

**The Roles of Information Technology in the Healthcare Management System: An Empirical Analysis of the Saudi Aramco Medical Services Organization (Samsu)**

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**ABSTRACT**

*This research paper explored the contribution of the information technology in the healthcare management system in the Saudi Aramco Medical Services Organization (SAMSO). The researchers conducted research to determine the correlation between the adoption of information technology and healthcare management system performance; the impact of electronic health records (EHRs), telemedicine, and health information exchange (HIE) systems on healthcare quality, patient outcomes, patient satisfaction, patient access, communication, and continuity of care. The quantitative research design was used and 100 respondents were sampled. The study data were collected using structured questionnaire which contained closed ended and five point likert scale items. The analysis of the data was performed in terms of descriptive statistics, reliability analysis, correlation analysis, and regression analysis. The results revealed that information technology adoption affected the performance of the healthcare management system in a significant positive way. EHR efficacy transformed the quality of healthcare to a great extent, whereas the use of EHR had a positive impact on patient outcomes. The effect of telemedicine on patient and provider satisfaction as well as on healthcare accessibility was very positive. The communication effectiveness and continuity of care were also dramatically increased using HIE systems. Comprehensively, all the hypotheses were proved, which means that information technology was instrumental in enhancing healthcare management and service delivery in SAMSO.*

**Keywords:** Information technology, healthcare management system, electronic health records, telemedicine, Saudi Aramco Medical Services Organization (SAMSO)

**INTRODUCTION**

Health management systems (HMS) are now an essential part of ensuring the efficiency and effectiveness of healthcare services worldwide. Healthcare management has changed dramatically due to the advent of information technology (IT), which enables better patient care, greater efficiency, and better decision making (Ayatollahi & Zeraatkar, 2020). Healthcare management in today's world includes many technologies designed to improve healthcare. From electronic health records (EHRs) to telehealth clinics, IT solutions are revolutionizing the delivery and accessibility of healthcare (Bhatia, 2021). In addition to easier patient information management, these systems allow doctors to communicate instantly, resulting in better patient outcomes and greater collaboration. IT-driven analyses enhance global health programs and improve public health outcomes by providing valuable data for epidemiological research, disease surveillance, and resource allocation. Collectively, the impact of HMS goes beyond the care of an individual patient; it impacts the larger healthcare system by supporting informed decision-making, improving resource utilization, and improving health outcomes.

On the other hand, Saudi Arabia's healthcare system is changing rapidly due to high healthcare expenses (Balkhi et al., 2021). IT infrastructure meets the changing needs of healthcare management. The government's Vision 2030 program aims to improve service quality, efficiency, and accessibility and

focuses on the digital transformation of healthcare. In this regard, health management is essential to coordinating health services with national development goals. Saudi Aramco's SAMSO provider is a prime example of using IT to improve public health services.

The use of electronic health records (EHR) is essential for digitizing and centralizing patient information across the healthcare organization and is an important aspect of HMS in Saudi Arabia. Using EHR systems, doctors at companies such as SAMSO can set up EHR systems to quickly access patient information, medical history, and treatment plans (Justinia, n.d.). This improves care coordination and allows for more informed clinical decisions. Additionally, telemedicine platforms have become popular in Saudi Arabia's healthcare system, especially when addressing issues of healthcare inequality and geography (Ahmed, 2021). Thanks to telemedicine, patients can receive treatment, perform virtual consultations, diagnose, and receive care from the comfort of their homes or another remote location. This not only reduces stress and wait times in clinics but also increases patient satisfaction while improving access to care, especially in remote areas.

Saudi Arabia's healthcare system will benefit from the use of recent practices of IT. In addition to improving patient care and ease of use, HMS increases efficiency by reducing paperwork and streamlining administrative processes and operations. The result is better allocation of healthcare organizations' resources and reduced costs. This leads to more efficient use of assets and resources (Balaraman & Kosalram, 2013). Additionally, HMS has a positive impact on the larger healthcare sector in Saudi Arabia by promoting a culture of innovation and informed decision making (Al Khashan et al., 2021).

Healthcare organizations can effectively solve public health problems by using IT solutions. Clinical decision support systems (CDSS) and health information exchange (HIE) systems are used to analyze population health, identify areas for improvement, and implement intervention plans (Musen et al., 2021). The HMS study of SAMSO is the variable (DV) in the study. When examining the role of information technology (IT) in SAMSO's HMS, there are several independent variables (IVs) that can be considered to have an impact on the variable. The following categories apply to the topic or factors to be examined in this study:

The first independent variable is IT, and the themes could be using telemedicine platforms for remote consultations, implementing electronic health records (EHR) systems, adopting Health Information Exchange (HIE) systems for smooth data sharing. Moreover, Integrating CDSS to assist healthcare providers in making decisions.

Further dimension of IT that been tested in this study is readiness of an organization. The theme of organizational preparation centers on SAMSO's technological infrastructure readiness, leadership support, and organizational culture in relation to the implementation of IT-driven healthcare management systems. Independent variables that fall under this theme could be: Support from the leadership and dedication to IT integration, the culture and adaptability of the organization, the technological infrastructure, which includes IT resources and support systems.

