ9	The HMIS gives users adequate information on business processes.	
Service Quality (SV)	SV1	The technical support staff correctly delivers the service requested by users.	Chang et al. (2012)
	SV2	The technical support department shows a sincere interest in solving the problem conveyed by the user.	Laumer et al. (2017)

Table 3.4 (Continued)

Construct		Items Description	Adapted
Service Quality (SV)	SV3	The technical support staff has the knowledge to answer questions related to HMIS.	Chang et al. (2012) Laumer et al. (2017)
	SV4	The technical support staff provides help to the user promptly.	
	SV5	The technical support staff is provided and completed on time.	
	SV6	The staff technical support is always available when needed.	
	SV7	The HMIS can be relied on to provide information when needed.	
Organizational Performance (OP)	OP1	Adoption of HMIS will help reduce the time allotted to accomplish tasks.	Alene G. (2018) Awan et al. (2016) Azeez et al. (2019) Chang et al. (2012)
	OP2	Adoption of HMIS improves employee job performance.	
	OP3	The HMIS facilitates easy access to patient information.	
	OP4	The adoption of HMIS helps increased user satisfaction.	
	OP5	The adoption of HMIS facilitated the exchange of organizational data quickly.	
	OP6	The HMIS helps to improve the operation process within the hospital.	
	OP7	The adoption of HMIS helps to improve patient care delivery.	
	OP8	The adoption of HMIS will increase the productivity of the hospital.	
	OP9	The HMIS will help to enhance hospital effectiveness by reducing errors and redundancy.	
	OP10	The HMIS will provide a competitive advantage to healthcare institutions.	

Note: For more details, please refer to Appendix A

3.8 Data Collection Method

This study employs a quantitative research strategy for data collection. Data from healthcare employees at HSB and HSAH were gathered using a survey questionnaire. Healthcare employees were asked to respond to the survey based on their experience with HMIS usage. The researcher surveyed through an online survey with the help of HSB's and HSAH's staff in distributing the questionnaire's URL address among their colleagues in various departments. An introduction message and invitation via the URL link to the representative healthcare employee from Sultan Abdul Halim Hospital. This online survey is flexible as, to answer the questionnaire, respondents need to connect on the "URL link", and it will direct them to the online questionnaire. Finally, after completing the survey, participants click the "Submit" button, and the researcher will receive it in the survey database. After the researcher found out the response rate from the respondents was low, this study was initiated by distributing the questionnaires in hardcopy forms to get more respondents and double up the response rate. The questionnaire forms were handed and collected back from several staff at HSB and HSAH.

3.9 Data Analysis Procedure

The researcher collects and enters the data for each survey questionnaire into a computer. The researcher used the statistical Package for Social Science (SPSS) to analyse the data. For academic researchers, SPSS is the most widely available and commonly used comprehensive statistical computer program. In the data processing and analysis stage, researchers convert the data into a format that will answer management's questions through a series of interconnected procedures.

The researcher used the following data analysis in this study. The validity of the questions is evaluated during the initial test. Next, the value of reliability coefficients was measured using Cronbach's Alpha. Descriptive analysis was then used to analyse the data. The descriptive analysis calculates and interprets the data based on the frequency and descriptive criteria. The descriptive analysis evaluates the demographic, independent, and dependent variables. The categorical variables were investigated using percentages and frequencies, while the continuous variables were examined using the mean and standard deviation.

Using inferential statistics, the proposed hypotheses were tested in this study. With two distinct types of analysis, the researcher has put the hypotheses to the test. To start, Pearson Correlation investigates the association between the variables: information quality, system quality, service quality, and healthcare institution organizational performance. Then, multiple Regression analysis is applied to see how IS success factors like information, system, and service quality affect healthcare institutions' organizational performance.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

4.1 Chapter Overview

Data analysis and results are presented in this part. Survey data consisted of responses from healthcare professionals working for HSB and HSAH. In addition, the statistical data obtained through SPSS analysis are presented in this chapter. The part subsections that make up this section incorporate the profile of respondents, descriptive analysis, and inferential analysis.

4.2 Profile of the Respondents

As previously mentioned, gathered data comes from HSB and HSAH healthcare professionals. Following survey requirements, researchers distributed the questionnaire to 400 healthcare professionals. However, the questionnaires with complete evaluations were only returned by 368 healthcare professionals employed in HSB and HSAH. The respondents' background consists of gender, age, marital status, job position, department, working services, job status, and education among healthcare professionals in HSB and HSAH (refer to Table 4.1).

The analysis using SPSS revealed that 78 respondents were males (21.2%) and 290 (78.8%) were females. The statistics show that most of the respondents were female. Next, the frequency result shows the age groups of healthcare employees. Results show that the highest age group was between 26 to 30 years, representing 173 respondents, which is 47%. Following that, frequency results show that the age group

between 31 to 35 has 83 respondents, 22.6% of the sample. Next, the more than 36 years of age group consists of 60 respondents and 16.3% of the sample of respondents. Finally, 52 respondents aged 20 to 25 comprised 14.1% of the sample.

Every respondent has different marital status. Results reveal that most respondents were already married, consisting of 196 respondents resulting in 53.3% of the sample. The second largest marital status for respondents is single, with 45.7% or 168 respondents from the sample. Only 4 respondents come from divorced status, which is 1.1% of the respondents. Following that, the respondents come from various job positions. Besides, the healthcare employees in this research come from physicians, nurses, pharmacists, and other positions that served them as healthcare professionals. Most of the respondents are nurses, which is 210, resulting in 57.1% of the samples. Subsequently, 103 or 28% of the respondents are healthcare professionals other than physicians, nurses, and pharmacists. Next, 29 respondents or 7.9%, are physicians, while the other 26 respondents or 7.1%, are pharmacists.

