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TOWARDS AN INTEGRATED HEALTH INFORMATION SYSTEM IN GHANA USING FIT AND VIABILITY THEORY

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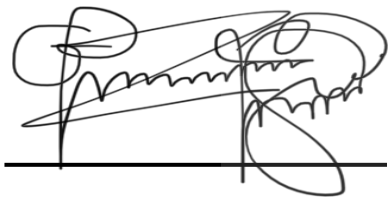
DECLARATION

I, **SANCHO ACKOUSSAH,** do hereby declare that this work is the result of my research and has not been presented by anyone for any academic award in this or any other university. All references used in the work have been fully acknowledged. I, therefore, bear responsibility for any shortcomings.



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ABSTRACT

An integrated health information system (IHIS) allows data to be securely exchanged and transferred to locations where it can be used to generate knowledge and information that advances policy objectives. An integrated health information system supports the delivery and monitoring of integrated health care across the globe. IHISs also serve as public health monitoring and management systems. Electronic health records (EHR) and electronic medical records (EMR) have received the majority of attention in recent studies on the deployment of integrated health information systems. The adoption of an integrated health information system, its benefits, and the relationship between its adoption and effective and efficient health care delivery are not well documented. Extant studies on health information system adoption have focused mostly on electronic health records. There is a lack of literature on the adoption of an integrated health information system, its benefits, and the correlation between its adoption and effective and efficient health care delivery. Ghana has a fragmented health information system, which hinders the smooth communication and exchange of data between health institutions.

The purpose of this study is to assess the fit and viability of an integrated health information system within the Ghanaian health sector. The study further seeks to investigate the benefits of IHIS adoption. Lastly, the study explored the correlation between IHIS adoption and effective and efficient health care delivery. The study does this through the lens of fit and viability theory. The study adopted a quantitative methodology and a survey approach to examine how well the Ghanaian health system is fit and viable toward an integrated health information system in an effort to fill the vacuum in the literature. A 5-point Likert scale questionnaire was designed by Google

Forms and used to collect data for the study. A quantitative data analysis method was employed through partial least square structural equation modelling (PLS-SEM) to achieve the objectives of the study. A total of 461 health care workers were conveniently sampled through an online questionnaire designed using Google Forms.

The study found task characteristics, organisational viability, and state policy as the major influencers of IHIS integration in Ghana. Technology characteristics, economic viability, and IT infrastructure were not having a significant influence on integrated health information system implementation. Digital curiosities significantly influence the relationship between technology fit, IT infrastructure, and the Integrated Health Information System (IHIS). Furthermore, the moderator, Age of Health Institutions, had a negligible impact on the economic and organisational viability of IHIS adoption. The findings of the study are important for policymakers in the health sector of Ghana since it has revealed the major influencers of IHIS adoption. Additionally, this study contributes suggestions to help Ghana's health institutions, public health officials, and government make the most of IHIS for effective, prompt, and more inclusive health care delivery. Because this study adopted a quantitative approach, it is recommended that a qualitative approach be adopted to ascertain a deeper understanding of how an integrated health information system could go a long way toward improving efficiency and communication in the health sector. Lastly, the government must be considered in further studies to know its viewpoint on IHIS adoption and usage.

DEDICATION

I dedicate this work to the Almighty God, who has strengthened me to be able to achieve this feat. I again dedicate this work wholeheartedly to my ever-loving mother (Ms. Felicia Adzo Seddoh), who has been a pillar throughout my entire life, and to my sister (Sarah Ackoussah), who has always been there for me. Lastly, I dedicate this feat to my lovely wife, Precious Kporzuxe-Ackoussah, and my loving daughter, Janelle Elorm Ackoussah, for their unflinching support, prayers, and encouragement.