Furthermore the user acceptance theme of utilization is the next dimension of an independent variable. The usability and efficacy of IT-based healthcare management solutions within SAMSO are examined from the perspectives, attitudes, and experiences of patients and healthcare professionals. Moreover, variables that fall under this theme could be how helpful and simple IT systems are seen by healthcare professionals, how satisfied patients are with telemedicine services and the accessibility of electronic health records, Users receive assistance and training for using IT systems.

Another dimension is impact on patient care. This theme looks into how patient outcomes, satisfaction, and the general standard of care delivery within SAMSO are affected by IT-enabled healthcare management systems. IVs that fall under this theme could be: Clinical outcomes such as a reduction in medical errors or increased adherence to treatment, Patient satisfaction with the cleanliness, quality, and

accessibility of healthcare services, Measurement of performance, including appointment waiting time and length of stay.

Subsequently, the researchers would like to investigate the impacts of IT based activities in the Health Management System (HMS). The purpose of this study is to find out that many factors affect the performance of the SAMSO IT health management system, such as business planning, user acceptance, technology use, and the impact on patient care. By examining these changes, the study hopes to shed light on how IT is being incorporated into healthcare management, identify growth and collaboration challenges, and provide recommendations for improving the standards and effectiveness of healthcare at SAMSO and possibly other organizations.

### **Problem Statement**

Although SAMSO has invested in IT infrastructure and implemented various IT solutions, such as telemedicine platforms and electronic health record (EHR) systems, there is little evidence of the extent to which these technologies are being used, and integration into healthcare management is limited (Almuwail et al., 2023). Furthermore, not all aspects of SAMSO's IT impact on patient care, user acceptability, and organizational readiness have been thoroughly examined (Mahnashi et al., 2021). Additionally, in many hospitals, IT-based EHRs are still not active to deliver healthcare services. In order to solve the issue, no patient records are instantly available. A quantitative study on IT and healthcare was carried out in Saudi Arabia by Samra et al., (2020). This study's primary goal was to determine how information system management affects the health sector and how to best take advantage of the advantages that come with using this technology. The researcher explained that some IT services are available, but the staff is unable to use them. It represented a real-world knowledge gap between theory and practice.

Saudi Arabia's use of hospital information systems for medical research is increasing day by day. A mixed-method investigation of the perspectives of medical practitioners and IT specialists participating in hospital database management systems was carried out in 2019. There is a population gap here in order to assess the current state of medical research in Saudi Arabia, (ii) pinpoint potential problems that could impede the advancement of medical research, and (iii) pinpoint potential solutions to strengthen the role of HIS in medical research in Saudi Arabia, a mixed method study was carried out in the country. He discovered that there was a population gap.

The benefits of widespread adoption of electronic medical records (EMRs) in Saudi Arabia, the perceptions of health care professionals, and the obstacles and challenges toward improved implementation of this technology were all explored by AlSadrah (2020) in her study, Electronic medical records and health care promotion in Saudi Arabia. He discovered that there was inadequate computer literacy, a lack of system customization to meet hospital requirements, and inadequate information technology assistance and training.

Current study was quantitative in nature. The aim of this study is to know the implications of IT into healthcare management, streamline healthcare delivery procedures, and eventually improve patient care outcomes within SAMSO. Gap found that still many hospitals are using paper pencil system (Yaghmour, 2021). It needs more time and resources.

### **Research Questions**

1. What is the relationship between EHRs effectiveness and quality of healthcare?
2. What effect does the SAMSO's implementation of telemedicine have on patient and provider satisfaction and healthcare accessibility?

3. What effects does SAMSO's use of HIE systems have on the efficacy of healthcare communication and care continuity?
4. What is the relationship between adoption of IT and Performance of the Healthcare Management System?
5. What is the relationship between utilization of HER and patient results?

### **Research Objectives**

1. To examine the relationship between the effectiveness of Electronic Health Records (EHRs) and the quality of healthcare.
2. To assess the effect of SAMSO's implementation of telemedicine on patient and provider satisfaction, as well as healthcare accessibility.
3. To determine the effects of SAMSO's use of Health Information Exchange (HIE) systems on the effectiveness of healthcare communication and continuity of care.
4. To investigate the relationship between the adoption of information technology and the performance of the healthcare management system.
5. To examine the relationship between the utilization of Electronic Health Records (EHRs) and patient outcomes.

### **Research Hypotheses**

H1: There is a significant relationship between the adoption of information technology and the performance of the healthcare management system.

H2: There is a significant positive relationship between EHR effectiveness and the quality of healthcare.

H3: SAMSO's implementation of telemedicine has a significant positive effect on patient and provider satisfaction and healthcare accessibility.

H4: SAMSO's use of HIE systems has a significant positive effect on healthcare communication effectiveness and continuity of care.

H5: There is a significant positive relationship between the utilization of EHRs and patient outcomes.

### **Theoretical Framework**

Unified Theory of Acceptance and Use of Technology (UTAUT)

A well-known theoretical framework for understanding and forecasting people's acceptance and adoption of new technologies, particularly information technology, is the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). To provide a thorough explanation of technology adoption behavior, UTAUT incorporates components from a number of current models, including the Theory of Reasoned Action (TRA), Innovation Diffusion Theory (IDT), and Technology Acceptance Model (TAM).