On the other hand, the respondents come from different departments. The highest number of respondents are from hospitalization management which is 162 respondents or 44% of the total respondents. Following that, respondents from outpatient management are 91 or 24.7%. The number of respondents from administrative management and medical records management is almost the same, which are 38 or 10.3% and 34 or 9.2%, respectively. Next, respondents from medicine management were 28 respondents or 7.6%, while another 4.1% or 15 respondents came from other departments listed in the questionnaire.

In addition, the length of services for every respondent was analysed. From the frequency results, the working services of the respondent majority already served the healthcare sectors between 4 to 6 years which is 35.9% or 132 respondents. Next, 33.4% or 123 respondents, have been working between 1 to 3 years. Meanwhile, 64 respondents or 17.4%, have already worked more than 10 years, and only 13.3% or 49 respondents, had worked for 7 to 9 years. Based on the survey results, among the total number of respondents, 352 respondents, or 95.7%, hold permanent status while the other 16 respondents or 4.3%, served as contract employees.

Since this study determined the use of computer systems, a close-ended question for education level has also been included in the demographic part. Most respondents, which account for 207 or 56.3% of the respondents from the overall sample, are Kementerian Kesihatan Malaysia (KKM) college graduates. The second largest number of respondents who graduated with a bachelor's degree is 38.6% or 142. Following that, only 19 or 5.2% of the respondents hold master's or doctorate degrees.

Table 4.1
Demographic Information of Respondents

Category	Coding	Frequency	Percentage (%)
Gender	Male	78	21.2
	Female	290	78.8
	Total	**368**	**100**
Age	20 – 25 years	52	14.1
	26 – 30 years	173	47.0

Table 4.1 (Continued)

Category	Coding	Frequency	Percentage (%)
Age	31 – 35 years	83	22.6
	More than 36 years	60	16.3
	Total	**368**	**100**
Marital Status	Single	168	45.7
	Married	196	53.3
	Divorced	4	1.1
	Widowed	0	0
	Total	**368**	**100**
Working Services	1 – 3 years	123	33.4
	4 – 6 years	132	35.9
	7 – 9 years	49	13.3
	10 years and above	64	17.4
	Total	**368**	**100**
Job Position	Physicians	29	7.9
	Nurse	210	57.1
	Pharmacist	26	7.1
	Others	103	28.0
	Total	**368**	**100**
Department (Unit)	Outpatient management	91	24.7
	Medical records management	34	9.2
	Administrative management	38	10.3

Table 4.1 (Continued)

Category	Coding	Frequency	Percentage (%)
Department (Unit)	Hospitalization management	162	44.0
	Medicine management	28	7.6
	Others	15	4.1
	Total	**368**	**100**
Job Status	Permanent	352	95.7
	Contract	16	4.3
	Total	**368**	**100**
Working Services	1 – 3 years	123	33.4
	4 – 6 years	132	35.9
	7 – 9 years	49	13.3
	10 years and above	64	17.4
	Total	**368**	**100**
Education	High school and below	0	0
	KKM College	207	56.5
	Bachelor's Degree	142	38.4
	Master's/Doctorate Degree	19	5.1
	Total	**368**	**100**

4.3 Descriptive Statistics of Variables of Study

The descriptive analysis aims to determine how HMIS success factors affected healthcare institutions' organizational performance. This study has four main variables: information quality, system quality, service quality, and organizational

performance. The results were summarised in Table 4.2: mean, standard deviation, minimum, and maximum of the study constructs.

Table 4.2
Descriptive Statistics of the Variables

Variable	Minimum	Maximum	Mean	Std. Deviation
Information Quality	3.75	4.88	4.27	.27
System Quality	3.67	4.89	4.27	.28
Service Quality	3.43	4.86	4.25	.31
Organizational Performance	3.70	4.80	4.25	.25

The minimum information quality rating was 3.75, and the maximum rating was 4.88. The standard deviation value was .27, and the mean value of information quality was 4.27. The mean value indicates that the level of information quality is high. Next, the descriptive analysis for system quality shows that based on the five-point Likert scale, the minimum rating is 3.67 while the maximum rating is 4.89 with a standard deviation of .28. Meanwhile, a mean value for system quality is 4.27, which indicates that its level is high.

Following that, the five-point Likert scale, the minimum rating represented by service quality is 3.43, while the maximum rating is 4.86. The mean value is 4.25, and the standard deviation is .31. Mean value of service quality implies that the level of service quality is high. Finally, the descriptive statistics analysis for organizational performance shows the minimum rating is 3.70, and the maximum rating is 4.80 based on the five-point Likert scale. At the same time, the mean value and standard deviation

are 4.25 and .25, accordingly. Hence, the mean value shows that the level of organizational performance is high.

4.4   Reliability Analysis

The definition of reliability (Sekaran & Bougie, 2013) tests how consistently a gauge measures whatever concept it is measuring. This study performed a reliability analysis to guarantee reliable, consistent, and stable questionnaires. Cronbach's alpha is employed in this study as a statistical tool used in internal consistency reliability assessments. By following this method, a high reliable item resulted from high correlation values with the test metric, and items with low correlation values are unreliable and are excluded from the test. If CR value more than 0.7, the item has sufficient internal consistency credibility (Hair et al., 2013).

The value of reliability coefficients for the questionnaires is presented in Table 4.3. Cronbach's Alpha value for all items indicates good strength of association for the. Based on the strength using the Rule of Thumb by Hair et al. (2016), strength of association result shows that organizational performance, information quality, and system quality are excellent, whereas service quality is as good. Therefore, the results showed that the instrument used in this research is acceptable and reliable in measuring the response.

