A Decomposed Model of Technical Facilitating Conditions, Organizational Facilitating Conditions, AI Adoption, and Quality of Healthcare Information System in the UAE

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Abstract

UAE has a continuous interest in the adoption of AI in the healthcare sector and the target of becoming one of the best medical and healthcare destinations in the world. In adjacent, there is a lack of knowledge of how AI can influence the use and quality of Health Information System (HIS) and the need for a comprehensive model of AI adoption. Therefore, the study aims to investigate and analyse a model of AI adoption that is based on the technical and organisational facilitating conditions to predict and diagnose disease, which impacts the quality of HIS in UAE. The proposed conceptual framework is designed to explain the variance of quality of HIS by two main independent variables, which are technical facilitation conditions and organizational facilitating conditions. Additionally, AI adoption acts as a mediator. The conceptual framework is a hierarchical model in which technical facilitating conditions has three antecedents (IT infrastructure, IT unit professionalism, and IT vendor professionalism); and organisational facilitating conditions has three antecedents (HR-IT capacity, financial capacity, and managerial support). The research approach was deductive and used quantitative methods. The population consists of all staff working in hospitals and health care with duties in using the system for predicting and diagnosing disease includes specialist doctors, as well as healthcare administrative staff in government hospitals under the Emirates Health Services Establishment (EHS) in the UAE. The whole population size is 3500. Therefore, the actual dataset is 348, using the simple random sampling from the listed 17 hospitals in 2019/2020. The statistical analysis result revealed that the conceptual framework can explain 55.3% of the variance within the Quality of HIS. The results revealed IT vendor professionalism is not a significant predictor for the technical facilitating conditions. Technical facilitating conditions have no significant effect on the quality of HIS neither directly nor indirectly via the mediation of the AI adoption.

Keywords*: Quality of Health Information System, AI Adoption, Technical Facilitation Conditions, Organizational Facilitating Conditions, Emirates Health Services Establishment (EHS), UAE*

Introduction

UAE is one of the countries that has experienced fundamental changes in the healthcare sector since the federation was founded in 1971. It has come a long way from having just seven hospitals and 12 health centres at that time. the Union was formed to now housing around 200 hospitals, it became up to 70 hospitals (Al-Neyadi, Abdallah, & Malik, 2018) and over one thousand private and public clinics, indicating a dramatic growth in its healthcare sector (Al-Suwaidi, 2011). The federal healthcare system in UAE had originally been developed primarily for the purpose of serving the needs of the government employees, but expanded gradually to meet the needs of the general public. In addition, healthcare facilities were concentrated in urban areas with a focus on curative healthcare. Therefore, the healthcare sector has now become one of the key contributors to the UAE economy (Al-Suwaidi, 2011). UAE is seeking to become a major destination for healthcare service in the region and become one of the main destinations for medical tourism in the world (Ahmed, Amiri, & Khan, 2018; Al-Talabani, Kilic, Ozturen, & Qasim, 2019). This research is mapped with the UAE special interest in the healthcare and medical services, which can be achieved with the implementation of AI in the healthcare sector.

The UAE has a strong commitment to adopt and apply the most advanced techniques in the world; and this makes the UAE unique and make it the icon of luxury and excel lifestyle (Lasrado & Uzbeck, 2017). By 2021, federal governments in UAE seek to adopt clear initiatives and innovative solutions toward implementation strategy of artificial intelligence in different domains including medical and health care sector (Alhashmi, Salloum, & Abdallah, 2019). The UAE has a special interest in integrating the AI tools in healthcare facilities and to continue improving the processes of it in the offered services (ValuStrat, 2018). In addition, to estimate the propagation of artificial intelligence (AI) adoption and its relation to healthcare quality in UAE, empirical studies should be conducted to measure the quality received. In particular, this research is an empirical examination for the factors that can excel the AI adoption of the healthcare sector in UAE, which is aligned with the UAE federal strategies.

The quality of Health Information Systems (HIS) refer to importance study competence and management of data by main components of HISs that includes : healthcare data analytics for reducing healthcare cost and managing population healthcare; to getting factors contribute to the improvement of patient care ,Collaborative care through health information exchanges (HIEs) to access patients health records across the healthcare facilities, healthcare cost control for saving cost and achieving efficiencies, this is due to use digital networks to connection among the systems and healthcare facilities, and management of population healthcare by using data of clinical diagnose patients, HISs can collect, analyse, and deliver it to decision support systems to getting proper treatment (Brook, 2020).

Artificial intelligence is one of the most important technologies for developers of computer applications and systems and is a part of advanced technology, beside to that it is a revolution in healthcare and one of the most modern technologies that provide improvement in the field of healthcare for patients through the presence of tools that help doctors in making the appropriate decision (Alhashmi et al., 2019). AI is a simulation of humans in the various human processes to do them with machines, and it is being linked to a computer, smart machines are robots and smart systems that immortalize human experience are among the most common tools of artificial intelligence. Human intelligence operations include learning, speech recognition, thinking, and problem solving (Alhashmi et al., 2019). Over the last few decades, there has been a proliferation of healthcare management research to help with all kinds of system-level failures and component-level. Health management is therefore characterized as preventing failures of the system and the diagnostic process, whilst predicting the efficiency and life of remaining useful of its components. However, most approaches often demand mechanisms that are intelligent enough to gather enough data on the failing variable, the type of the fault, and its effect on the overall performance of the system. Thus, initiatives are being focused on combining artificial intelligence, technologies of predictive and diagnostic across systems and associated and required platforms (Khan & Yairi, 2018).

Adoption and implementation of artificial intelligence has been explored by scholars in different domains. Khobi, Mtebe, and Mbelwa (2020) exploring different factors for AI adoption in the healthcare sector, which include performance expectancy, efforts expectancy, and social influence as the main dimensions. Ye et al. (2019) examine the psychological factors of AI adoptions in health care sectors and his model include perceived usefulness, perceived ease of use, subjective norm, perceived behavioural control, and health awareness. Ngyyen and Luu (2020) examine the factor of Adoption of Industry 4.0 in SMEs; authors examined a variety of factors include, saving time, saving cost, perceived on-time, improvement product quality, enhanced customer relationships, development of human resources, perceived usefulness, perceived ease-of-use, business resources, and environment. None of the previous literature examined the factors of AI adoption from the technology, organisational facilitation, technological facilitation, and environment. Therefore, this study will increase the knowledge of AI adoption by considering a comprehensive conceptual framework.

Exploring the existing literature of the factors of quality of health information systems revealed different factors, the emphasis on managerial and organisational factors. Alsharo, Alnsour, and Alabdallah (2020) examined the impact of habit on the effective use of HIS in Jordan; Lubua and Pretorius (2018) examined the impact of self-efficacy, degree of resistance, relevance of the approach, relevance of the method; Lwoga, Sangeda, and Mushi (2020) examined six antecedents, self-efficacy, information quality, service quality, social influence, and compatibility; Khobi, Mtebe, and Mbelwa (2020) applied the three dimensions of TOE frameworks in a direct relationship to HIS effective use. The previous literature did not examine artificial intelligence adoption as a mediator or as antecedent for the quality of HIS; this study will support the theory by examining the AI adoption in the model of Quality and use of HIS.

Therefore, the study aims to investigate and analyse a model of AI adoption that is based on the technical and organisational facilitating conditions for predicting and diagnosing disease, which impacts the quality of HIS in UAE.