Key Constructs of UTAUT

Performance Expectancy: The belief about the technology's ability to improve work performance.  
Effort Expectancy: The technology's apparent simplicity of usage and ease of understanding.  
Social Influence: The impact of social elements on a person's intention to utilize technology, including peer and superior support and norms.  
Facilitating Conditions: Having the tools and assistance needed to use the technology.  
Hedonic Motivation: According to Venkatesh et al. (2003), the pleasure or delight experienced when utilizing technology.

#### Application of UTAUT in Healthcare Management

The UTAUT framework has been used in numerous studies to examine IT adoption in healthcare settings and evaluate the variables affecting healthcare professionals' adoption and usage of new technology. As an illustration: UTAUT was used in a study by Holden and Karsh (2010) to investigate doctors' acceptability of electronic health record (EHR) systems. The researchers discovered that doctors' intentions to use EHR systems were highly influenced by social influence, effort expectancy, and performance expectancy. Gagnon et al. (2016) used UTAUT in another study to investigate the factors affecting telemedicine technology acceptability among healthcare professionals. The results emphasized the significance of perceived utility and user-friendliness in forecasting healthcare professionals' adoption of telemedicine.

#### Advantages of UTAUT

Through the integration of several constructs and ideas, UTAUT provides a thorough framework for comprehending technology adoption behavior. It makes it easier to create focused interventions and tactics to encourage the adoption of new technologies by offering useful insights into the variables influencing people's intentions to do so. UTAUT is an invaluable tool for both researchers and practitioners because it has been extensively verified and used in a variety of situations, including the healthcare industry.

#### UTAUT's Limitations

Although UTAUT offers a solid theoretical framework, its usefulness may differ based on the particular situation and technology under study. Opponents contend that UTAUT's focus on elements at the person level could potentially obscure the impact of larger organizational and environmental factors on the adoption of technology. UTAUT's findings and insights may not be fully supported by additional research because it may not have included all pertinent aspects impacting technology adoption behavior. All things considered, UTAUT provides a useful framework for evaluating IT adoption in healthcare management by providing a methodical way to comprehend the intricate interactions between variables influencing people's acceptance and usage of technology in clinical settings.

The usefulness of UTAUT in predicting healthcare professionals' intentions to adopt and use IT solutions like electronic health records (EHR), telemedicine platforms, and health information exchange (HIE) systems has been demonstrated by research conducted in healthcare settings (Holden & Karsh, 2010; Gagnon et al., 2016).

**Conceptual Framework: The Impact of Information Technology in Healthcare Management System at SAMSO**



**METHODS AND PROCEDURE**

This research paper explored the contribution of the information technology in the healthcare management system in the Saudi Aramco Medical Services Organization (SAMSO). The researchers conducted research to determine the correlation between the adoption of information technology and healthcare management system performance; the impact of electronic health records (EHRs), telemedicine, and health information exchange (HIE) systems on healthcare quality, patient outcomes, patient satisfaction, patient access, communication, and continuity of care. The quantitative research design was used and 100 respondents were sampled and the study data were collected using structured questionnaire which contained closed ended and five point likert scale items. The analysis of the data was performed in terms of descriptive statistics, reliability analysis, correlation analysis, and regression analysis. The results revealed that information technology adoption affected the performance of the healthcare management system in a significant positive way. EHR efficacy transformed the quality of healthcare to a great extent, whereas the use of EHR had a positive impact on patient outcomes. The effect of telemedicine on patient and provider satisfaction as well as on healthcare accessibility was very positive. The communication effectiveness and continuity of care were also dramatically increased using HIE systems. Comprehensively, all the hypotheses were proved, which means that information technology was instrumental in enhancing healthcare management and service delivery in SAMSO. The researchers also found that the further investment in digital health technologies had the potential to enhance the quality of healthcare, healthcare efficiency, and patient-centered outcomes.

**RESULTS AND FINDINGS**

**Table 1**

Descriptive Statistics of Study Variables

Variable	No. of Items	Mean	Standard Deviation
Adoption of Information Technology	5	4.02	0.61
EHR Effectiveness	5	3.94	0.66

Variable	No. of Items	Mean	Standard Deviation
Telemedicine Use	4	3.76	0.72
HIE Systems	4	3.81	0.69
Quality of Healthcare	5	3.98	0.63
Patient and Provider Satisfaction	4	3.74	0.71
Healthcare Accessibility	4	3.69	0.76
Communication Effectiveness	4	3.87	0.68
Continuity of Care	4	3.84	0.70
Patient Outcomes	5	3.91	0.65
Performance of Healthcare Management System	6	4.05	0.58

As indicated in Table 1, the mean scores of each of the study variables were relatively high meaning that the respondents in general gave positive perceptions about the use of information technology and the associated outcomes in SAMSO. The mean score was the highest in the performance of the healthcare management system ( $M = 4.05$ ,  $SD = 0.58$ ) then in the adoption of information technology ( $M = 4.02$ ,  $SD = 0.61$ ) and quality of healthcare ( $M = 3.98$ ,  $SD = 0.63$ ). There was also a strong average rating of EHR effectiveness ( $M = 3.94$ ,  $SD = 0.66$ ) and patient outcomes ( $M = 3.91$ ,  $SD = 0.65$ ). The mean of the use of telemedicine ( $M = 3.76$ ,  $SD = 0.72$ ), patient and provider satisfaction ( $M = 3.74$ ,  $SD = 0.71$ ), and healthcare accessibility ( $M = 3.69$ ,  $SD = 0.76$ ) were lower, though they were also favorable perceptions. Standard deviations were between 0.58 and 0.76 implying that there was a moderate degree of the consistency of the answers provided by the respondents.