Table 4.3
Reliability Coefficients (Cronbach's Alpha) of the Scales

Variable	No. of Items	Alpha N = 368
Organizational Performance	10	.844
Information Quality	8	.811
System Quality	9	.833
Service Quality	7	.784

4.5   Inferential Statistics

This section provides a description of the survey's inferential statistics results. The relationship between two variables, their differences between subgroups, and how multiple independent variables explain the variance of the dependent variable are all covered in inferential statistics. There are two subsections: The Pearson correlations between the study's key variables are discussed in detail in the first section (4.5.1). The multiple regression analysis results, which put the study's hypothesis to the test, are the focus of the second section (4.5.2).

4.5.1   Pearson Correlation

Correlation is measured by the degree to which two variables have a linear relationship. According to Fah and Hoon (2009), there are three potential relationships exist between the two factors which are positive linear correlation, negative linear correlation, or no correlation. The study's independent and dependent variables are compared with one another using the Pearson correlation coefficient.

Pearson's correlation analysis determined the association between information, system, and service quality with healthcare institutions' performance, as stated in this study's first to the third objective. Table 4.4 reported that there is a significant positive considerable influence between healthcare institutions' performance with information quality ($r = .84$), system quality ($r = .85$) and service quality ($r = .81$).

Table 4.4

Pearson's Correlation Analysis of Information Quality, System Quality and Service Quality with Healthcare Institution's Performance

Variable	Healthcare Institution's Performance
Information Quality	.84*
System Quality	.85*
Service Quality	.81*

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

A healthcare institution's performance score is proportional to the information, system, and service quality score. In other words, the higher the score on information, system, and service quality, the higher the score on the healthcare institution's performance. Hence, healthcare institutions' performance positively correlates with information, system, and service quality. Therefore, the study's hypotheses H1, H2, and H3 are accepted because information, system, and service quality significantly influence healthcare institutions' performance.

4.5.2   Multiple Regressions Analysis

Hypothesis tests are explained in this section. In this section, the explanation of how independent and dependent variables affect one another will be discussed.

Using the statistical method known as multiple regression, three hypotheses were proposed to determine whether information quality, system quality, and service quality significantly predicted organizational performance. As stated by Neuman (2014), the results of multiple regression analysis have two primary repercussions. It helps to explain how the independent variable affects the dependent variable in a predictive way. More specifically, via referring to the level of influence that a set of independent variables has on the dependent variable is shown by R-squared (R^2). Predicting the dependent variable from information about the independent variable is easier when the R^2 is higher. Second, the regression analysis's findings assist in determining each independent variable's effect level on the dependent variable and the sign of the independent variable's effect on the dependent variable.

Besides, multiple regression also assumes a linear relationship in which residuals or errors are normally distributed and are uncorrelated with the predictor variables. A potentially very problematic condition is multicollinearity, which can result in either false or misleading results. Multicollinearity occurs when there is high cross-correlation between several sets of independent variables. In other words, when there is a lot of cross-correlation between multiple independent variable sets, this is called multicollinearity. For this reason, it is crucial to test for multicollinearity in multiple regression. Therefore, Table 4.5 represents this study's multicollinearity analysis of independent variables.

Table 4.5
Multicollinearity Analysis

Variables	Collinearity Statistics	
	Tolerance	VIF
Information Quality	.26	3.80
System Quality	.29	3.42
Service Quality	.28	3.59

In light of the analysis in the table above shows Variance Inflation Factor (VIF) to quantify the multicollinearity. Tolerance, as defined by Pallant (2007), is the percentage of the model's variability that cannot be explained by other independent variables. The tolerance is between .26 to .29, which is not less than .20. Therefore, the value does not violate the multicollinearity assumption. In addition, the VIF value between 3.42 and 3.80, below the cut-off of 10, also supports the multicollinearity assumptions. Furthermore, Hair et al. (2011) stated that multicollinearity is a concern if below .20 or greater than five. As a result, multicollinearity is good in this research.

To reiterate, multiple regression aims to predict an interval-dependent variable from a combination of several interval or independent variables. The regression analysis summary, regression analysis on ANOVA, and results for the proposed hypotheses are presented in Table 4.6, Table 4.7, and Table 4.8.

Table 4.6
Regression Analysis Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.892[a]	.796	.794	.296

a. Predictors: (Constant), SERVICEQUALITY, SYSTEMQUALITY, INFORMATIONQUALITY
b. Dependent Variable: ORGPERFORMANCE

Table 4.7
Regression Analysis on ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	123.90	3	41.30	472.70	.000[b]
	Residual	31.80	364	.09		
	Total	155.71	367			

a. Dependent Variable: ORGPERFORMANCE
b. Predictors: (Constant), SERVICEQUALITY, SYSTEMQUALITY, INFORMATIONQUALITY

Table 4.8
Summary of Multiple Regression Analysis for Information Quality, System Quality, and Service Quality in Influencing Healthcare Institution's Performance

Variable	Unstandardized B	Standardized Beta	T	P
Information Quality	.32	.33	7.05	.00
System Quality	.40	.40	9.23	.00
Service Quality	.22	.22	4.99	.00

$p < .05$ (significant at the 0.01 level, 2-tailed)

A combination of information, system, and service quality contributed 79.6% (R^2 = .796) impact on healthcare institutions' performance. The multiple regression model developed R^2 = .796, F (3, 364) = 472.70, p = 0.00 for all three predictors. System quality has the highest beta coefficient (β= .40, p = .00), indicating the most significant factor in influencing healthcare institution's performance, followed by information quality (β= .33, p = .00) and service quality (β= .22, p = .00).