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LIST OF ABREVIATIONS

HIS	Health Information Systems
HER	Electronic Health Records
EPR	Electronic Patient Records
EMR	Electronic Medical Records
HIT	Health Information Technology
MBS	Medical Billing Software
PP	Patient Portal
HIE	Health Information Exchange
RPM	Remote Patient Monitoring
LIS	Laboratory Information System
MAR	Medical Administration Records
MRN	Medical Record Number
GHS	Ghana Health Service
PHI	Protected Health Information
PHM	Population Health Management
ADU	Automated Dispensing Units
CDSS	Clinical Decision Support System

CI	Clinical Informatics
DW	Data Warehouse
DSS	Decision Support System
HIP	Health Information Portal

CHAPTER ONE

INTRODUCTION

1.1 Research Background

An integrated health information system makes it possible for data to be securely exchanged and transferred to locations where they can be used to generate knowledge and information that furthers policy goals (OECD, 2022). An integrated health information system supports the creation, provision, and monitoring of integrated health care and the provision of integrated public health monitoring and management (Kenu et al., 2020). This includes the management and promotion of research and innovation in medical technologies and procedures that enhance health and medical care (Agyekum et al., 2021). Health systems in the twenty-first century have been built on information and data. A variety of data assets are pertinent for policy goals to be tracked and assessed for effectiveness. Acute and long-term health care statistics, as well as information on public health and social services, are all included in these datasets. The integrated health information system should include information on the entire health system in addition to other pertinent data sources like social, economic, and environmental health information (Thacker & Stroup, 2018).

Countries that are moving toward integrated health information systems recognise the value of data as a non-rivalrous asset with numerous potential applications (Rahimi et al., 2009). Data contain many characteristics of a public good and should be used to their fullest potential in order to benefit society. All data must be coded to the predetermined technical and semantic formats in order to accomplish this task of integration or data harmonization. Data cannot be sent where they are needed, traded meaningfully, or analysed unless in this manner, as prescribed earlier (Tiffin et

al., 2019). Ghana's health system possesses a number of advantages that can be used to create a top-notch health data infrastructure and an integrated health information system (Bedeley & Palvia, 2020).

However, there are a number of fundamental obstacles that must be addressed to have a successful health information system (Bedeley & Palvia, 2020). One of them is the fragmentation of the overall health information system, a choice in design that encourages market and competitive dynamics while also putting up an institutional barrier to information exchange and sharing (Serrano et al., 2020). Fragmentation has significantly harmed electronic medical records (Baumann et al., 2018). The data are still insufficiently developed and segregated, despite efforts to exchange them. This occurs as a result of the non-interoperability of HIS used by various hospitals within the healthcare industry (Khubone et al., 2020). Because there is a lack of uniformity among health systems, they cannot communicate with one another. Lack of agreement and a common understanding of laws and regulations also hinders the growth of secure health data sharing, accessibility, and use (Ouedraogo et al., 2019). To enable the moral and efficient use of this rapidly expanding resource known as IHIS, however, a political decision, legal direction, and appropriate strategic action are required (Győrffy et al., 2020). The potential and challenges of the twenty-first century are also different, and the growing volume of health data being produced calls for these changes (Thindwa et al., 2020). To build an integrated health information system that meets the demands and potential of the 21st century, it will be necessary to develop, implement, and manage a health data infrastructure and integrated information system, as well as new institutional functions and processes (Stylianides et al., 2019). A successful implementation requires good governance and policies that build confidence among all stakeholders.

An integrated health information system would immediately assist in raising the quality of service, outcomes, and patient empowerment by enabling patients and their healthcare providers to access health information (primary data use). As a result of their inability to have their medical information electronically sent, COVID-19 patients have difficulty being transferred between hospitals or being referred to other hospitals, which has recently been brought to light in research by Kenu et al. (2020). Medical errors are more likely to occur because busy clinicians must manually transfer patient data from the local electronic record to other transferable forms to be transmitted with the patient (Kenu et al., 2020). This leads to delays and inefficiencies.