Literature Review

Conceptual Framework

This study proposed a hierarchical conceptual framework of HIS quality healthcare model. This model is partly adapted from the UTAUT3 and TOE frameworks since this study looks at technology acceptance and how new technology is communicated and has affected the quality of HIS through other external factors. The combination consists of two main independent variables, which are technical facilitation conditions and organizational facilitating conditions. Technical facilitating conditions has three antecedents (It infrastructure, IT unit professionalism, and IT vendor professionalism), and organisational facilitating conditions has three antecedents (HR-IT capacity, financial capacity, and managerial support). This model is designed to explain the variance of quality of health information system (HIS) by integrating the AI adoption as a mediator along with the stated two dimensions and its 6 antecedents. (As seen in Figure 1).

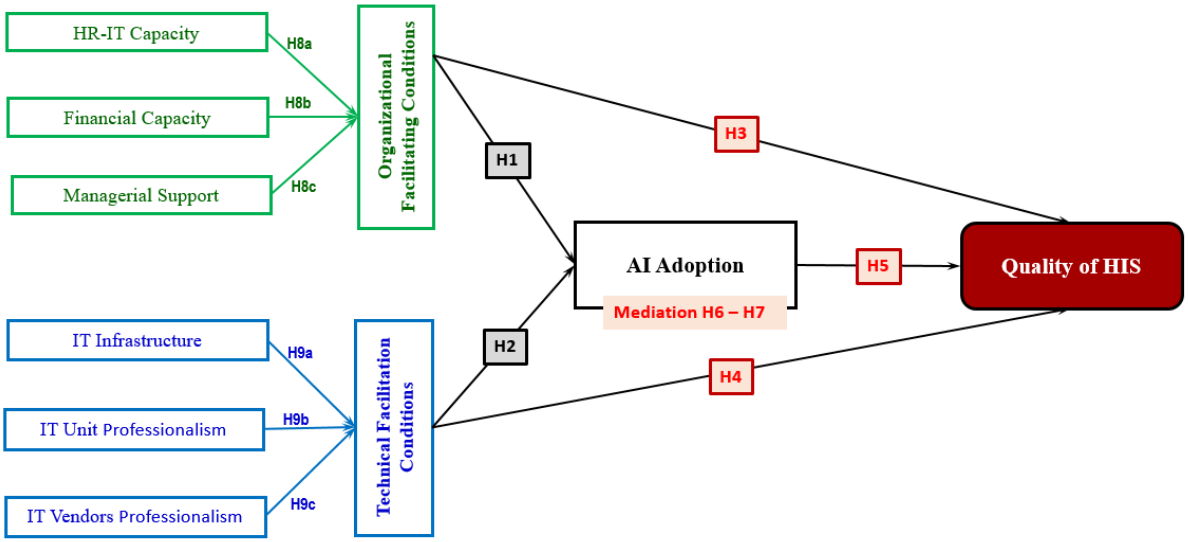


Figure 1:Research Framework

Antecedents of Technical Facilitation Conditions

This section has main three sub-hypotheses. These hypotheses describe the relationship between each of IT infrastructure, IT Unit professionalism and IT vendors' professionalism with technical facilitation conditions.

IT Infrastructure and Technical Facilitation Conditions.

The first sub hypothesis of hypothesis number eleven states that IT infrastructure has a significant direct effect on technical facilitation conditions. Whereby information technology infrastructure is defined broadly as a set of information technology components that are the foundation of an IT service; typically, physical components, but also various software and network components (Carbone, 2020; Loimusalo, 2019). According to some scholars that have carefully studied information technology infrastructure topic they found out that information technology infrastructure has a positive impact on technical facilitation conditions (Alekseeva et al., 2020; Cao & Zhang, 2020). A better information technology infrastructure will defiantly lead to a better facilitation for technical condition (Albahari et al., 2018; Braganza et al., 2020). Based on that the researcher is expecting significant impact of information technology infrastructure on technical facilitation conditions in UAE organizations.

- Hypothesis: IT Infrastructure has a significant direct effect on Technical Facilitation Conditions.

IT Unit Professionalism and Technical Facilitation Conditions.

The second sub hypothesis of hypothesis number eleven states that IT unit professionalism has a significant direct effect on technical facilitation conditions. Whereby professionalism is defined as "the conduct, aims, or qualities that characterize or mark a profession or a professional person;" and it defines a profession as "a calling requiring specialized knowledge and often long and intensive academic preparation." Furthermore, IT unit professionalism describes the common aim of IT unit toward working together to achieve it apart from any interpersonal problem (Ahmad et al., 2019; Ashrafi & Javadi, 2020). According to some scholars that have carefully studied IT unit professionalism topic they found out that IT unit professionalism has a positive impact on technical facilitation conditions (Benyamin et al., 2018; Gienapp, 2018; Salimi, 2019). Professionalism leads to a better utilization of company resources and this is including the IT unit and technical facilitation conditions (Benyamin et al., 2018; Song et al., 2018; Yeboah & Kaplowitz, 2016). Based on that the researcher is expecting significant impact of IT unit professionalism on technical facilitation conditions in UAE organizations.

- Hypothesis: IT Unit Professionalism has a significant direct effect on technical facilitation conditions.

IT Vendors Professionalism and Technical Facilitation Conditions.

The third sub hypothesis of hypothesis number eleven states that IT vendors' professionalism has a significant direct effect on technical facilitation conditions. As professionalism is defined as "the conduct, aims, or qualities that characterize or mark a profession or a professional person;" and it defines a profession as "a calling requiring specialized knowledge and often long and intensive academic preparation (Aggarwal & Singh, 2020; X. Zhang et al., 2017).

Furthermore, IT vendors professionalism describes efficacy and effectivity that the IT vendors are using to do the job required from them on time (Alnajjar, 2017; Vanderstukken & andMonique Ramioul, 2019). According to some scholars that have carefully studied IT vendors professionalism topic they found out that IT vendors professionalism has a positive impact on technical facilitation conditions (Alnajjar, 2017; Vairetti et al., 2019; van Meerkerk & Edelenbos, 2018). Professionalism leads to a better utilization of company resources and this is including technical facilitation conditions (Aakhus & Benovitz, 2008; Rhoten, 2003).Based on that the researcher is expecting significant impact of IT vendors' professionalism on technical facilitation conditions in UAE organizations.

- Hypothesis: IT Vendors Professionalism has a significant direct effect on Technical Facilitation Conditions.

Antecedents of Organizational Facilitating Conditions

This section has main three sub-hypotheses. Those hypotheses describe the relationship between each of HR-IT capacity, financial capacity and managerial support with organizational facilitating conditions.

HR-IT Capacity and Organizational Facilitating Conditions.

The first sub hypothesis of hypothesis number twelve states that HR-IT capacity has a significant direct effect on organizational facilitating conditions. Whereby in a general meaning capacity means the maximum amount that something can contain (Mutiara et al., 2019; D. H. B. Phan et al., 2020; Saeidi et al., 2019).HR-IT capacity means the maximum that the organization can use of human resource power along with the information technology tools to support the tasks accomplishment (Handayani et al., 2017; Poux et al., 2020; Raj & Smys, 2019). According to some scholars that have carefully studied HR-IT capacity topic they found out that HR-IT capacity has a positive impact on organizational facilitating conditions (Bawo & Lippeveld, 2016; Poux et al., 2020; Thollet, 2020).A better HE-IT capacity will lead to a greater use of technology and this will lead to a greater work facilitation conditions at the origination (Ahmadi et al., 2018; Shafi et al., 2018; Thomo & Sarivougioukas, 2020).Based on that the researcher is expecting significant impact of HR-IT capacity on organizational facilitating conditions in UAE organizations.

- Hypothesis: HR-IT Capacity has a significant direct effect on Organizational Facilitating Conditions.

Financial Capacity and Organizational Facilitating Conditions.