**Table 2**

Reliability Analysis of Measurement Scales

Construct	No. of Items	Cronbach's Alpha	Composite Reliability
Adoption of Information Technology	5	0.86	0.89
EHR Effectiveness	5	0.84	0.88
Telemedicine Use	4	0.81	0.85
HIE Systems	4	0.83	0.87
Quality of Healthcare	5	0.85	0.89
Patient and Provider Satisfaction	4	0.80	0.84

Construct	No. of Items	Cronbach's Alpha	Composite Reliability
Healthcare Accessibility	4	0.79	0.83
Communication Effectiveness	4	0.82	0.86
Continuity of Care	4	0.81	0.85
Patient Outcomes	5	0.84	0.88
Performance of Healthcare Management System	6	0.88	0.91

Table 2 showed that all the constructs were satisfactorily reliable. The values of Cronbach alpha were between 0.79 and 0.88 whereas composite reliability was between 0.83 and 0.91. The performance of the healthcare management system had the highest reliability ( $\alpha = 0.88$ , CR = 0.91), then came the adoption of information technology ( $\alpha = 0.86$ , CR = 0.89) and finally quality of healthcare ( $\alpha = 0.85$ , CR = 0.89). The lowest value of Cronbach's alpha, which was observed in the case of healthcare accessibility ( $\alpha = 0.79$ ), was still acceptable. The results indicated that the measurement scales were internally consistent and able to be subject to further statistical analysis.

**Table 3**

Correlation Matrix of the Study Variables

	1	2	3	4	5	6
1. Adoption of IT	1.000					
2. EHR Effectiveness	0.64	1.000				
3. Telemedicine Use	0.58	0.55	1.000			
4. HIE Systems	0.61	0.59	0.57	1.000		
5. Patient Outcomes	0.53	0.67	0.49	0.56	1.000	
6. Healthcare Management System Performance	0.71	0.65	0.60	0.63	0.58	1.000

Table 3 demonstrated the correlation among the variables of the study and indicated that there are positive relationships among all the key constructs. The performance of healthcare management system had the highest correlation with adoption of information technology ( $r = 0.71$ ), which is positive. Patient outcomes ( $r = 0.67$ ) and the performance of healthcare management systems ( $r = 0.65$ ) also had a strong correlation with EHR effectiveness. The HIE systems were positively correlated with the performance of the healthcare management system ( $r = 0.63$ ), the use of IT ( $r = 0.61$ ), and effectiveness of EHR ( $r = 0.59$ ). The use of telemedicine was positively correlated with the adoption of IT ( $r = 0.58$ ), HIE systems ( $r = 0.57$ ), and EHR effectiveness ( $r = 0.55$ ) with moderate relationships. In general, the correlation outcomes indicated that the enhancement of one area of information technology was related to the enhancement of other areas of healthcare delivery and management.

**Table 4**

Relationship Between EHR Effectiveness and Quality of Healthcare

Variables	Beta ( $\beta$ )	R	R <sup>2</sup>	t-value	p-value
EHR Effectiveness → Quality of Healthcare	0.62	0.65	0.42	8.47	0.003

Table 4 revealed that EHR effectiveness significantly positively impacted the healthcare quality. The regression coefficient ( $= 0.62$ ) suggested that as the EHR effectiveness was increased by a single unit, the healthcare quality rose significantly. The value of correlation ( $R = 0.65$ ) showed that there was a strong relationship and the coefficient of determination ( $R^2 = 0.42$ ) revealed that the EHR effectiveness explained 42% of the variation in quality of healthcare. The t-value of 8.47 and p-value of 0.003 showed that this relationship existed statistically. As such, the findings were in accordance with the opinion that the appropriate utilization of EHR systems enhanced the quality of healthcare services.

**Table 5**

Effect of Telemedicine on Patient and Provider Satisfaction and Healthcare Accessibility

Dependent Variable	Beta ( $\beta$ )	R	R <sup>2</sup>	t-value	p-value
Patient and Provider Satisfaction	0.54	0.58	0.34	6.92	0.01
Healthcare Accessibility	0.49	0.52	0.27	5.88	0.004

Table 5 showed that the use of telemedicine positively influenced both satisfaction of patients and their providers and access to health care to a significant extent. To achieve patient and provider satisfaction, the use of telemedicine gave a regression coefficient of 0.54 with  $R = 0.58$  and  $R^2 = 0.34$  indicating that the telemedicine usage was able to explain 34 percent of the variance in satisfaction. This was a statistically important connection ( $t = 6.92, p = 0.010$ ). Telemedicine use also had a positive magnitude ( $= 0.49, R = 0.52, R^2 = 0.27, t = 5.88, p = 0.004$ ), which indicates that telemedicine was used to explain 27 percent of the variance in the accessibility. These findings indicated that telemedicine enhanced satisfaction as well as access of healthcare services but the impact on satisfaction was marginally greater than the impact on access.