Through the deployment of efficient, integrated health information systems, the waste of resources within the health sector could be significantly decreased (Harris et al., 2017). There are claims that developing nations have a lot of erroneous health data, inadequate human resources, and inadequate IT infrastructure (Zayyad & Toycan, 2018). In order to extract information that may be used for health planning, decision-making, and resource allocation, effective integrated health information systems (IHIS) are therefore required (Zayyad & Toycan, 2018). Therefore, there is a need for a study that will primarily focus on the fit and viability of Ghana's health sector towards an integrated health information system.

1.2 Research Problem

Despite the high priority and clear interest in adopting and implementing integrated health information systems and electronic medical records in both developed and developing countries, there is a significant gap between the developed and developing worlds in terms of IHIS adoption. This gap is between the planning for the implementation of such systems in hospitals and the

success of implementing and operating such systems optimally to achieve the primary purpose (Kruk et al., 2018). This is a common occurrence in Ghana, where the private sector plays a rising role and contributes more to the country's national health care system, which serves as the primary provider (Kruk et al., 2018). The Ministry of Health (MOH) is the main government organisation in charge of providing the people of the nation with preventive, curative, and rehabilitative healthcare.

The results of a study by Bedeley and Palvia (2018) on the problems with e-health care in developing nations, using Ghana as an example, showed that the absence of ICT infrastructure was at the top of the list of problems with the e-health system, followed by a lack of fundamental ICT knowledge or abilities. Other issues uncovered in the study were the availability and reliability of the internet; financial and sustainability issues; and the privacy and security of electronic health records, among others. The study concluded from the findings that e-health implementation was still at the initial stages in Ghana, with lots of basic challenges as stated above. The study recommended further studies to explore the problems and come up with suggestions towards a wholistic e-health system like an integrated health information system.

A wholistic e-health system, such as an integrated health information system, needs to be implemented, but the challenges of its fit with current IT infrastructure available in the health sector and the viability of adopting and using this system need to be researched. This study seeks to fill this gap by using the fit and viability theoretical lens to assess the fit and viability of Ghana's health sector towards an integrated health information system. In the case of context gaps, many studies (Gardner et al., 2019; Jacox et al., 2019; Katurura & Cilliers, 2018; X. Li et al., 2020; K.

Mohammed et al., 2016; Moucheraud et al., 2017) have confirmed the progress and benefits many developed countries are reaping from the implementation of integrated health information systems. Countries such as the USA, France, and the United Kingdom have leveraged IHIS to improve their health systems significantly (Kruk et al., 2018).

Conversely, developing countries lag behind in the use of IHIS for the management of public health. Until the outbreak of the COVID-19 pandemic, many health institutions did not appreciate the impact that a lack of integrated health systems had on health care delivery in Ghana (Eslami et al., 2021). This was evident in the difficulty in transferring patient data since there were designated hospitals that were handling COVID-19 issues in the country (Rani et al., 2021). This exposed the fragmentation of health systems and how a lack of interoperability or exchange of electronic health records (EHR) of patients was critically hindering efficient or effective healthcare delivery (Gyasi, 2020). Though most studies in Ghana focused mainly on the adoption of EHR and their impact on healthcare delivery, there is still an unclear positive correlation between EHR, which is a subset of IHIS, and quality healthcare delivery (Khubone et al., 2020; Tsai et al., 2020). Though the majority of studies on technology adoption in healthcare focused on EHR adoption and use in Ghana's health sector, only a few studies examined the larger picture of integrated health information systems (Opoku et al., 2019). To address this gap, it is therefore imperative that research be carried out to ascertain the fit, viability, benefits, efficiency, and effectiveness of IHIS in the developing world, like Ghana.

Several studies (Kesse-Tachi et al., 2019; Kisekka & Giboney, 2018; Yusif et al., 2020) have been conducted to address the significance of EHR adoption, but few have examined the integration of

these disparate health information systems into an integrated health information system. These studies used several theories, including the Technology Acceptance Model (TAM) and Unified Theory of Acceptance (UTAUT), the Diffusion of Innovations Theory (DIT), and Task-Technology Fit (TTF), among others, but few studies have used the fit and viability theories to study the adoption of HER or IHIS in the developing world context. It is unlikely to generalise the conclusions and findings of studies that used TAM, TTF, DIT, and UTAUT to examine the consequences of IHIS adoption from the perspective of industrialised countries like the USA, France, Germany, and Japan, among others. This is because of cross-cultural issues, computer literacy, technology competence, technical expertise, financing gaps, policies, laws, and regulations, as well as the availability of IT infrastructure to support this system.