The second sub hypothesis of hypothesis number twelve states that financial capacity has a significant direct effect on organizational facilitating conditions. Whereby financial capacity refers to the ability to satisfactorily manage one's financial affairs in a manner consistent with personal self-interest and values (Fareedi & Ghazawneh, 2018; Zakaria & Yusof, 2016). Assessment of financial capacity should include formal objective assessment in addition to a clinical interview and gathering contextual data (Finnegan et al., 2017; Nuri et al., 2018). According to some scholars that have carefully studied financial capacity topic they found out that financial capacity has a positive impact on organizational facilitating conditions (Alipour & Ahmadi, 2017; Sligo et al., 2017; Teklegiorgis et al., 2016). A greater financial capacity will lead to a greater use of technology and this will lead to a greater work facilitation conditions at the origination (Mucha et al., 2020; Ruder-Hook, 2018; Sjøberg, 2019). Based on that the researcher is expecting significant impact of financial capacity on organizational facilitating conditions in UAE organizations.

- Hypothesis: Financial Capacity has a significant direct effect on Organizational Facilitating Conditions.

Managerial Support and Organizational Facilitating Conditions.

The third sub hypothesis of hypothesis number twelve states that managerial support has a significant direct effect on organizational facilitating conditions. Whereby managerial support can take many different forms, including effective communication between workers and managers, involving workers in important decisions, giving workers clear feedback on their performance and helping them with difficult tasks (Alekseeva et al., 2020; Fountaine et al., 2019; Jahić & Roitsch, 2020). According to some scholars that have carefully studied managerial support topic they found out that managerial support has a positive impact on organizational facilitating conditions (Braganza et al., 2020; Wladawsky-Berger, 2019). Management support at the organization is always considered as one of the important facilitation roles used to optimize the performance (Ahmad et al., 2019; Y. Zhang et al., 2018; X. Zhu et al., 2019). Based on that the researcher is expecting significant impact of managerial support on organizational facilitating conditions in UAE organizations.

- Hypothesis: Managerial Support has a significant direct effect on Organizational Facilitating Conditions.

Organizational Facilitating Conditions, AI Adoption, and Quality of HIS.

Organizational facilitating conditions is the level to which an individual believes that a technological and business facilities exist to sustain the use of the system, and the degree to which he or she has the suitable expertise and sources to take advantage of stated system (Al-Ajlouni et al., 2018; Harle et al., 2016).

According to some scholars that have carefully studied organizational facilitating conditions topic they found out that organizational facilitating conditions has a positive impact in making a better AI adoption (Popova et al., 2019; Poux et al., 2020; J. Zhu et al., 2018). The more the organization wants to facilitate the work for employees the more they should of adopt and provide smart tools helps them to work better (Poux et al., 2020; SECRETARIAT, 2016; Thollet, 2020). That's why firms now tend to adopt more AI tools for better effectivity (Bawo & Lippeveld, 2016; Ebnehoseini et al., 2019; Huang et al., 2019; Shafi et al., 2018). Based on that the researcher is expecting significant impact of organizational facilitating conditions on AI adoption in UAE organizations. This hypothesis is alike with other hypotheses in others studies (Ahmadi et al., 2018; Thomo & Sarivougioukas, 2020).

- Hypothesis: Organizational Facilitating Conditions has a significant direct effect on AI Adoption.
  According to some scholars that have carefully studied organizational facilitating conditions topic they found out that organizational facilitating conditions has a positive impact in making a better quality of health information system (HIS) (Ahmadi et al., 2018; Thomo & Sarivougioukas, 2020). A better organizational working conditions will help to make a better and smooth information system to accomplish the aim of the organization (de Carvalho Junior & Bandiera-Paiva, 2019; Karampela et al., 2017; Stylianides et al., 2017). Based on that the researcher is expecting significant impact of organizational facilitating conditions on quality of health information system (HIS) in UAE organizations. This hypothesis is alike with other hypotheses in others studies (Karampela et al., 2017; Nuri et al., 2018; Sligo et al., 2017; Zakaria & Yusof, 2016).
- Hypothesis: Organizational Facilitating Conditions has a significant direct effect on Quality of HIS.

Technical Facilitating Conditions, AI Adoption, and Quality of HIS.

Facilitating conditions refer to the degree to which an individual believes that organizational and technical infrastructure exists to support the use of a system (Ghazali, Nguyen, Mutum, & Yap, 2019; Huber, Anderson, & Bernauer, 2018; Polhill et al., 2017). and technical facilitating conditions is the techniques that is used for a purpose of making the work easier (Salimon et al., 2017; X. Zhang et al., 2017). According to some scholars that have carefully studied technical facilitating conditions topic they found out that technical facilitating conditions has a positive impact in making a better AI adoption (Alnajjar, 2017; Vanderstukken & andMonique Ramioul, 2019). AI is so important in making a solution for every technical problem at the originations that's why firms now tend more to adopt AI tools for better effectivity (Mahardika et al., 2019; Messerlin & Zarrouk, 2000; van Meerkerk & Edelenbos, 2018). Based on that the researcher is expecting significant impact of technical facilitating conditions on AI adoption in UAE organizations.

- Hypothesis: Technical Facilitation Conditions has a significant direct effect on AI Adoption.

  According to some scholars that have carefully studied technical facilitating conditions topic they found out that technical facilitating conditions has a positive impact in making a better quality of health information system (HIS) (Adesina & Zinnah, 1993; Håkanson & Nobel, 2000; Kokko, 1994). A better technical working conditions will help to make a better performance of the organizational system to accomplish the aim of the organization (Agwu, 2018; Al-Ajlouni et al., 2018; Harle et al., 2016; Mutiara et al., 2019). Based on that the researcher is expecting significant impact of technical facilitating conditions on quality of health information system (HIS) in UAE organizations. This hypothesis is alike with other hypotheses in others studies (Popova et al., 2019; Poux et al., 2020).
- Hypothesis: Technical Facilitation Conditions has a significant direct effect on Quality of HIS.

AI Adoption as a mediator in the relationship between this study Independent Variables and Quality of HIS.

Artificial intelligence forms the basis for all computer learning and is the future of all complex decision making (Thollet, 2020).As business leaders and innovators race to reach the promise of artificial intelligence to deliver a competitive advantage as well as cost and time savings, the technology is altering industries from finance to manufacturing with new products, processes and capabilities (Huang et al., 2019; Poux et al., 2020).Furthermore, many researchers that have studied the role of AI adoption as a mediator in many independents variables, including some of this study variables and the relationship with quality of information system and found out that AI adoption is playing a significant important mediating role in making a better anticipation the variance of dependent variables related to IT (Fareedi & Ghazawneh, 2018; Finnegan et al., 2017; Zakaria & Yusof, 2016).Based on that the researcher is expecting significant positive mediating effect of AI adoption on the relationship between this study independent variables and quality of health information system (HIS).

- Hypothesis: AI Adoption has a mediating role in the relationship between Technical Facilitation Conditions and Quality of HIS.
- Hypothesis: AI Adoption has a mediating role in the relationship between Organizational Facilitating Conditions and Quality of HIS.

Methodology

The research design considered for this study is classified as exploratory and hypothesis testing investigation; therefore, the research approach is deductive and used quantitative methods. Overall, the proposed hypotheses were examined for this study to assess the relationships between the different variables of the proposed conceptual framework. The population is all staff working in hospitals and health care with duties in using the system for predicting and diagnosing disease includes specialist doctors and healthcare administrative staff at the levels of senior management and executive management in government hospitals under Emirates Health Services Establishment (EHS) in UAE. An estimation of the workforce working in those Hospitals is approximately 3500 employees in different physician and administration jobs. The targeted sample size is 346 subjects that respect the G*Power effective sample size (178) and the minimum sample size for PLS analysis (50). The data collection took place during 2019/2020. The sampling technique is simple random sampling to collect samples from the listed 17 hospitals of the EHS. Data obtained from the survey is analysed by utilizing the software Statistical Package for the Social Sciences (SPSS 25) and SmartPLS 3.0. The tool used for the data collection is a well-structured survey that collected online and adapted from an extensive literature review to identify the items in the measuring instrument. In addition, the adapted questionnaire was validated from expert panel and checked for reliability by conducting a pilot study.