**Table 6**

Effect of HIE Systems on Communication Effectiveness and Continuity of Care

Dependent Variable	Beta ( $\beta$ )	R	R <sup>2</sup>	t-value	p-value
Communication Effectiveness	0.57	0.61	0.37	7.31	0.03
Continuity of Care	0.52	0.56	0.31	6.41	0.01

Table 6 showed that the effects of HIE systems on communication effectiveness and continuity of care were important and significant in a positive way. Communication effectiveness outcomes indicated that 0.57 was the beta of communication effectiveness,  $R = 0.61$ , and  $R^2 = 0.37$ , which means that HIE systems explained 37% of the change in communication effectiveness. The correlation was found to be significant statistically ( $t = 7.31, p = 0.030$ ). On the same note, to establish continuity of care, HIE

systems presented  $31 = 0.52$ ,  $R = 0.56$ , and  $R^2 = 0.31$ , which reflected that HIE systems reflected 31 percent of the variation in continuity of care. This correlation was also important ( $t = 6.41$ ,  $p = 0.010$ ). These results meant that the implementation of HIE systems improved the sharing of patient care information between healthcare organizations and improved patient continuity.

**Table 7**

Relationship Between Adoption of IT and Performance of Healthcare Management System

Variables	Beta ( $\beta$ )	R	$R^2$	t-value	p-value
Adoption of IT $\rightarrow$ Healthcare Management System Performance	0.68	0.71	0.50	9.26	0.002

Table 7 indicated that there was a strong and positive relation between adoption of information technology and performance of the system of healthcare management. The strongest relationship tested was the one with the regression coefficient ( $= 0.68$ ), indicating the adoption of IT to be a significant predictor of the management system performance. The correlation coefficient ( $R = 0.71$ ) showed that there was a high association whereas the  $R^2 = 0.50$  indicated that the adoption of IT explained 50% of the variation in healthcare management system performance. The t-value of 9.26 and p-value of 0.002 indicated that relationship was found to be statistically significant. Such a finding implied that IT usage increased significantly the overall performance of the healthcare management system.

**Table 8**

Relationship Between Utilization of EHR and Patient Outcomes

Variables	Beta ( $\beta$ )	R	$R^2$	t-value	p-value
Utilization of EHR $\rightarrow$ Patient Outcomes	0.59	0.63	0.40	7.85	0.01

As demonstrated in table 8 patient outcomes were significantly and positively related to the use of EHR. The regression coefficient ( $= 0.59$ ) showed a moderate value of positive effect, whereas the correlation coefficient ( $R = 0.63$ ) showed a strong connection of the two variables. The coefficient of determination ( $R^2 = 0.40$ ) demonstrated that the use of EHR accounted 40 percent of the variation in patient outcomes. This was a statistically significant relationship, as the t-value of 7.85 and the p-value of 0.010 both were statistically significant. This finding suggested that the higher the use of EHR the better patient outcomes.

**Table 9**

Hypotheses Testing Summary

Hypothesis Statement	p-value	Result
H1 There was a significant relationship between the adoption of information technology and the performance of the healthcare management system.	0.002	Supported
H2 There was a significant positive relationship between EHR effectiveness and the quality of healthcare.	0.003	Supported

Hypothesis Statement	p-value	Result
H3	SAMSO's implementation of telemedicine had a significant positive effect on patient and provider satisfaction and healthcare accessibility. 0.010, 0.004	Supported
H4	SAMSO's use of HIE systems had a significant positive effect on communication effectiveness and continuity of care. 0.030, 0.010	Supported
H5	There was a significant positive relationship between the utilization of EHR and patient outcomes. 0.010	Supported

The results of the hypothesis testing were presented in Table 9 and indicated that all hypotheses were approved. H1 established the fact that the use of information technology had a significant association with the healthcare management system performance ( $p = 0.002$ ). H2 had a big positive correlation between the effectiveness of EHR and quality of healthcare ( $p = 0.003$ ). H3 demonstrated that telemedicine was a significant barrier as it enhanced patient and provider satisfaction and access to healthcare ( $p = 0.010$  and  $p = 0.004$ ). H4 verified that HIE systems had a significant positive effect on the effectiveness and continuity of care ( $p = 0.030$  and  $p = 0.010$ ). H5 proved that the use of EHR was significantly positively connected with patient outcomes ( $p = 0.010$ ). All in all, the results were consistent that information technology had a major impact in enhancing healthcare management and service delivery at SAMSO.

## DISCUSSION

The results of the undertaken research suggested that information technology contributed significantly to the enhancement of healthcare management within the Saudi Aramco Medical Services Organization (SAMSO). The descriptive findings indicated a relatively good mean score on all the major variables, especially on the performance of healthcare management systems, the adoption of information technology, the quality of healthcare, and the effectiveness of EHR. These results indicated that the respondents viewed IT as a proven and working part of healthcare administration. This trend was consistent with previous reports that the adoption of health information technologies had dramatically increased in healthcare systems, but the extent of efficient utilization usually depended on the setting and level of implementation maturity. As an illustration, Adler-Milstein et al. (2014) and Adler-Milstein et al. (2017) indicated the gradual improvement in EHR adoption, and also indicated that the implementation difficulties did not decrease after the process. The current results were in line with that trend with the highest usage and positive perceptions not always meaning the lack of operational constraints.