4.6   Overall Hypotheses Results

The results of the hypotheses testing are presented in Table 4.9 below:

Table 4.9
Overall Hypotheses Results Table

Hypothesis	Regression Results	Result
H1: Information quality has a significant influence on the organizational performance of healthcare institutions.	β= .33, p = .00	Supported
H2: System quality significantly influences healthcare institutions' organizational performance.	β= .40, p = .00	Supported
H3: Service quality has a significant influence on the organizational performance of healthcare institutions.	β= .22, p = .00	Supported

System quality is the main success factor influencing HMIS adoption towards the performance of healthcare institutions. It shows that a more excellent system

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quality contributes to tremendous HMIS adoption success, leading to the better organizational performance of healthcare institutions. A greater level of information quality will significantly impact organizational performance. Following that, service quality also significantly influences organisational performance improvement in healthcare institutions. Employee performance will be excellent if service quality is high.

4.7   Conclusion

Results regarding the characteristics of respondents and the response rate were discussed in this part. Moreover, this part has offered aftereffects of Cronbach's Alpha in estimating the unwavering quality of surveys utilized in this review.

CHAPTER 5

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.1   Chapter Overview

Results and conclusions concerning the research's hypotheses, questions, and goals were emphasized in the last part. Further, the answers to research questions and goals have also been presented. Then, the theoretical and practical implications are depicted in the following section. The study's limitations are discussed in the next section, and suggestions for future research are addressed. Finally, it ends with the recapitulations and conclusion of the study.

5.2   Discussion

In this information age, healthcare institutions must improve their business performance and competitiveness without compromising their social mission. In addition, the hospital develops strategic policies for the organization's administrative, human, and internal resources. It makes decisions quickly and accurately to boost responsiveness, innovation, and service-quality medical services for the community. We must provide a flexible, effective, and efficient service with practical courses for capital owners without neglecting their social mission. Previous studies conducted by Moukénet et al. (2021) and Jeffery et al. (2022) have shown that using HMIS can impact patient satisfaction, improve internal communication networks, reduce expenses, and securely keep data digitally. Computerized hospital management is an essential tool and can even be said to support hospital management fully (Demirel,

2018). Research on IS success factors and decision-making frequently mentions impacts on organizational performance.

This study aims to shed light on several factors that determine the successful implementation of HMIS in healthcare institutions with organizational performance. Therefore, it was necessary to choose a theoretical foundation to undertake the most critical aspects affecting the success of her HMIS deployment in healthcare institutions. This study applied the D&M model by proposing ISSM in healthcare institutions, particularly in HSB and HSAH, and examining the impact of IS success factors on organizational performance. Based on a review of the existing literature in the IS research field, system, information, and service quality characteristics were selected and tested as success factors for implementing HMIS in healthcare institutions.

Information quality is a success factor of HMIS adoption success, which significantly influences organisational performance. Hence, H1 is supported. In addition, this result also indicates that system quality as a success factor of HMIS adoption significantly affects organizational performance, which represents the H2 is supported. This study also revealed that service quality as a success factor of HMIS adoption plays a vital role in influencing organizational performance, which means H3 is supported. Therefore, The study model's findings demonstrate that each hypothesis was supported. The D&M IS success model, as applied to this study, suggested that net benefits, which is the organization's performance influenced by system quality, information quality, and service quality. This study's findings also confirm those of previous studies on ISSM constructs.

5.3   Results Discussion Summary

The outline of research results is discussed by referring to the research objectives in this study separately.

5.3.1   Information Quality and Organizational Performance

The first objective investigates the influence of information quality on healthcare institutions' performance. Based on the findings, information quality significantly influenced organization performance as an HMIS adoption success factor. Fundamentally, this finding can be explained by information quality reducing the organizational and operational effort associated with activities outside information processing systems. In addition, patient needs are anticipated by receiving a good standard of information content in terms of completion, precision, understanding, timeliness, and relevance to making decisions. Therefore, it supports the decision-making process (efficiency within an organization), which can significantly impact and improve organizational performance.

According to Hausvik (2017), information quality directly affects organizational performance as a single factor (exclusive) and in combination with other variables (non-exclusive). In exclusive relationships, information quality directly impacts various aspects of organizational performance, like financial performance. On the other hand, in a non-exclusive relationship, information quality was usually clustered in the affected technical factors, system quality and service quality concerning organizational factors. The higher the quality of information, the higher the utilization and satisfaction of information. These results indicate that the better quality of data provided in reports, the more likely end users will use and be satisfied.

Therefore, they are more likely to improve patient care services aimed at improving organizational performance.

Moreover, previous studies indicate a positive correlation between organizational performance and information quality (Chen et al., 2022; AbdelKader et al., 2022; Abdulkareem et al., 2022; and Jaya et al., 2022). Hence, the H1 is aligned with past research. In most studies, information quality directly impacts improving the health care process by focusing on information quality to enhance the clinical delivery process and enabling supervisors to disseminate information to facilitate health quality improvement projects. For example, information quality aspects such as clear information, constantly updated content, and valid and understandable information can satisfy the user with the available data. Information quality was found to predict HMIS adoption success in enhancing the organizational performance of healthcare facilities. Thus, the first research objective was achieved.

5.3.2 System Quality and Organizational Performance

The second aim is to determine the effect of system quality on healthcare institutions' performance. Following the results, the test performed for (H2) reported a strong correlation between system quality as a success factor for HMIS adoption towards the organisational performance of healthcare institutions. Therefore, the H2 in this study is supported. According to Alkasasbeh et al. (2019), system quality is the primary criterion for success. It primarily focuses on technical system characteristics like stability, response time, and ease of use. Similarly, a system's quality includes whether or not it has issues and is simple to use. Its features include ease of use, usability, and learnability (Mtebe et al., 2018). This suggests that if the system is easy,

flexible, convenient, the system will be used more frequently by healthcare professionals, which will affect the efficient and effective management of the organization.