Findings

Validity and Reliability of Constructs

The main reliability easements are outer loading and cross loading to test the proper loading of the items in its associated variable. Every item must has sufficient loading above 0.708 within in its associated variable and must be higher than all loadings in all other variables(Hulland, 1999; Jr-Hair, Hult, Ringle, & Sarstedt, 2016). As seen in Table 1, the proposed model have proper loading above 0.708 for all the items except items. The findings also revealed that all the variables have proper composite reliability because the Cronbach's Alpha scores are above the threshold value of 0.7. In addition, the convergent validity that represented by the value of the average variance extracted (AVE) revealed an adequate measure above the threshold of 0.5. Therefore, the dataset have a suitable convergent validity, composite reliability, and outer loading.

Table 1: Constructs Reliability and Validity

Construct	Item	Proper Loadings	AVE	Cronbach's' Alpha
Organizational Facilitating Conditions	OFC1	0.782	0.706	0.895
	OFC2	0.877		
	OFC3	0.853		
	OFC4	0.83		
	OFC5	0.855		
HR-IT Capacity	HRC1	0.856	0.701	0.893
	HRC2	0.758		
	HRC3	0.872		
	HRC4	0.848		
	HRC5	0.848		
Financial Capacity	FC1	0.859	0.776	0.928
	FC2	0.886		
	FC3	0.878		
	FC4	0.887		
	FC5	0.894		
Managerial Support	MS1		0.808	0.921

	MS2	0.893		
	MS3	0.919		
	MS4	0.897		
	MS5	0.885		
Technical Facilitation Conditions	TFC1	0.771	0.758	0.892
	TFC2	0.877		
	TFC3	0.917		
	TFC4	0.91		
	TFC5			
IT Infrastructure	ITI1	0.823	0.714	0.900
	ITI2	0.849		
	ITI3	0.843		
	ITI4	0.886		
	ITI5	0.822		
IT Unit Professionalism	ITUP1	0.883	0.762	0.922
	ITUP2	0.858		
	ITUP3	0.854		
	ITUP4	0.857		
	ITUP5	0.911		
IT Vendors Professionalism	ITVP1	0.89	0.809	0.941
	ITVP2	0.924		
	ITVP3	0.892		
	ITVP4	0.906		
	ITVP5	0.885		
AI Adoption	AIA1	0.777	0.734	0.927
	AIA2	0.914		
	AIA3	0.859		
	AIA4	0.885		
	AIA5	0.899		
	AIA6	0.796		
Quality of HIS	QHIS1	0.918	0.855	0.966
	QHIS2	0.922		
	QHIS3	0.933		
	QHIS4	0.932		

	QHIS5	0.918		
	QHIS6	0.923		

Table 2 shows the Fornell & Larcker criterion matrix that used to assess the discriminant validity to assure that the different variables and its items have enough space between each other. The matrix is a refined matrix of the latent variable's correlations. The test is successful if the value in the diagonal is higher than any other value within the crossed column and raw. For instance, FC has the value of 0.881, which is higher than all the other scores within the shared column and raw. The rest of the study's variables have a good adequate level of the discriminant validity. Based on the above tests, the data set have the proper level of reliability and validity to proceed for relationships examination.

Table 2: Discriminant validity – Fornell-Larcker Criterion

	AIA	FC	HRC	ITI	ITUP	ITVP	MS	OFC	QHIS	TFC
AIA	0.857									
FC	0.614	0.881								
HRC	0.658	0.703	0.837							
ITI	0.498	0.552	0.568	0.845						
ITUP	0.626	0.565	0.654	0.652	0.873					
ITVP	0.611	0.573	0.674	0.578	0.798	0.899				
MS	0.651	0.697	0.679	0.491	0.585	0.573	0.899			
OFC	0.687	0.741	0.795	0.644	0.720	0.710	0.749	0.840		
QHIS	0.622	0.471	0.558	0.440	0.418	0.420	0.616	0.560	0.924	
TFC	0.562	0.515	0.607	0.647	0.659	0.584	0.498	0.623	0.481	0.871

Relationships Examinations and Discussions

Table 3 shows the predictive power and predictive relevance of the two outcome variables; Quality of HIS and AI Adoption besides to Technical Facilitation Conditions and Organizational Facilitating Conditions. Result of the main dependent variable revealed that the variance of the Quality of HIS has an explanation power of 0.553 which is moderate and a large predictive relevance of 0.468. AI Adoption, Technology Characteristics, Technical Facilitation Conditions, Organizational Facilitating Conditions, and Environmental Norm can explain 55.3% of the variance within the Quality of HIS. Result of the mediating variable revealed that the variance of the AI Adoption has an explanation power 0.567, which is moderate and a large predictive relevance of 0.405. Technology Characteristics, Technical Facilitation Conditions, Organizational Facilitating Conditions, and Environmental Norm can explain 56.7% of the variance within AI Adoption.

The result revealed that the variance of the Technical Facilitation Conditions has an explanation power of 0.520, which is moderate, and a large predictive relevance of 0.387. A rate of 52.0% of the variance can be explained by the antecedents of the variable. Result revealed that the variance of the Organizational Facilitating Conditions has an explanation power 0.736, which is moderate, and a large predictive relevance of 0.511. A rate of 73.6% of the variance can be explained by the antecedents of the variable.

Table 3: Predictive Power and Predictive Relevance of Proposed Model

	R Square	Q Square
Quality of HIS	0.553 (moderate)	0.468 (large)
AI Adoption	0.567 (moderate)	0.405 (large)
Technical Facilitation Conditions	0.520 (moderate)	0.387 (large)
Organizational Facilitating Conditions	0.736 (moderate)	0.511 (large)

Table 4 shows the results of the path coefficient and significance level for all the relationships in the proposed conceptual framework. The rule of thumb stated that the relationship is significant if the P vale is less than 0.05 or the T statistics is above 1.96 Hair et al. (2016).

For the relationships of OFC prediction, there are three relationships. For the relationship HRC → OFC results revealed a significant influence because the P vales is 0.000 less than 0.05 and the T statistics 7.888 above 1.98 and with a path coefficient of 0.432. For the relationship FC → OFC results revealed a significant influence because the P vales is 0.000 less than 0.05 and the T statistics 4.240 above 1.98 and with a path coefficient of 0.233. For the relationship MS → OFC results revealed a significant influence because the P vales is 0.000 less than 0.05 and the T statistics 6.489above 1.98 and with a path coefficient of 0.294.

For the relationships of TFC prediction, there are three relationships. For the relationship ITI → TFC results revealed a significant influence because the P vales is 0.000 less than 0.05 and the T statistics 6.217 above 1.98 and with a path coefficient of 0.368. For the relationship ITUP → TFC results revealed a significant influence because the P vales is 0.000 less than 0.05 and the T statistics 3.838 above 1.98 and with a path coefficient of 0.337. For the relationship ITVP → TFC results revealed a non-significant influence because the P vales is 0.164 greater than 0.05 and the T statistics 1.394 below 1.98 and with a weak path coefficient of 0.103.

For the relationships of AIA prediction, there are two relationships. For the relationship OFC → AIA results revealed a significant influence because the P vales is 0.000less than 0.05 and the T statistics 4.900 above 1.98 and with a path coefficient of 0.332. For the relationship TFC → AIA results revealed a significant influence because the P vales is 0.013 less than 0.05 and the T statistics 2.480 above 1.98 and with a path coefficient of 0.128.