One of the most significant study findings was the close association between the adoption of information technology and the performance of healthcare management system. The regression analysis indicated that the use of IT described a significant amount of variation in the performance of management systems. This showed that the more organizations were using digital systems, the more was the administrative efficiency, coordination, and better functioning of the organization. This finding was in line with the general claim in the literature that health information technology has taken center stage in the contemporary healthcare operations. Al-Shorbaji and Househ (2016) suggested that IT has revolutionized clinical and managerial practice through the advancement of faster information exchange, better documentation, and coordination of the care process. On the same note, Balaraman and Kosalram (2013) defined hospital information systems as one of the most important mechanisms of enhancing decision-making and workflow integration. Alghamdi et al. (2021), working in the Saudi context also discovered that information technology played a significant role in the performance of the healthcare sector. Hence, the current research supported the stance according to which IT adoption is not a technical upgrade but a management capability that frames the performance of the institutions.

The findings also revealed that the effectiveness of EHR was significantly related to positive healthcare quality. This observation implied that the usefulness of EHRs was not only determined by their existence but the effectiveness with which they were used to aid in documentation, retrieval, coordination, and clinical decision making. This was in accord with Alotaibi et al. (2020) who conducted a systematic review and meta-analysis to find that EHR systems had the potential to enhance the quality of healthcare in cases where they were implemented and used appropriately. Similar results were previously reported by Garrido et al (2005) and Furukawa (2010) where electronic records were associated with the enhancement of certain areas of care quality and patient-sensitive outcomes. Besides, Patel et al. (2020) highlighted that EHRs are central to broader health IT performance since they define quality of information, clinical workflow and organizational learning. The current research thus proposed similarities in that the EHR-related gains at SAMSO were probably related to the operational effectiveness of the system and not mere adoption quo.

One of the associated findings was the fact that the use of EHR was significantly related to patient outcomes. This facilitated the perception that in the event that electronic documentation is utilized in the healthcare procedures actively, it can help in enhancing the coordination of treatment, enhancing follow-up, and making informed clinical choices. As Jensen et al. (2012) demonstrated, electronic health records may be used to facilitate research and clinical care, as patient information will be easier to access and analyze. The study conducted by Amarasingham et al. (2010) also showed that it was possible to identify patients at risk of adverse outcomes based on the data of electronic medical record, which is why digital records are important to take proactive care. In the present research, the correlation between the use of EHR and patient outcomes was positive, indicating that the system was not only helping in the area of administration but also impacting patient outcomes. This finding should however be taken with caution in the view of literature that health IT can occasionally create unintended consequences when poorly implemented into practice. Ash et al. (2004) and Han et al. (2011) cautioned that poorly designed systems would introduce new types of error or cause a break in clinical processes. Therefore, the favorable results of this research can be viewed as a fairly effective usage, yet further focus on usability and workflow compatibility has to be paid.

Telemedicine was also observed to exert a vast impact on patient and provider satisfaction and access to healthcare. These findings were aligned with a significant amount of literature in which telemedicine is characterized as the means of enhancing service accessibility, lowering consulting obstacles, and augmenting convenience. Ekeland et al. (2010) demonstrated the evidence of the effectiveness of telemedicine in various healthcare functions, whereas Kruse et al. (2017) discovered that telehealth was mostly tied to high patient satisfaction. According to Bashshur et al. (2015), telemedicine was a key to healthcare reform due to the possibility to expand services to underserved regions and minimize inefficiencies. The conclusion of the present study that telemedicine enhanced accessibility was especially important in the context of Saudi healthcare, where service expansion and system transformation are the areas of strategic priorities. In their analysis of the Seha application in Saudi Arabia, Alharbi et al. (2021) also demonstrated that the digital health applications had the potential to facilitate better service utilization and satisfaction. The outcome was also representative of wider international claims by Hollander and Carr (2020) that more continuity and access can be enhanced by virtual care when a physical service delivery is limited.

The impact of the HIE system on the effectiveness of communication and continuity of care was also statistically significant. These results confirmed the age-old debate that health information exchange enhances provider coordination by ensuring that the relevant information on a patient is accessible at all service points. Kaelber and Bates (2007) attributed HIE to improvement in patient safety whereas Fresse et al. (2008) demonstrated financial and efficiency gains in emergency care. Hincapie et al. (2014) and Furukawa et al. (2011) have also determined that HIE use was related to the efficiency of information-sharing and clinical process. The positive correlation with continuity of care was particularly significant in the given study as the fragmentation of communication is still one of the most significant problems in healthcare systems. Moghaddasi et al. (2015) also concluded that the implementation of HIE enhanced information management and healthcare delivery. Thus, SAMSO

results were an empirical contribution to the assumption that HIE systems reinforce the relational and coordination aspects of healthcare management.