In addition, system quality is crucial because it affects the system's technical performance, user interface uniformity, usability, programming errors, and system maintainability. Constant complaints about system outages, system instability, and security issues impact operational efficiency and ultimately lead to poor organizational performance. Healthcare institutions use HMIS to facilitate the efficacy of processes to gather and change a pile of data to help managers make tactical and strategic decisions. Nevertheless, a highly flexible system characterized by high maintainability and many useful system functions can significantly impact an organisation's efficiency through improved decision-making. In connection with this study, system quality can help users achieve desired objectives and improve the quality of tasks, enhancing efficient and effective performance. A similar result to previous researchers (AbdelKader et al., 2022; Ngqwala & Dyk, 2022; Wei et al., 2022; and Lin et al., 2022) support with recent studies.

5.3.3 Service Quality and Organizational Performance

The third objective investigates service quality influences on healthcare institutions' performance. Given the findings, service quality significantly influenced organization performance as an HMIS adoption success factor. This indicates that the services provided by the IT department to HMIS users have led to satisfaction for its users. For example, aspects of quality of service, such as the quick response and empathy of technical support staff when a user makes a complaint, can make the user

feel comfortable using the system. Hence, users can actively use HMIS to boost the company's performance if they receive superior technical support, especially during errors. In addition, high-quality IS service and support, such as perfect performance, timeliness, and reliability of service quality, clearly lead to effective and timely decision-making processes, leading to increased internal organizational efficiency.

Additionally, the presence of knowledgeable employees who can communicate effectively between various business units and better understand user needs also impact organizational performance. The IS services are better aligned with organizational goals leading to better decision-making, better anticipation of patient needs, and more accurate predictions of patient flow. In addition, expediting service to the HMIS end-users through the IS department's responsiveness enhances efficiency, positively impacting the organization's productivity. As a result, healthcare institutions' organizational performance is positively influenced by service quality. Similar to other works within the same field (AbdelKader et al., 2022; Abdulkareem et al., 2022; and Lin et al., 2022) support with recent studies. Thus, the third research objective is achieved.

5.3.4 Main Contributing Success Factor of HMIS Adoption and Organizational Performance

System quality contributes the highest association to organizational performance compared to the other predictors. A good system quality will produce high-quality information and ease of service quality. User-friendly and allows them to perform their daily tasks efficiently, one of the features a system should possess. A well-designed HMIS improves patient care and work process quality and enhances

organizational performance. System quality measures usability, flexibility, learning, ease of use, and reliability. These features of HMIS are remote from organizational performance.

For an organization to reap the benefits such as reduced expenses, increased revenue, and enhanced process efficiency, it needs a system that has been designed, developed, and put into place correctly. Conversely, an imperfectly designed or engineered system is more prone to experience a regular interruptions, adversely affecting business operations and leading to inefficiency and inefficient management. Therefore, a system that is easy to maintain has a long life and is easier to maintain quality of service. Meanwhile, a good system quality aims to improve the quality of the information and ensures efficient movement of document readiness and usability. Improved system quality helps produce meaningful data and prompt reports, allowing users to respond quickly to changing information requirements. Therefore, it can be inferred that destructive systems are more likely to output poor-quality information, underscoring the importance of maintaining a high level of system quality to produce accurate and useful data. A similar result to previous researchers (Ngqwala & Dyk, 2022; Wei et al., 2022; Abdallah et al., 2022; and Lai, 2022) supports with recent studies.

5.4   The Study Implication

The present research has theoretical and practical implications around HMIS success and its impacts on healthcare institutions' performance. Therefore, the following discussion will deliberate the significance of the study:

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5.4.1 Theoretical Implications

In general, research on the success of IS has always been highlighted and debated. As systems and technologies improve and evolve, the debate over their effectiveness and the assessment of their success has been continually discussed by researchers, academics, and practitioners over the years. However, they must still identify the underlying links between HMIS success factors and organisational performance. Effective and efficient MIS usage is crucial in distinguishing between successful and unsuccessful organizations (Burca et al., 2006). Empirical evidence also yielded conflicting results. Altaany (2013); Supattra (2007); Jehad et al. (2009); Shehadeh et al. (2013); reveal a positive association, while Omiunu (2015) indicated no association.

Therefore, current research is expected to dissect the impact of HMIS success factors (information, system, and service quality) towards organizational performance, particularly considering HSB and HSAH. The results contributed three ways to expanding the literature. First, it demonstrates the stability of the utilisation of the model within healthcare institutions. Second, this study extends the IS literature by examining D&M models via HMIS usage. Thirdly, to better explain the factors that influence organizational performance improvement in healthcare settings, develop a novel theoretical framework for evaluating the HMIS success within an organization setting.

5.4.2 Practical Implications

As in the current scenario, IT and high-performance computing technology advances will drive each area. Healthcare institutions need help dealing with data

management, given the growing population. Liberalization and globalization require more emphasis on quality, schedules, innovation and patient-centricity while increasing the value of services, systems and information to increase competitiveness. Therefore, HMIS assessments need to be more relevant regarding organizational goals. The outcome of this study confirms information, service, and system quality as the importance of HMIS success factors of organizational performance. With these critical elements, HMIS may succeed or have little impact on success. Therefore, managers of both the organization and IT ought to be aware of the significance of system quality toward the organization's performance. Information System (IS) departments and organizations depend heavily on the quality of their IS systems.

Additionally, managers can positively influence their information system's success by ensuring it generates quality data. Therefore, top management must be compassionate regarding the quality of data received since it affects both the decision-making processes and the organization's performance will improve. Besides, given limited resources, IT officers must give more concentration to provide a good and quality service and ensure adequate resources and extensive user training to achieve better results—short-term service results in higher future repair costs and higher running costs for the organization. Ultimately, the findings will stimulate interest among managers and practitioners in formulating an IS strategy that will bring better benefits to their organization, develop a plan for implementing HMIS, and help them better serve their organization. In addition, it may guide in determining how to allocate resources efficiently and effectively.