For the relationships of GHIS prediction, there are three relationships. For the relationship AIA → QHIS results revealed a significant influence because the P vales is 0.012 less than 0.05 and the T statistics 2.531 above 1.98 and with a path coefficient of 0.228. For the relationship TFC → QHIS results revealed a non-significant influence because the P vales is 0.740 greater than 0.05 and the T statistics 0.332 below 1.98 and with a weak path coefficient of 0.021. For the relationship OFC → QHIS results revealed a non-significant influence because the P vales is 0.897 greater than 0.05 and the T statistics 0.130 below 1.98 and with a weak path coefficient of -0.011.

Table 4:Path Coefficient Assessment of the Study Variables

	Path Coefficient	Standard Deviation	T Statistics	P Value (one tailed)	Status
ITI -> TFC	0.368	0.059	6.217	0.000	Significant
ITUP -> TFC	0.337	0.088	3.838	0.000	Significant
ITVP -> TFC	0.103	0.074	1.394	0.164	Non-Significant
HRC -> OFC	0.432	0.055	7.888	0.000	Significant
FC -> OFC	0.233	0.055	4.240	0.000	Significant
MS -> OFC	0.294	0.045	6.489	0.000	Significant
TFC -> AIA	0.128	0.051	2.480	0.013	Significant
OFC -> AIA	0.332	0.068	4.900	0.000	Significant
TFC -> QHIS	0.021	0.063	0.332	0.740	Non-Significant
OFC -> QHIS	-0.011	0.088	0.130	0.897	Non-Significant
AIA -> QHIS	0.228	0.090	2.531	0.012	Significant

Table 5 shows the mediating role of AI adoption in the relationship between the independent variables of technical facilitation conditions and organizational facilitating conditions and the dependant variable of Quality of HIS in hospitals. For the mediation test, there are three important values to decide the level of mediation between no mediation, partial mediation, or full mediation. As seen in the table; there are direct effects, indirect effect, and total effect.

For the relationship TFC → AIA → QHIS, AI adoption has no mediating effect because the indirect effect has a P value 0.069, which is above 0,05 and not significant. In addition, the direct effect from TFC to QHIS is not significant as well, which revealed that the variable TFC has no impact on the QHIS, neither direct nor indirect.

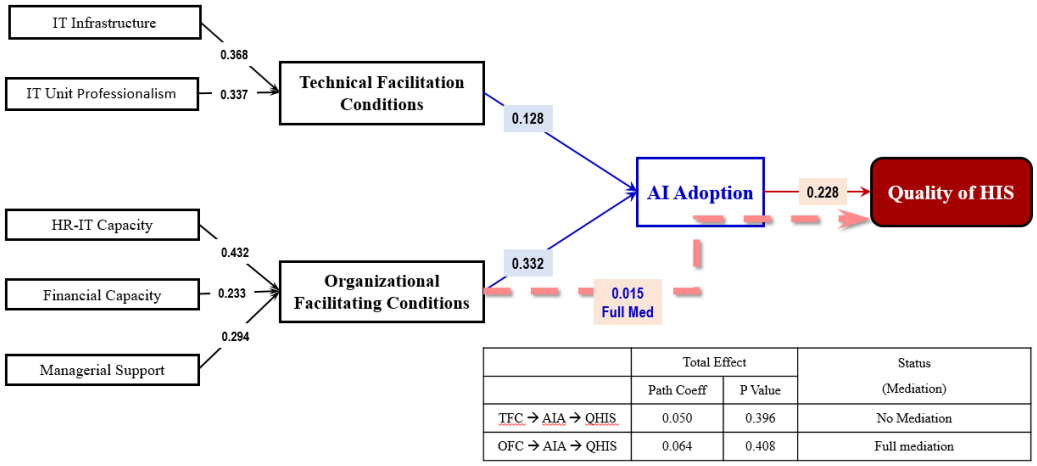
For the relationship OFC → AIA → QHIS, AI adoption has full mediating effect because the indirect effect has a P value 0.015, which is below 0,05 and significant, besides to a path coefficient of 0.076. In addition, the direct effect from OFC to QHIS is not significant, which revealed that the variable OFC can impact on the QHIS via the mediation of AIA.

Table 5: Moderating effects of Awareness of smart government

	Direct Effect			Indirect Effect			Total Effect		Status (Mediation)
	Path Coeff	P Value	Status	Path Coeff	P Value	Status	Path Coeff	P Value	
TFC -> AIA -> QHIS	0.021	0.740	Non - Sig	0.029	0.069	Non - Sig	0.050	0.396	No Mediation
OFC -> AIA -> QHIS	-0.011	0.897	Non - Sig	0.076	0.015	Sig	0.064	0.408	Full mediation

Contributions and Recommendations

Figure 2, shows the re-specified conceptual framework along with the path coefficient scores. Based on the total effect scores, the organisational facilitating conditions, which caused by the three antecedents, HR-IT capacity, financial capacity, and management support. For the technical facilitating conditions, both direct and indirect impacts are non-significant.



	Total Effect		Status
	Path Coeff	P Value	(Mediation)
TFC → AIA → QHIS	0.050	0.396	No Mediation
OFC → AIA → QHIS	0.064	0.408	Full mediation

Figure 2: Re-Specified Conceptual Framework for the Quality of HIS and AI Adoption

The result of this study should further raise awareness about Quality of HIS and importance of the technical facilitation conditions and organizational facilitating conditions to improve the quality of the HIS. Decision makers can take the proper decision for improving the quality of the HIS and with consideration of the AI adoption. For instance, the results of this study revealed that both technical and organisational facilitating conditions have direct or indirect impact to both AI adoption and quality of HIS. Therefore, decision maker at the ministry level should make sure that the governance level is always active and the policies is always updated and monitored.

This study proposed a developed model with new constructs and relationships. While the proposed conceptual framework was assessed successfully, but further research is needed to assess the model in different environments. One of the constraints is the limited approach of implementation, which reduces the generalization, therefore replicating the same assessment in other countries is recommended to get a better understanding and generalization. Simply, the recommendation is for testing the model in different scenarios and conditions to enhance the generalization of the theory. The proposed conceptual framework can explain 55.3% of the variance in the quality of HIS; therefore further studies must focus in exploring, and examining additional factors such as individual characteristics, training and knowledge sharing. The results revealed that IT vendor professionalism is not a predictor for technical facilitating conditions; this could be because the internal IT professionalism is high; however, and further studies could explain this by interviewing experts and mature users of the system. In addition, the results revealed that the technical facilitating

conditions is not a predictor of the quality of the HIS; which call scholars to explain this by interviewing IT experts in the domain of the healthcare sector.

References

Aakhus, M., & Benovitz, M. G. (2008). Argument reconstruction and socio-technical facilitation of large scale argumentation. In *Proceedings of the 3rd International Conference on the Pragmatic Web: Innovating the Interactive Society* (pp. 77–81).

Adesina, A. A., & Zinnah, M. M. (1993). Technology characteristics, farmers' perceptions and adoption decisions: A Tobit model application in Sierra Leone. *Agricultural Economics*, *9*(4), 297–311.

Aggarwal, S., & Singh, A. K. (2020). Developmental, Relational and Facilitating (DRF) Organizational Culture Scale: An Empirical Study in Select Colleges of University of Delhi. *Global Business Review*, 0972150920939761.

Agwu, P. E. (2018). Credit risk management: Implications on bank performance and lending growth. *Available at SSRN 3122501*.

Ahmad, I., Azhar, N., & Chowdhury, A. (2019). Enhancement of IPD characteristics as impelled by information and communication technology. *Journal of Management in Engineering*, *35*(1), 4018055.

Ahmadi, H., Sadoughi, F., Azadi, T., & Shahmoradi, L. (2018). Hospital Information System (HIS) Performance in the Post-implementation Stage. In *2018 59th International Scientific Conference on Information Technology and Management Science of Riga Technical University (ITMS)* (pp. 1–5). IEEE.