Even though the overall findings were quite positive, they should be presented against known barriers of implementation in Saudi Arabia and other countries. According to Alharbi et al. (2018), the adoption of EHR in Saudi Arabia was associated with technical, organizational, and human barriers. Ahmed (2021) also determined infrastructure, workforce ability, and implementation problems as the persistent problems in the Saudi healthcare technology application. Other barriers reported by Kruse et al. (2018) include cost, training constraints, resistance to change, and interoperability constraints. Moreover, Almuwail et al. (2023) referenced the issue of non-compliance with security and privacy as one of the major problems in Saudi health institutions. These issues are important since using technology does not guarantee the sustainable performance improvement. The affirming results in this research can thus suggest that SAMSO might have gained a comparatively positive implementation climate, yet it still should be provided with continuous governance, training, protection of privacy, and usability enhancement.

As demonstrated in the discussion, the study findings were generally consistent with other past literatures, and added localized empirical data in SAMSO. The findings established that information technology, EHRs, telemedicine, and HIE systems had a positive relationship with healthcare coverage, quality, communication, continuity of care, patient outcomes, and performance of the management system. Practically, this implied that healthcare organizations were supposed to keep investing in built-in digital infrastructure and at the same time consider the quality of implementation, adoption among users, and data governance. Technology acceptance and physician engagement are critical to the maximum benefits of health IT as Holden and Karsh (2010) and Lau and Hsu (2014) proposed. Thus, the research confirmed the thesis that effective digitalization of healthcare is based on technical systems as well as on organizational factors facilitating their profitable utilization.

## **RECOMMENDATIONS**

- Healthcare organizations should continue expanding the adoption of information technology systems to improve the overall performance and efficiency of healthcare management processes.
- Hospitals and healthcare institutions should enhance the effective utilization of electronic health records to improve the quality of healthcare services and support better clinical decision-making.
- Healthcare providers should promote the wider use of telemedicine services to increase patient and provider satisfaction and to improve access to healthcare, especially for remote or underserved populations.
- Health information exchange systems should be strengthened to facilitate better communication among healthcare professionals and to ensure continuity of patient care across different departments and facilities.
- Training programs should be provided for healthcare staff to improve their technical skills and ensure the effective use of digital healthcare technologies.
- Healthcare organizations should develop strong data security and privacy policies to protect patient information and maintain trust in digital health systems.
- Policymakers and healthcare administrators should invest in modern digital infrastructure and support initiatives that encourage innovation and integration of advanced healthcare technologies.

## REFERENCES

- Adler-Milstein, J., DesRoches, C. M., Furukawa, M. F., Worzala, C., Charles, D., Kralovec, P., ... & Jha, A. K. (2014). More than half of US hospitals have at least a basic EHR, but stage 2 criteria remain challenging for most. *Health Affairs*, 33(9), 1664–1671.
- Adler-Milstein, J., Holmgren, A. J., Kralovec, P., Worzala, C., Searcy, T., Patel, V., ... & Bates, D. W. (2017). Electronic health record adoption in US hospitals: progress continues, but challenges persist. *Health Affairs*, 36(8), 1653–1660.
- Ahmed, N. J. (2021). Current practice of using technology in health-care delivery in Saudi Arabia: challenges and solutions. *Asian Journal of Pharmaceutics*, 15(1).
- Al Khashan, H., Abogazalah, F., Alomary, S., Nahhas, M., Alwadey, A., Al-Khudhair, B., ... & Hassanein, M. (2021). Primary health care reform in Saudi Arabia: progress, challenges and prospects. *Eastern Mediterranean Health Journal*, 27(10), 1016–1026.
- Alghamdi, S., Alqarni, A., & Alhuwaimel, L. (2021). Impact of information technology in Saudi Arabia's healthcare sector. *International Journal of Advanced Computer Science and Applications*, 12(3), 348–355.
- Alharbi, A., Alzuwaed, J., & Qasem, H. (2021). Evaluation of e-health (Seha) application: a cross-sectional study in Saudi Arabia. *BMC Medical Informatics and Decision Making*, 21(1), 1–9.
- Alharbi, F., Mohammed, A. A., & Ramzan, S. (2018). Electronic health records in Saudi Arabia: Adoption and challenges. *Journal of Health Informatics in Developing Countries*, 12(1), 1–12.
- Almuwail, K. I., Albarrak, A. S., Nasir, M., Bhutta, M., & Wahsheh, H. A. (2023). Examining the factors for non-compliance of Saudi health organizations for e-health security and privacy. *Journal of Theoretical and Applied Information Technology*, 101(2).
- Alotaibi, Y. K., Federico, F., & Jones, P. (2020). The impact of electronic health record systems on healthcare quality: A systematic review and meta-analysis. *Journal of the American Medical Informatics Association*, 27(9), 1401–1410.
- AlSadrah, S. A. (2020). Electronic medical records and health care promotion in Saudi Arabia: an overview. *Saudi Medical Journal*, 41(6), 583.
- Al-Shorbaji, N., & Househ, M. (2016). The impact of information technology on healthcare practice. In *Information Technology in Bio- and Medical Informatics* (pp. 1–17). Springer.
- Amarasingham, R., Moore, B. J., Tabak, Y. P., Drazner, M. H., Clark, C. A., Zhang, S., ... & Halm, E. A. (2010). An automated model to identify heart failure patients at risk for 30-day readmission or death using electronic medical record data. *Medical Care*, 48(11), 981–988.
- Ash, J. S., Berg, M., & Coiera, E. (2004). Some unintended consequences of information technology in health care: the nature of patient care information system-related errors. *Journal of the American Medical Informatics Association*, 11(2), 104–112.
- Ayatollahi, H., & Zeraatkar, K. (2020). Factors influencing the success of knowledge management process in health care organisations: a literature review. *Health Information & Libraries Journal*, 37(2), 98–117.