5.5   Limitations of the Study

This research has limitations, as no single research can wholly and accurately answer all the questions related to the phenomenon under study. In addition, the study is primarily limited to Kedah's primary healthcare institutions, i.e., HSB and HSAH. In consequence, the study's scope limits the results' generalizability. Thus, the presented results do not indicate all healthcare institutions' contexts. Therefore, the generalizability and validity of the results may be enhanced by using data with a large sample size.

Another limitation relates to the design of cross-sectional studies that exclude responses from different time intervals. A cross-sectional design explains that the data are collected only once, and in some cases, studies can be conducted that answer the research question over days, weeks, or months. Unfortunately, this means that the changes over time necessary for a successful HMIS adoption have not been captured to understand the dynamic changes that occur during HMIS adoption. For example, the magnitude of the HMIS success factor contributing to organizational performance may change or grow after some time. In addition, establishing causality from cross-sectional studies is relatively challenging because the outcome and exposure variables are measured simultaneously.

5.6   Recommendations for Future Research

The factors derived in this study may need to be more generalizable, and additional study is required to confirm the outcome in different settings and cultures. However, there are some recommendations to consider. First, the researcher recommends that future studies include a larger sample to include all healthcare

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institutions across Malaysia adopting HMIS in operation. In this way, the survey reaches a more significant number of respondents, and the results are more meaningful in summarizing the performance of HMIS-adopted healthcare institutions in Malaysia. In addition, rather than being confined to a single geographic region, researchers should explore different geographies to test the impacts shown inside the current research to determine if the results are relevant for another developing country. Accordingly, research should be expanded to consider other countries.

In addition, longitudinal studies are suggested among upcoming investigators in evaluating the development of HMIS and examining the range of advantages of HMIS in the healthcare setting. Because the degree of coordination of healthcare institutions' performance varies, significantly influencing results, researchers should collect data from at least two points using a longitudinal design. This creates a time lag between predictor and dependent structure measurements (Reio, 2010). In its way, this makes the factors associated with HMIS success more explicit. Nonetheless, it is advisable to conduct the same studies with different research approaches, for example, qualitative methods, as it can lead to a deeper understanding and more profound comprehension of the issues discussed in this research. Therefore, from a researcher's point of view, this improvement will become more critical in future studies.

5.7   Conclusion

Overall, this study can answer the objectives to examine the success factors of HMIS adoption in healthcare institutions' performance. Among the theoretical models, the Information System Success Model (ISSM) has received the most attention from subsequent conceptual and empirical work in the IS success domain and is regarded as one comprehensive framework. Based on the D&M model, this study described the impact of IS success factors (information quality, system quality, and service quality) as determinants of organizational performance in healthcare institutions. Finally, the current work results better understand HMIS's success in the Malaysian context. This has been covered to some extent in the published research literature, and the researcher hopes it contributed to both theory and future application.

Hence, the study is expected to improve organizational performance regarding HMIS adoption positively. The goal of any successful organization is to have a good management strategy, such as implementing HMIS to facilitate communication between all departments within the organization. More importantly, it assists in obtaining good performance for an organisation.

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Dear Participants,

This questionnaire is designed to assess the "Factors Affecting Health Management Information Systems (HMIS) Adoption Success Towards Improving Healthcare Institutions' Performance." Your participation is highly appreciated.

This study is conducted as a partial fulfillment for my Master of Science (Management). The information you provide for this purpose of study will be kept **STRICTY CONFIDENTIAL** and will be used for the academic purpose only.

Your input is highly valued. Thank you very much for your time and cooperation.

Yours Sincerely,

Peserta yang dihormati,

Soal selidik ini bertujuan untuk menilai "Faktor-faktor yang Mempengaruhi Keberkesanan Perlaksanaan Sistem Pengurusan Maklumat Kesihatan (HMIS) ke arah Meningkatkan Prestasi Institusi Penjagaan Kesihatan." Penyertaan anda amatlah dihargai.

Kajian ini dilakukan sebagai memenuhi sebahagian daripada keperluan Sarjana Sains (Pengurusan). Maklumat yang anda berikan untuk tujuan kajian ini akan **DIRAHSIAKAN** *dan akan digunakan bagi tujuan akademik sahaja.*

Maklumbalas anda amatlah dihargai. Terima kasih atas masa dan kerjasama yang diberikan.

Yang ikhlas,

………………………….
Nurul Khairiah Binti Musa
Master of Science (Management)
Universiti Utara Malaysia

SECTION A : **RESPONDENT PROFILE**

BAHAGIAN A : *PROFIL RESPONDEN*

Instruction : Please choose the right answer and answer all the questions.

Arahan : *Sila pilih jawapan yang betul dan jawab semua soalan.*

1. Gender / *Jantina*

   ☐ Male / *Lelaki*   ☐ Female / *Perempuan*

2. Age / *Umur*

   ☐ 20 – 25 years / *tahun*   ☐ 26 – 30 years / *tahun*

   ☐ 31 – 35 years / *tahun*   ☐ 36 years and above / *tahun dan ke atas*

3. Marital Status / *Status Perkahwinan*

   ☐ Single / *Bujang*   ☐ Married / Berkahwin

   ☐ Divorced / *Bercerai*   ☐ Widowed / *Janda*

4. Working Services / *Tempoh Perkhidmatan*

   ☐ 1 – 3 years / *tahun*   ☐ 4 – 6 years / *tahun*

   ☐ 7 – 9 years / *tahun*   ☐ 10 years and above/ *tahun dan ke atas*

5. Job Position / *Jawatan Kerja*

   ☐ Physicians / *Pakar Perubatan*   ☐ Pharmacist / *Ahli Farmasi*

   ☐ Nurse / *Jururawat*   ☐ Others / *Lain-lain*

6. Department (Unit) / *Bahagian (Unit)*

	Outpatient management / *Pengurusan pesakit luar*
	Medical records management / *Pengurusan rekod kesihatan*
	Administrative management / *Pengurusan pentadbiran*
	Hospitalization management / *Pengurusan kemasukan ke hospital*
	Medicine management / *Pengurusan perubatan*
	Others / *Lain-lain*