Much attention was not being paid to the fit and viability of the adoption of IHIS by leveraging on theories that measure such dimensions. Though the health sector's fit in the adoption process and its viability were the cornerstones of technology acceptance, little attention was paid to these factors in the majority of the theories employed in other research that focused on technology adoption. Technology cannot be adopted in the health sector if its fit and viability for adoption are not assessed. The purpose of this study is to assess the readiness and viability of Ghana's health sector for an integrated health information system using the theoretical framework's fit-viability framework. This study has expanded the fit and viability theory by adding state policy as an independent construct. Digital curiosities, a mediating variable, and the age of health institutions as a moderating factor were also deployed to assess their influence on the relationship between some independent constructs and the dependent construct of IHIS. The study by Bawakk and Kala Kamdjoug (2018), which dealt with the unified theory of acceptance and use of technology in

Cameroon, is one of the few that focused on technology adoption from a developing-world perspective. Unfortunately, there is little literature on the viability of the health sector in developing countries with regard to IHIS adoption. This study seeks to fill that gap in the literature.

1.3 Research Purpose

The purpose of this study is to assess the fit and viability of an integrated health information system within the Ghanaian health sector. The study does this through the lens of fit and viability theory.

1.4 Research Objectives

The main objectives of this study are;

a. To explore the fit and viability of integrated health information system in the public health sector of Ghana.
b. To assess the benefits towards integrated Health Information System within the public health sector of Ghana.
c. To evaluate the correlation between Integrated Health Information Systems, Quality Health Care Delivery and Public Health Management.

1.5 Research Questions

1. How fit and viable is Ghana's Public Health System towards an Integrated Health Information System?
2. What would be the benefits of an Integrated Health Systems within Ghana's public health sector?

3. What is the correlation between an Integrated Health Information System and Quality Health Care Delivery and Public Health Management?

1.6 Significance of the Study

For practise, this study will help unveil the importance and impeding factors of the adoption of IHIS in the delivery of healthcare in Ghana's public health institutions. Deployment of an integrated nationwide health information system in all public health facilities will, in the long run, reduce the public health bill (Lippeveld et al., 2000). It will also significantly improve the turnaround time in healthcare delivery within public health facilities in the country since all public health faculties will be hooked up to one common e-health platform. This is where patient health records will be securely and seamlessly shared between all health facilities in the country. This study provides empirical and insightful knowledge on the significance of the adoption of IHIS. It also points out the critical elements that need attention for the implementation of the IHIS. Furthermore, the study adds to knowledge by unveiling the critical role government needs to play in terms of policy and regulation towards the successful implementation or adoption of IHIS.

For research, the study added to knowledge by introducing new constructs to the study. The implementation of state IT policy demonstrated empirically how important government policy was to the adoption of IHIS. It will add to knowledge and literature from the perspective of developing countries since few, if any, of the studies carried out on technology adoption in the health sector assessed the readiness of countries in the developing world towards IHIS adoption. The use of fit and viability theory to do this study opens the door to many other studies that can adopt other appealing and engaging constructs to assess the readiness of countries towards IHIS adoption. This

is because this study added state policy on IT to the traditional constructs. It also used "digital curiosity" as a mediating variable between "technology fit" and "IT infrastructure viability" for IHIS adoption. Lastly, the study adopted the age of health facilities as a moderating variable between economic and organisational viability toward IHIS adoption.