Ahmed, G., Amiri, N. Al, & Khan, W. (2018). Outward medical tourism: a case of UAE. *Theoretical Economics Letters*, *8*(7), 1368–1390.

Al-Ajlouni, A., Al-Hakim, D., & Suliaman, M. (2018). Financial Technology in Banking Industry: Challenges and Opportunities. In *e International Conference on Economics and Administrative Sciences ICEAS2018*.

Al-Neyadi, H. S., Abdallah, S., & Malik, M. (2018). Measuring patient's satisfaction of healthcare services in the UAE hospitals: Using SERVQUAL. *International Journal of Healthcare Management*, *11*(2), 96–105.

Al-Suwaidi, A. (2011). The United Arab Emirates at 40: a balance sheet. *Middle East Policy*, *18*(4), 44.

Al-Talabani, H., Kilic, H., Ozturen, A., & Qasim, S. O. (2019). Advancing medical tourism in the United Arab Emirates: Toward a sustainable health care system. *Sustainability*, *11*(1), 230.

Albahari, A., Barge- Gil, A., Pérez- Canto, S., & Modrego, A. (2018). The influence of science and technology park characteristics on firms' innovation results. *Papers in Regional Science*, *97*(2), 253–279.

Alekseeva, L., Gine, M., Samila, S., & Taska, B. (2020). AI Adoption and Firm Performance: Management versus IT. *Available at SSRN 3677237*.

Alger, J., & Dauvergne, P. (2020). The Translocal Politics of Environmental Norm Diffusion. *Environmental Communication*, *14*(2), 155–167.

Alhashmi, S. F. S., Salloum, S. A., & Abdallah, S. (2019). Critical success factors for implementing artificial intelligence (AI) projects in Dubai government United Arab Emirates (UAE) health sector: Applying the extended technology acceptance model (TAM). In *International Conference on Advanced Intelligent Systems and Informatics* (pp. 393–405). Springer.

Alipour, J., & Ahmadi, M. (2017). Dimensions and assessment methods of data quality in health information systems. *Acta Medica Mediterranea*, *33*(2), 313–320.

Alnajjar, G. (2017). Facilitating conditions and cost in determining M-Commerce acceptance in Jordan: Initial findings. *Leadership, Innovation and Entrepreneurship as Driving Forces of the Global Economy*. Springer.

Alsharo, M., Alnsour, Y., & Alabdallah, M. (2020). How habit affects continuous use: evidence from Jordan's national health information system. *Informatics for Health and Social Care*, *45*(1), 43–56.

AMBARWATI, R., HARJA, Y. D., & THAMRIN, S. (2020). The Role of Facilitating Conditions and User Habits: A Case of Indonesian Online Learning Platform. *The Journal of Asian Finance, Economics and Business (JAFEB)*, *7*(10), 481–489.

Arana, L., Medina, L., Pol, E., & Tun, N. (2020). Measuring the Success of Hospital Information System (HIS) at La Loma Luz Adventist Hospital.

Ashrafi, F., & Javadi, A. (2020). Correct characteristics of the newly involved artificial intelligence methods in science and technology using statistical data sets. *International Journal of Modern Engineering Technologies*, *2*(2).

Bawo, L., & Lippeveld, T. (2016). Building a resilient health system (HS) in Liberia: Health Information System (HIS) Strategic Planning. *Annals of Global Health*, *82*(3).

Benyamin, A., Djuwita, R., & Ariyanto, A. A. (2018). Norm activation theory in the plastic age: Explaining children's pro-environmental behaviour. In *E3S Web of Conferences* (Vol. 74, p. 8008). EDP Sciences.

binti Abd Wahab, S. A. (2018). The relationships between facilitating conditions, internal beliefs, attitute and lecturerstrend of using iTaleEM in International Islamic University Malaysia. Kuala Lumpur: International Islamic University Malaysia, 2018.

Braganza, A., Chen, W., Canhoto, A., & Sap, S. (2020). Productive employment and decent work: The impact of AI adoption on psychological contracts, job engagement and employee trust. *Journal of Business Research*.

Brook, C. (2020). DATA PROTECTION 101 :What is a Health Information System? *DATAINSIDER Digital Guardian's Blog*.

Cao, X., & Zhang, D. (2020). From Forced to Voluntary AI Adoption. *Available at SSRN*.

Carbone, S. C. (2020). Quantitative Influences of Trust and Unified Use and Acceptance Factors on AI Adoption in Healthcare. Capella University.

Chatterjee, S., Ghosh, S. K., Chaudhuri, R., & Chaudhuri, S. (2020). Adoption of AI-integrated CRM system by Indian industry: from security and privacy perspective. *Information & Computer Security*.

Cubric, M. (2020). Drivers, barriers and social considerations for AI adoption in business and management: A tertiary study. *Technology in Society*, 101257.

Dauvergne, P. (2018). The power of environmental norms: marine plastic pollution and the politics of microbeads. *Environmental Politics*, *27*(4), 579–597.

Davidson, W. H., & McFetridge, D. G. (1985). Key characteristics in the choice of international technology transfer mode. *Journal of International Business Studies*, *16*(2), 5–21.

Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International Journal of Man-Machine Studies*, *38*(3), 475–487.

de Carvalho Junior, M. A., & Bandiera-Paiva, P. (2019). Unwanted RBAC Functions Over Health Information System (HIS). In *International Conference on Information Technology & Systems* (pp. 712–719). Springer.

de Carvalho Junior, M. A., Ortolani, C. L. F., & Pisa, I. T. (2016). Health Information System (HIS) security standards and guidelines history and content analysis. *Journal of Health Informatics*, *8*(3).

Ebnehoseini, Z., Tabesh, H., Deldar, K., Mostafavi, S. M., & Tara, M. (2019). Determining the Hospital Information System (HIS) Success Rate: Development of A New Instrument and Case Study. Open Access Maced J Med Sci. 2019 May 15; 7 (9): 1407-1414.

Färe, R., Grosskopf, S., Noh, D.-W., & Weber, W. (2005). Characteristics of a polluting technology: theory and practice. *Journal of Econometrics*, *126*(2), 469–492.

Fareedi, A. A., & Ghazawneh, A. (2018). An Ontology Approach for Knowledge Acquisition and Development of Health Information System (HIS).

Finnegan, K., Marx, M., Kaludzu, E., Malunga, B., O'Hagan, R., Yosefe, S., & Dambula, I. (2017). Barriers and Facilitators of Data Quality and Use in Malawi's Health Information System. *Annals of Global Health*, *83*(1).

Fountaine, T., McCarthy, B., & Saleh, T. (2019). Building the AI-powered organization. *Harvard Business Review*, *97*(4), 62–73.

Ghazali, E. M., Nguyen, B., Mutum, D. S., & Yap, S.-F. (2019). Pro-environmental behaviours and Value-Belief-Norm theory: Assessing unobserved heterogeneity of two ethnic groups. *Sustainability*, *11*(12), 3237.

Gienapp, P. (2018). The choice of the environmental covariate affects the power to detect variation in reaction norm slopes. *BioRxiv*, 311217.

Girjatovics, A., & Pesoa, L. M. (2020). Hossein Ahmadi, Farahnaz Sadoughi, Tania Azadi and Leila Shahmoradi. Hospital Information System (HIS) Performance in the Post-implementation Stage Navdeep Singh Randhawa and Mandeep Dhami. Reduction of Energy Consumption in WSN Using Hybrid VGDRA Approac.

Gunawan, W., & Liejaya, B. (2020). Formulating cloud based hospital information system (HIS) with Zachman framework. In *IOP Conference Series: Materials Science and Engineering* (Vol. 725, p. 12092). IOP Publishing.