7. Job Status / *Status Pekerjaan*

	Permanent / *Tetap*		Contract / *Kontrak*

8. Education / *Pendidikan*

	High school and below / *Sekolah menengah dah ke bawah*
	KKM College / *Kolej KKM*
	Bachelor's degree / *Ijazah Sarjana Muda*
	Master's/Doctorate Degree / *Ijazah Sarjana/Kedoktoran*

SECTION B: FACTORS AFFECTING HEALTH MANAGEMENT INFORMATION SYSTEMS (HMIS) ADOPTION SUCCESS TOWARDS IMPROVING HEALTHCARE INSTITUTIONS' PERFORMANCE.

BAHAGIAN B: FAKTOR-FAKTOR YANG MEMPENGARUHI KEBERKESANAN PERLAKSANAAN SISTEM PENGURUSAN MAKLUMAT KESIHATAN (HMIS) KE ARAH MENINGKATKAN PRESTASI INSTITUSI PENJAGAAN KESIHATAN.

Instruction: Please answer all the questions. Indicate your agreement or disagreement about the statements on a scale of 1 = Strongly Disagree to 5 = Strongly Agree.

Arahan: Sila jawab semua soalan. Nyatakan persetujuan atau ketidaksetujuan anda tentang pernyataan pada skala 1 = Sangat Tidak Setuju hingga 5 = Sangat Setuju.

INFORMATION QUALITY / *KUALITI MAKLUMAT*

No.	Items	1	2	3	4	5
1	The information presented by the HMIS is accurate. *Maklumat yang disampaikan oleh HMIS adalah tepat.*					
2	The information generated by HMIS is always in a timely manner. *Maklumat yang dijana oleh HMIS sentiasa tepat pada masanya.*					
3	The information presented by HMIS is easy to understand. *Maklumat yang disampaikan oleh HMIS mudah difahami.*					
4	The information provided by HMIS is essential for the decision-making process. *Maklumat yang diberikan oleh HMIS adalah penting untuk proses membuat keputusan.*					

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5	The HMIS provides more current (up to date) information. *HMIS menyediakan lebih banyak maklumat terkini (mengikut peredaran masa).*					
6	The HMIS generates information that instantly and rapidly responds to users' demands. *HMIS menjana maklumat yang memberi respon dengan segera dan pantas kepada permintaan pengguna.*					
7	The information presented within the HMIS is well laid out. *Maklumat yang dibentangkan dalam HMIS disusun dengan baik.*					
8	The content and information in the HMIS are beneficial to the organizational management processes. *Kandungan dan maklumat dalam HMIS bermanfaat kepada proses pengurusan organisasi.*					

SYSTEM QUALITY / *KUALITI SISTEM*

No.	Items	1	2	3	4	5
1	The HMIS is easy to use. *HMIS mudah digunakan.*					
2	The user interface designed in HMIS is human-oriented. *Antara muka pengguna yang direka dalam HMIS adalah berorientasikan manusia.*					
3	The functions of the HMIS meet users' requirements. *Fungsi HMIS memenuhi keperluan pengguna.*					
4	The HMIS is always available. *HMIS sentiasa tersedia.*					
5	The HMIS is regularly maintained and examined by the IT department. *HMIS sentiasa diselenggara dan diperiksa oleh jabatan IT.*					
6	The HMIS responded fairly and quickly to commands. *HMIS bertindak balas dengan adil dan pantas kepada arahan.*					
7	The HMIS makes information easily accessible. *HMIS menjadikan maklumat mudah diakses.*					
8	Users are aware and clear about every HMIS function. *Pengguna tahu dan jelas tentang setiap fungsi HMIS.*					
9	The HMIS gives users adequate information on organization processes. *HMIS memberikan maklumat yang mencukupi kepada pengguna tentang proses organisasi.*					

SERVICE QUALITY / *KUALITI PERKHIDMATAN*

No.	Items	1	2	3	4	5
1	The technical support staff correctly delivers the service requested by users. *Kakitangan sokongan teknikal menyampaikan perkhidmatan yang diminta oleh pengguna dengan betul.*					
2	The technical support staff shows a sincere interest in solving the problem conveyed by the user. *Kakitangan sokongan teknikal menunjukkan minat yang ikhlas untuk menyelesaikan masalah yang disampaikan oleh pengguna.*					
3	The technical support staff has the knowledge to answer questions related to HMIS. *Kakitangan sokongan teknikal mempunyai pengetahuan untuk menjawab soalan berkaitan HMIS.*					
4	The technical support staff provides help to the user promptly. *Kakitangan sokongan teknikal memberikan bantuan kepada pengguna dengan segera.*					
5	Service by the technical support staff is provided and completed on time. *Perkhidmatan oleh kakitangan sokongan teknikal disediakan dan disiapkan tepat pada masanya.*					
6	The technical support staff is always available when needed. *Kakitangan sokongan teknikal sentiasa tersedia apabila diperlukan.*					
7	The HMIS can be relied on to provide information when needed. *HMIS boleh dipercayai untuk memberikan maklumat apabila diperlukan.*					

SECTION C: NET BENEFITS (ORGANIZATIONAL PERFORMANCE)
BAHAGIAN C: FAEDAH BERSIH (PRESTASI ORGANISASI)

Instruction: Please answer all the questions. Indicate your agreement or disagreement about the statements on a scale of 1 = Strongly Disagree to 5 = Strongly Agree.