For policy, this study will also help public health officials gather critical data for policy formulation and be able to forecast the health patterns of the country. This study will shed light on the gaps in our healthcare system. The situation where patients who travel to other parts of the country to seek medical care are unable to have their medical histories, clinical data, medication, and diagnosis histories accessed by the doctors who will attend to them will be a thing of the past. This study will help the Ghana Health Service and the Ministry of Health, by extension, identify the benefits of an integrated health information system for all public health facilities in the country. The study will unravel the benefits and the value this system will create when deployed in Ghana's public health facilities from the patient, clinical personnel, health workers, administrators of hospitals, and public health management perspectives.

1.7 Chapter Outline

The thesis will be arranged in seven (7) chapters. Chapter one provides the introduction to the study, the study background, the problem statement, the objectives, specific objectives, and the limitations of the study. Chapter two looks at important literature on health information system adoption, usage, issues, and integration from a global perspective, an African perspective, and a Ghanaian perspective. Problems and gaps in literature, methods, theory, context, and issues raised by current and past researchers are addressed in this chapter. Chapter three presents the research

framework for the study and supports it with appropriate literature. The hypothesis for the study will be developed in this chapter, and its justification will be clearly explained. Chapter four presents the methodology adopted in this study, which includes the research paradigm, research methods, population and sampling techniques, data collection, and the method of data analysis. Chapter five critically examines the analysis, interpretation, and reporting of the collected data. All data analysis (data reporting) will be included in the analysis and will be shown in tables and graphs. The focus of chapter six is the discussion of results from the analysis of the findings in chapter five in order to unearth the themes and trends arising from the findings. The discussion of the results will be supported by existing literature in the same field of study to support the findings. Chapter Seven concludes with a summary of the findings, a conclusion, and recommendations for future research. References, appendices, and a copy of the administered questionnaire are presented in this section.

CHAPTER TWO

LITERATURE REVIEW

2.1 Chapter Overview

The previous chapter outlined the research problem, objectives, and significance of this study. This chapter will review the literature relating to integrated health information systems in developing and developed countries. It will unearth the trends and themes in literature that will enable this study to assess the fit and viability of Ghana's public health sector towards an integrated health information system. The first part will review literature generally from health information systems worldwide and previous papers and research done in the area of health information systems, followed by the definition and conceptualization of integrated health information systems. The second part will review the literature on health sector reforms in Ghana and look at efforts made toward the establishment of health information systems and their integration. The third section examines the conceptual and methodological techniques used by current researchers. Finally, in order to strongly demonstrate the need for the study, the final section discusses the gaps that were discovered in the literature.

2.2 Health Information System

Data collection, compilation, analysis and synthesis, as well as communication and usage, are the four main activities of a health information system, which provides the foundation for decision-making. The health information system gathers information from the healthcare industry and other relevant fields, evaluates it to assure its overall quality, applicability, and timeliness, and then transforms it into knowledge for making health-related decisions (Stokke, 2016). To manage the

day-to-day operations of the hospital, good administration and the use of an effective information system are required to increase the effectiveness of healthcare (Ardielli, 2021).

Given that the health sector must meet ever-increasing needs while dealing with static or declining resources, the necessity to accomplish more with fewer resources is particularly crucial. To improve the efficacy of health care, good management is also necessary (Meri et al., 2019). The difficulty for health systems is to manage service delivery in a manner that effectiveness losses are minimally invasive (Moucheraud et al., 2017). Decision-makers at each stage of the management spiral must use information in order for it to influence management in the best possible way (Bans-Akutey & Sowah, 2020). These decision points could involve conducting a situational analysis, establishing priorities, or carrying out a pre-planned activity (Kuhn & Giuse, 2018). It is convenient to define a "system" as any group of parts that cooperate to accomplish a specific goal (Katurura & Cilliers, 2018). Therefore, a health information system's main objective is to improve the management of health services by offering the finest information support. A meaningful compilation of facts or data is how we define "information." While agreement on the definitions of "system" and "information" is quickly reached, it is more difficult to define the term "health information system" (Stylianides et al., 2019). Last but not least, health information systems integrate the information needed for improved management at all levels of health services to increase the efficacy and efficiency of health services (Jahanbakhsh et al., 2018).