Hakam, F. (2020). Integrasi Hospital Information System (HIS) dengan Picture Archiving and Communications System (PACS) dan Laboratory Information Management Systems (LIMS).

Håkanson, L., & Nobel, R. (2000). Technology characteristics and reverse technology transfer. *MIR: Management International Review*, 29–48.

Håkanson, L., & Nobel, R. (2001). Organizational characteristics and reverse technology transfer. *MIR: Management International Review*, 395–420.

Handayani, P. W., Hidayanto, A. N., Pinem, A. A., Hapsari, I. C., Sandhyaduhita, P. I., & Budi, I. (2017). Acceptance model of a hospital information system. *International Journal of Medical Informatics*, *99*, 11–28.

Harle, P., Havas, A., & Samandari, H. (2016). The future of bank risk management. McKinsey Global Institute.

Huang, Y., Wang, C., Xue, X., Wu, G., & Li, J. (2019). PRS66 A COST ANALYSIS OF CURRENT SITUATION OF PNEUMONIA TREATMENT IN CHINA: A BIG-DATA HOSPITAL INFORMATION SYSTEM (HIS) DATABASE ANALYSIS. *Value in Health*, *22*, S362.

Huber, R. A., Anderson, B., & Bernauer, T. (2018). Can social norm interventions promote voluntary pro environmental action? *Environmental Science & Policy*, *89*, 231–246.

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strategic Management Journal*, *20*(2), 195–204. https://doi.org/10.2307/3094025

Ismail, N. I. (2016). Development of implementation models for hospital information system (HIS) in Malaysian public hospitals. Universiti Tun Hussein Onn Malaysia.

Ismail, N. I., & Abdullah, N. H. (2016). Hospital Information System (HIS) Implementation in Malaysian Public Hospitals. *Journal of International Information Institute (Tokyo)*, *19*, 833–838.

Jahanbakhsh, M., Raisi, A. R., & Kian, E. J. (2018). Identification of hospital information system (HIS) performance benchmarking indicators in Tehran province social security hospitals. *Journal of Advanced Pharmacy Education & Research| Oct-Dec*, *8*(S2), 155.

Jahić, J., & Roitsch, R. (2020). State of the Practice Survey: Predicting the Influence of AI Adoption on System Software Architecture in Traditional Embedded Systems. In *European Conference on Software Architecture* (pp. 155–169). Springer.

Jebraeily, M., Rahimi, B., Fazlollahi, Z. Z., & Afshar, H. L. (2019). Using SERVQUAL model to assess hospital information system service quality. *Hormozgan Medical Journal*, *23*(1), e86977.

Jõgi, I., Erme, K., Levoll, E., & Stamate, E. (2017). Radical production efficiency and electrical characteristics of a coplanar barrier discharge built by multilayer ceramic technology. *Journal of Physics D: Applied Physics*, *50*(46), 465201.

Jr-Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage Publications.

Kalong, N. A., & Yusof, M. (2017). Waste in health information systems: a systematic review. *International Journal of Health Care Quality Assurance*.

Karampela, I., Tzortzis, E., Kefala, I., Zygoura, E., Mantzana, V., & Armaganidis, A. (2017). Proposal for the Implementation of Quality Standards in a Medical Unit Through Integration to the Hospital Information System. In *ICIMTH* (pp. 185–188).

Khan, S., & Yairi, T. (2018). A review on the application of deep learning in system health management. *Mechanical Systems and Signal Processing*, *107*, 241–265.

Khobi, J. A. M., Mtebe, J. S., & Mbelwa, J. T. (2020). Factors influencing District Health Information System usage in Sierra Leone: A study using the Technology- Organization- Environment Framework. *The Electronic Journal of Information Systems in Developing Countries*, e12140.

Kim, W.-H., & Kim, K.-S. (2018). Pro-environmental intentions among food festival attendees: an application of the value-belief-norm model. *Sustainability*, *10*(11), 3894.

Kokko, A. (1994). Technology, market characteristics, and spillovers. *Journal of Development Economics*, *43*(2), 279–293.

Lasrado, F., & Uzbeck, C. (2017). The excellence quest: a study of business excellence award-winning organizations in UAE. *Benchmarking: An International Journal*.

Loimusalo, A. (2019). RPA and AI Adoption in the Finnish Non-Life Insurance Industry.

Lubua, E. W., & Pretorius, P. D. (2018). DETERMINANTS OF A SUSTAINABLE USE OF THE HEALTH INFORMATION SYSTEM IN THE SUB-SAHARAN AFRICA CONTEXT. In *11th IADIS International Conference Information Systems* (pp. 171–184).

Lwoga, E. T., Sangeda, R. Z., & Mushi, R. (2020). Predictors of electronic health management information system for improving the quality of care for women and people with disabilities. *Information Development*, 0266666920947147.

Mahardika, H., Thomas, D., Ewing, M. T., & Japutra, A. (2019). Experience and facilitating conditions as impediments to consumers' new technology adoption. *The International Review of Retail, Distribution and Consumer Research*, *29*(1), 79–98.

Messerlin, P. A., & Zarrouk, J. (2000). Trade Facilitation: Technical regulations and customs procedures. *World Economy*, *23*(4), 577–593.

Meulenaere, K. De, & Kunze, F. (2020). Do Age Norm Violations Favor or Endanger Firm Innovation? The Role of Environmental Dynamism. In *Academy of Management Proceedings* (Vol. 2020, p. 14063). Academy of Management Briarcliff Manor, NY 10510.

Mucha, T., Halminen, O., Tenhunen, H., & Seppälä, T. (2020). Commercial Adoption of AI in the Healthcare Sector: An Exploratory Analysis of S&P500 Companies. *Studies in Health Technology and Informatics*, *270*, 113–117.

Mutiara, U., Candanni, L. R., & Hasibuan, R. R. (2019). Construction of Financial Technology in Banking Systems in Indonesia. *Jurnal Hukum NOVELTY*, *10*(02), 150–163.

Nasirian, F., Ahmadian, M., & Lee, O.-K. D. (2017). AI-based voice assistant systems: Evaluating from the interaction and trust perspectives.

NGUYEN, X. T., & LUU, Q. K. (2020). Factors affecting adoption of industry 4.0 by small-and medium-sized enterprises: A case in Ho Chi Minh city, Vietnam. *The Journal of Asian Finance, Economics, and Business*, *7*(6), 255–264.

Nuri, N. N., Sarker, M., Ahmed, H. U., Hossain, M. D., Dureab, F., & Jahn, A. (2018). Quality of the Mental Health Information System in a Specialized Mental Hospital in Bangladesh. *Acta Informatica Medica*, *26*(3), 180.

Passaro, S. (2019). Organizational implications of AI adoption: a multiple case study on system integrators.

Petrina, N., Ulyannikova, Y., & Poon, S. (2020). Evidence Synthesis in Health Information System (HIS) Adoption: Challenges and Solutions. Position Paper.

Phan, D. H. B., Narayan, P. K., Rahman, R. E., & Hutabarat, A. R. (2020). Do financial technology firms influence bank performance? *Pacific-Basin Finance Journal*, *62*, 101210.

Polhill, J. G., Craig, T., Alonso-Betanzos, A., Sánchez-Maroño, N., Fontenla-Romero, O., Dumitru, A., … Carrus, G. (2017). Interactions matter: modelling everyday pro-environmental norm transmission and diffusion in workplace networks. *Agent-Based Modeling of Sustainable Behaviors*. Springer.

Popova, M. G., Ganyukova, N. P., & Gladenkova, V. P. (2019). Information system of monitoring physical development of the subject based on analysis of his morphological and functional parameters. *Vestnik of Astrakhan State Technical University. Series: Management, Computer Sciences and Informatics*, (1), 87–98.