- Balaraman, P., & Kosalram, K. (2013). E-hospital management & hospital information systems-changing trends. *International Journal of Information Engineering and Electronic Business*, 5(1), 50.
- Balkhi, B., Alshayban, D., & Alotaibi, N. M. (2021). Impact of healthcare expenditures on healthcare outcomes in the Middle East and North Africa (MENA) region: a cross-country comparison, 1995–2015. *Frontiers in Public Health*, 8, 624962.
- Bashshur, R. L., Shannon, G. W., Krupinski, E. A., Grigsby, J., & Kvedar, J. C. (2015). National telemedicine initiatives: essential to healthcare reform. *Telemedicine and e-Health*, 21(12), 1063–1070.
- Bhatia, R. (2021). Emerging health technologies and how they can transform healthcare delivery. *Journal of Health Management*, 23(1), 63–73.
- Ekeland, A. G., Bowes, A., & Flottorp, S. (2010). Effectiveness of telemedicine: A systematic review of reviews. *International Journal of Medical Informatics*, 79(11), 736–771.
- Frisse, M. E., Johnson, K. B., Nian, H., Davison, C. L., Gadd, C. S., Unertl, K. M., ... & Turri, P. A. (2008). The financial impact of health information exchange on emergency department care. *Journal of the American Medical Informatics Association*, 15(6), 712–718.
- Furukawa, M. F., Raghu, T. S., Shao, B., & Burke, D. E. (2010). Electronic medical records, nurse staffing, and nurse-sensitive patient outcomes: evidence from California hospitals, 1998–2007. *Health Services Research*, 45(4), 941–962.
- Furukawa, M. F., Wang, Y., & McCullough, J. S. (2011). Health information exchange and the use of electronic health records: does affiliation matter?. *Journal of Health Economics*, 30(6), 1149–1158.
- Garrido, T., Jamieson, L., Zhou, Y., Wiesenthal, A., & Liang, L. (2005). Effect of electronic health records in ambulatory care: retrospective, serial, cross sectional study. *BMJ*, 330(7491), 581.
- Hincapie, A. L., Warholak, T. L., Altyar, A., Almasri, J., & Barnett, S. (2014). Health information exchange usage in emergency departments and clinics: the who, what, and why. *Journal of the American Medical Informatics Association*, 21(1), 143–149.
- Holden, R. J., & Karsh, B. T. (2010). The technology acceptance model: its past and its future in health care. *Journal of Biomedical Informatics*, 43(1), 159–172.
- Hollander, J. E., & Carr, B. G. (2020). Virtually perfect? Telemedicine for Covid-19. *New England Journal of Medicine*, 382(18), 1679–1681.
- Jensen, P. B., Jensen, L. J., & Brunak, S. (2012). Mining electronic health records: towards better research applications and clinical care. *Nature Reviews Genetics*, 13(6), 395–405.
- Justinia, T. (n.d.). Transforming Health Care in Saudi Arabia. In *Nursing Informatics*.
- Kaelber, D. C., & Bates, D. W. (2007). Health information exchange and patient safety. *Journal of Biomedical Informatics*, 40(6), S40–S45.
- Kruse, C. S., Kristof, C., Jones, B., Mitchell, E., & Martinez, A. (2018). Barriers to electronic health record adoption: a systematic literature review. *Journal of Medical Systems*, 42(2), 1–7.

- Kruse, C. S., Krowski, N., Rodriguez, B., Tran, L., Vela, J., & Brooks, M. (2017). Telehealth and patient satisfaction: A systematic review and narrative analysis. *BMJ Open*, 7(8), e016242.
- Lau, F., & Hsu, J. (2014). Exploring e-health usage and factors related to physician acceptance of technology in medical work: a qualitative study. *Medical Informatics and Decision Making*, 14(1).
- Moghaddasi, H., Babaei, M., & Javadi, M. (2015). The impact of implementing health information exchange on healthcare delivery and information management in emergency departments. *Health Information Management Journal*, 44(2), 14–20.
- Musen, M. A., Middleton, B., & Greenes, R. A. (2021). Clinical decision-support systems. In *Biomedical Informatics: Computer Applications in Health Care and Biomedicine*.
- Patel, V. L., Arocha, J. F., & Kaufman, D. R. (2020). A primer on aspects of EHRs that are essential to a better understanding of health IT and health systems. *International Journal of Medical Informatics*, 139.
- Samra, H., Li, A., Soh, B., & Zain, M. A. (2020). Utilisation of hospital information systems for medical research in Saudi Arabia. *Health Information Management Journal*, 49(2-3), 117–126.
- Yaghmour, S. (2021). *Nurses' knowledge of, and attitudes and perceptions towards people with dementia: A mixed method study in Saudi Arabia* (Doctoral dissertation, University of Southampton).