2.2.1 Architecture and design of Health information systems

Information is generated by health information systems for a range of users and objectives, which can be summed up as information generation. This data is created to help decision-makers at all

levels of the health system recognise problems and needs, decide on health policies intelligently, and allocate scarce resources as efficiently as possible (Sant Fruchtman et al., 2021). Information from numerous sources is used at different stages of the healthcare system to achieve a range of goals (Owusu Kwateng et al., 2021).

Clinical decisions are based on information about a patient's profile, treatment needs, and healthcare requirements that is at the individual-level. Medical records lay the groundwork for good, individualised clinical care. Issues may arise when health workers are overworked due to onerous data and reporting requirements from numerous uncoordinated subsystems. Using aggregated facility-level data from administrative sources such medication procurement records and health facility-level data, health care administrators can detect resource needs, advise purchase decisions for pharmaceuticals, equipment, and supplies, and establish community outreach (Faisal Ashfaque, 2017). Data from healthcare facilities can only give continuing, timely information relevant to public health decision-making if certain conditions are met (Moucheraud et al., 2017). All facilities (public and private) must be covered, and the data must accurately reflect the services provided to the general public.

Data at the population level are vital for guiding public health decisions because they reveal information on people who utilise services as well as, more importantly, those who do not. In developing countries with poor facility-based statistics (Gacheri Nkanata et al., 2018), household surveys have taken over as the primary data source (Tull, 2018). Nevertheless, household surveys are necessary everywhere because they are the only trustworthy source of information on

individual attitudes, practises, and routines that are significant determinants of health status and use of healthcare.

By incorporating data from both facilities and communities, public health surveillance aims to pinpoint issues and offer a solid framework for swift action. This is especially true when urgent action is necessary, such as when epidemic diseases are involved. Strong links to individuals in charge of disease control, as well as the need for rapid reporting and replies, are additional requirements for health information systems (Ouedraogo et al., 2019). Health information systems that can produce accurate data are becoming more and more important (Zhang et al., 2018). Decentralization and health sector reform have changed the roles of the central and peripheral levels of government in many nations (Sun & Medaglia, 2019). They have also led to new information needs due to shifting standards for data collection, processing, analysis, and dissemination (Mohammed et al., 2018). Reforms in the health sector have a greater impact on the requirement for consistency and high-quality data.

According to the Centers for Medicare and Medicaid Services, the US spent 3.2 trillion dollars ($9,990) on health care in 2015, an increase of 5.8% from the previous year (Zhang et al., 2020). In addition, 17.8% of US GDP was spent on healthcare (Yusif et al., 2020). With expenditures reaching US$8233, or 17.9% of GDP, vs the OECD average of US$3268, the United States continues to spend a disproportionately higher amount of money on health care per person than any other OECD country (Herko Coomans, 2022). Spending on health care accounts for a sizable portion of GDP in many countries (for example, 17.91% of American GDP, 10.1% of GDP in Japan, and 11.3% in Germany, China, and France) (Stylianides et al., 2019). Due to its importance

to both individuals and governments, as well as the economy's expanding expenditures, health care has been an important area of research for academics in management and other fields (Kassie et al., 2020). HIS directly affects a wide number of stakeholders, including patients, those working in the healthcare and information technology sectors, as well as nations or regions that struggle to provide high-quality healthcare (Owusu Kwateng et al., 2021).

From a scholarly perspective, the proliferation of HIS-related research at IS conferences and the sheer volume of HIS-related research articles, as well as entire special issues from prestigious journals devoted to the subject, provide evidence of the topic's growing importance and interest (European Journal of Information Systems, 2018; Journal of the AIS, 2019; and Information Systems Research, 2016) (Haried et al., 2019). The interest in researching and considering what is known about HIS has been influenced by this rising attention, which has been validated in recent years (Vichova & Hromada, 2018). It is obvious that there is a substantial need for HIS researchers to learn from prior research, evaluate the current status of HIS research, and plan future research directions to meet the anticipated importance of HIS given the increasing reliance on and predicted growth in this field (Cooper & Zmud, 1990). The desire to research HIS was influenced by the maturity of the field as well as the rise in HIS-related publications in recent years. A thorough evaluation of HIS research efforts is very necessary given the rising academic, social, and professional interest in the field of HIS (Bawack & Kala Kamdjoug, 2018).