Poux, F., Billen, R., Kaspryzk, J.-P., Lefebvre, P.-H., & Hallot, P. (2020). A Built Heritage Information System Based on Point Cloud Data: HIS-PC. *ISPRS International Journal of Geo-Information*, *9*(10), 588.

Raj, J. S., & Smys, S. (2019). Virtual Structure for Sustainable Wireless Networks in Cloud Services and Enterprise Information System. *Journal of ISMAC*, *1*(03), 188–205.

Rhoten, D. (2003). A multi-method analysis of the social and technical conditions for interdisciplinary collaboration. *Final Report, National Science Foundation BCS-0129573*.

Ruder-Hook, M. (2018). Organizational Adoption of AI Through A Sociocultural Lens.

Saeidi, P., Saeidi, S. P., Sofian, S., Saeidi, S. P., Nilashi, M., & Mardani, A. (2019). The impact of enterprise risk management on competitive advantage by moderating role of information technology. *Computer Standards & Interfaces*, *63*, 67–82.

Salimi, A. R. (2019). Effects of Environmental Concerns and Green Knowledge on Green Product Consumptions with an Emphasis on Mediating Role of Perceived Behavioral Control, Perceived Value, Attitude, and Subjective Norm. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, *10*(5), 651–661.

Salimon, M. G., Mokhtar, S. S. M., Yusoff, R. Z., Adeleke, A. Q., & Morakinyo, S. (2017). Facilitating conditions and Perceived Security as antecedents of trust among E-banking customers in Nigeria.

Sandu, N., & Gide, E. (2019). Adoption of AI-Chatbots to Enhance Student Learning Experience in Higher Education in India. In *2019 18th International Conference on Information Technology Based Higher Education and Training (ITHET)* (pp. 1–5). IEEE.

SECRETARIAT, H. I. S. R. A. P. (2016). Hospital Information System Renewal Panel Report.

Setiawan, B., Afiff, A. Z., & Heruwasto, I. (2020). Integrating the Theory of Planned Behavior With Norm Activation in a Pro-Environmental Context. *Social Marketing Quarterly*, *26*(3), 244–258.

Shafi, Q., Qadir, J., & Jalal, F. (2018). Using Geographic Information System (GIS) to Develop Health Information System (HIS) for Srinagar City, Jammu and Kashmir. *International Journal of Advanced Remote Sensing and GIS*, *7*(1), 2589–2602.

SHOORVARZY, M. R., & HEDAYAT, M. (2017). INVESTIGATION OF THE EFFECT HOSPITAL INFORMATION SYSTEM (HIS) ON THE QUALITY OF FINANCIAL REPORTING (STUDY CASE: MASHHAD BENTOLHODA HOSPITAL).

Sjøberg, M. (2019). Artificial Intelligence in Norwegian organizations: An exploratory study of challenges in AI adoption. Universitetet i Agder; University of Agder.

Sligo, J., Gauld, R., Roberts, V., & Villa, L. (2017). A literature review for large-scale health information system project planning, implementation and evaluation. *International Journal of Medical Informatics*, *97*, 86–97.

Song, H., Schuldt, J. P., McLeod, P. L., Crain, R. L., & Dickinson, J. L. (2018). Group norm violations in an online environmental social network: Effects on impression formation and intergroup judgments. *Group Processes & Intergroup Relations*, *21*(3), 422–437.

Stylianides, A., Mantas, J., Roupa, Z., & Yamasaki, E. N. (2017). Evaluation of an Integrated Health Information System (HIS) in a Public Hospital in Cyprus: A Pilot Study. In *ICIMTH* (pp. 44–47).

Teklegiorgis, K., Tadesse, K., Terefe, W., & Mirutse, G. (2016). Level of data quality from Health Management Information Systems in a resources limited setting and its associated factors, eastern Ethiopia. *South African Journal of Information Management*, *18*(1), 1–8.

Thollet, M. (2020). Structuring elements of the Hospital Information System (HIS)[Elementos que estructuran el Sistema de Información Hospitalaria (HIS)].

Thomo, T., & Sarivougioukas, J. (2020). Continuous Quality Improvement System (CQIS) and the Hospital Information System (HIS). In *5th International Conference on Engineering and Formal Sciences Brussels, 24-25 January 2020* (p. 85).

Vairetti, C., González-Ramírez, R. G., Maldonado, S., Álvarez, C., & Voβ, S. (2019). Facilitating conditions for successful adoption of inter-organizational information systems in seaports. *Transportation Research Part A: Policy and Practice*, *130*, 333–350.

Valdez, D. A. (2020). AI Adoption Among Corporations Explored. *Massachusetts Institute of Technology*.

ValuStrat. (2018). How can AI transform the healthcare sector in UAE?

van Meerkerk, I., & Edelenbos, J. (2018). Facilitating conditions for boundary-spanning behaviour in governance networks. *Public Management Review*, *20*(4), 503–524.

Vanderstukken, A., & andMonique Ramioul, I. N. (2019). Technical Literacy, Communication Literacy and Skill Development in Virtual Teams: Validating a Scale and Finding Facilitating Conditions. *Digital Media Literacy in Teamwork and Distance Work: Competences, Discourse and Organizational Design*, 107.

Wladawsky-Berger, I. (2019). The Current State of AI Adoption. *Wall Street Journal, 08th Oct*, 1.

Yang, J., Roth, P., Ruehl, C. R., Shafer, M. M., Antkiewicz, D. S., Durbin, T. D., … Karavalakis, G. (2019). Physical, chemical, and toxicological characteristics of particulate emissions from current technology gasoline direct injection vehicles. *Science of The Total Environment*, *650*, 1182–1194.

Ye, T., Xue, J., He, M., Gu, J., Lin, H., Xu, B., & Cheng, Y. (2019). Psychosocial factors affecting artificial intelligence adoption in health care in China: Cross-sectional study. *Journal of Medical Internet Research*, *21*(10), e14316.

Yeboah, F. K., & Kaplowitz, M. D. (2016). Explaining energy conservation and environmental citizenship behaviors using the value-belief-norm framework. *Human Ecology Review*, *22*(2), 137–160.

Yu, C., Ganapathy, S., Hageman, J., van Eijck, L., Eck, E. R. H. Van, Zhang, L., … Wagemaker, M. (2018). Facile synthesis toward the optimal structure-conductivity characteristics of the argyrodite Li6PS5Cl solid-state electrolyte. *ACS Applied Materials & Interfaces*, *10*(39), 33296–33306.

Zakaria, N., & Yusof, S. A. M. (2016). Understanding technology and people issues in hospital information system (HIS) adoption: Case study of a tertiary hospital in Malaysia. *Journal of Infection and Public Health*, *9*(6), 774–780.

Zhang, X., Geng, G., & Sun, P. (2017). Determinants and implications of citizens' environmental complaint in China: Integrating theory of planned behavior and norm activation model. *Journal of Cleaner Production*, *166*, 148–156.

Zhang, Y., Li, Y., Huang, Y., Li, S., & Wang, W. (2018). Characteristics of mass, heat and gaseous products during coal spontaneous combustion using TG/DSC–FTIR technology. *Journal of Thermal Analysis and Calorimetry*, *131*(3), 2963–2974.

Zhu, J., Wright, G., Wang, J., & Wang, X. (2018). A critical review of the integration of geographic information system and building information modelling at the data level. *ISPRS International Journal of Geo-Information*, *7*(2), 66.

Zhu, X., Li, Y., Zhang, P., Wei, Y., Zheng, X., & Xie, L. (2019). Temporal–spatial characteristics of urban land use efficiency of China's 35mega cities based on DEA: Decomposing technology and scale efficiency. *Land Use Policy*, *88*, 104083.

Zwierzycki, M. (2020). On AI Adoption Issues in Architectural Design.