Arahan: Sila jawab semua soalan. Nyatakan persetujuan atau ketidaksetujuan anda tentang pernyataan pada skala 1 = Sangat Tidak Setuju hingga 5 = Sangat Setuju.

No.	Items	1	2	3	4	5
1	Adoption of HMIS will help reduce the time allotted to accomplish tasks. *Penggunaan HMIS akan membantu mengurangkan masa yang diperuntukkan untuk menyelesaikan tugas.*					
2	Adoption of HMIS improves employee job performance. *Penggunaan HMIS meningkatkan prestasi kerja pekerja.*					
3	The HMIS facilitates easy access to patient information. *HMIS memudahkan akses kepada maklumat pesakit.*					
4	The adoption of HMIS helps increased user satisfaction. *Penggunaan HMIS membantu meningkatkan kepuasan pengguna.*					
5	The adoption of HMIS facilitated the exchange of organizational data quickly. *Perlaksaan HMIS memudahkan pertukaran data organisasi dengan cepat.*					

6	The HMIS helps to improve the operation process within the hospital. *HMIS membantu menambah baik proses operasi dalam hospital.*					
7	The adoption of HMIS helps to improve patient care delivery. *Perlaksaan HMIS membantu meningkatkan penyampaian penjagaan pesakit.*					
8	The adoption of HMIS will increase the productivity of the hospital. *Perlaksaan HMIS akan meningkatkan produktiviti hospital.*					
9	The HMIS will help to enhance hospital effectiveness by reducing errors and redundancy. *HMIS akan membantu meningkatkan keberkesanan hospital dengan mengurangkan ralat dan redundansi.*					
10	The HMIS will provide a competitive advantage to healthcare institutions. HMIS akan memberikan kelebihan daya saing kepada institusi penjagaan kesihatan.					

THANK YOU FOR YOUR TIME AND SUPPORT

TERIMA KASIH ATAS MASA DAN SOKONGAN ANDA

1. **Descriptive Statistics**

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
INFORMATIONQUALITY	368	3.75	4.88	4.2657	.26676
SYSTEMQUALITY	368	3.67	4.89	4.2651	.27673
SERVICEQUALITY	368	3.43	4.86	4.2546	.30627
ORGPERFORMANCE	368	3.70	4.80	4.2548	.25205
Valid N (listwise)	368				

2. **Reliability Analysis**

   i. **Organizational Performance**

Scale: ALPHA_ORGPERFORMANCE

Case Processing Summary

		N	%
Cases	Valid	368	100.0
	Excluded[a]	0	.0
	Total	368	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.844	.844	10

ii.   Information Quality

Scale: ALPHA_INFORMATIONQUALITY

Case Processing Summary

		N	%
Cases	Valid	368	100.0
	Excluded[a]	0	.0
	Total	368	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.811	.811	8

iii.   System Quality

Scale: ALPHA_SYSTEMQUALITY

Case Processing Summary

		N	%
Cases	Valid	368	100.0
	Excluded[a]	0	.0
	Total	368	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.833	.833	9

110

iv. Service Quality

Scale: ALPHA_SERVICEQUALITY

Case Processing Summary

		N	%
Cases	Valid	368	100.0
	Excluded[a]	0	.0
	Total	368	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.784	.784	7
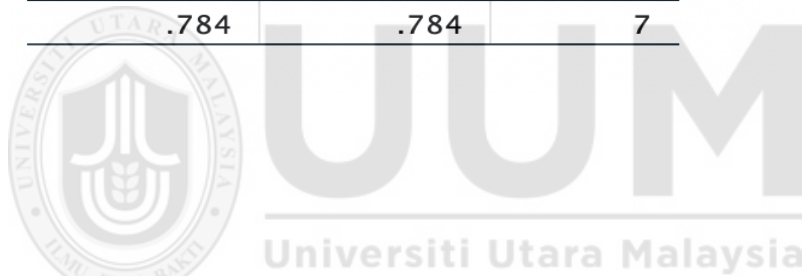
3. Pearson Correlation

Correlations

		ORGPERFORMANCE	INFORMATIONQUALITY	SYSTEMQUALITY	SERVICEQUALITY
Pearson Correlation	ORGPERFORMANCE	1.000	.836	.846	.812
	INFORMATIONQUALITY	.836	1.000	.808	.818
	SYSTEMQUALITY	.846	.808	1.000	.795
	SERVICEQUALITY	.812	.818	.795	1.000
Sig. (1-tailed)	ORGPERFORMANCE	.	.000	.000	.000
	INFORMATIONQUALITY	.000	.	.000	.000
	SYSTEMQUALITY	.000	.000	.	.000
	SERVICEQUALITY	.000	.000	.000	.
N	ORGPERFORMANCE	368	368	368	368
	INFORMATIONQUALITY	368	368	368	368
	SYSTEMQUALITY	368	368	368	368
	SERVICEQUALITY	368	368	368	368

4. Multiple Regression

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.892[a]	.796	.794	.29559	.796	472.695	3	364	.000

a. Predictors: (Constant), SERVICEQUALITY, SYSTEMQUALITY, INFORMATIONQUALITY

b. Dependent Variable: ORGPERFORMANCE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	123.904	3	41.301	472.695	.000[b]
	Residual	31.804	364	.087		
	Total	155.709	367			

a. Dependent Variable: ORGPERFORMANCE

b. Predictors: (Constant), SERVICEQUALITY, SYSTEMQUALITY, INFORMATIONQUALITY

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.234	.104		2.238	.026		
	INFORMATIONQUALITY	.321	.046	.326	7.048	.000	.263	3.804
	SYSTEMQUALITY	.401	.043	.404	9.228	.000	.292	3.420
	SERVICEQUALITY	.221	.044	.224	4.991	.000	.279	3.589

a. Dependent Variable: ORGPERFORMANCE