The information system for patient care and the managerial information system are the two primary divisions of the health information system, as shown in Figure 2.1. The patient information system is further broken down into three separate groups. All patient data is managed by the patient

management system (PMS), which is the first. It takes information about the patient's age, sex, location, blood type, and contact information, among other things. The management of the patient's fundamental information falls under the purview of this system. The clinical information system is the module that gathers and stores all clinical information about the patient, including laboratory results, x-rays, diagnoses, medications, CT scans, and all other relevant clinical information that is needed for efficient and effective healthcare delivery (Vuong et al., 2019). The data is harnessed and stored securely in formats that can be transferred and used by other health institutions when need be. The data is securely saved and stored so it cannot be accessed, used, or altered without authorization. Figure 2.2 depicts the security architecture necessary for every health information system. There are different levels of user access, and the process of authentication is clearly defined and documented. A log of activities is kept to monitor the activities of users on the system (Moghadam & Colomo-Palacios, 2018) because clinical health information of patients is protected by law, like the data protection law of Ghana (Keshta & Odeh, 2021).

Immediately below the CIS is the Patient Information Database (PID), which stores all the clinical and sensitive clinical data of patients in a secured, encrypted, and well-defined exchangeable format. This data is then shared among clinicians who have the required user rights or access level and authorization to view, use, or alter such data. The database can be cloud-based or housed in a physical central data centre built to house all the clinical information collected (Meri et al., 2019). This database generates the electronic medical records (EMR) of patients, which are securely exchanged between health institutions for efficient and effective healthcare delivery. Systems for clinical support services make up the third module. Clinical decision support (CDS) provides essential information in a timely manner to help with decision-making regarding a patient's care,

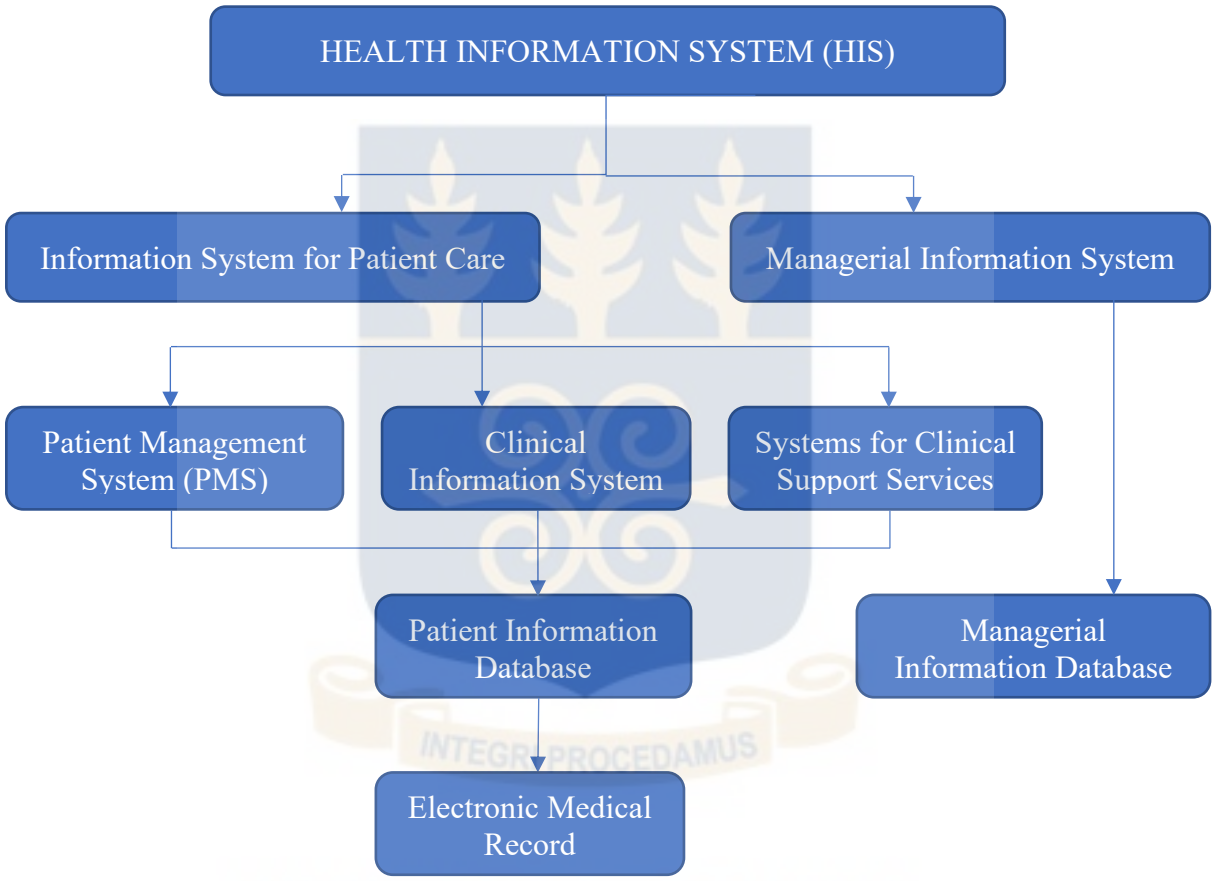
generally at the point of treatment (Baumann et al., 2018). By handling some repetitious tasks, warning them of potential problems, or providing advice that the clinical team and patient can take into account, CDS tools and systems aid clinical teams (Sloane & Silva, 2019).

Giving doctors, patients, and others timely information so they may make wise healthcare decisions is the fundamental purpose of CDS (Tham et al., 2018). Databases that can provide information relevant to certain patients, datasets created for particular diseases or patient types, alarms addressing potentially dangerous situations, and recommendations are examples of CDS tools. CDS may lead to cost reductions, increased output, and less patient suffering (Sloane & Silva, 2019). In fact, CDS can sometimes address all three of these problems at once, for example, by alerting physicians to potential duplicate tests a patient could be about to receive.

A management information system (MIS), a group of related systems and procedures, gathers data from a variety of sources, including the PMS and CID, compiles it, and then presents it in a useful way. Managers create reports using the MIS to offer them a complete overview of all the data they need to make choices about everything from daily operations to top-level strategy and policy (Tull, 2018). Modern management information systems heavily rely on technology to collect and display data, yet the concept itself predates modern computing (Umezuruike et al., 2017). The managerial information system is the backbone of decision-makers or policymakers. This module is used to analyse all the data collected so as to help in framing policy and decision-making. The managerial information system has a sub-module called the management information database, which serves as a central storage point for all data collected by the Health Information System's managerial information system (Bodavala, 2017). This database can either be cloud-based or housed in a

physical data centre that houses all the collected information securely against theft or physical damage (Zhang et al., 2020).

Figure 2. 1 Health Information System Architecture



Source: Author's construction

2.2.2 Integrated Health Information Systems – An Overview

A system that permits the safe exchange and movement of data to locations where they can be used to produce information and knowledge that promotes health care delivery and policy goals is widely referred to as an integrated health information system (Stylianides et al., 2019). An integrated health information system provides integrated public health monitoring and

management, takes advantage of recent developments in health information, and encourages research and innovation in technologies and treatments that improve health and health care. It also supports the development, delivery, and monitoring of integrated health care (Kassie et al., 2020). (Agyekum et al., 2021).

> *"An integrated health information system provides the underpinnings for decision-making and has four key functions: data generation, compilation, analysis and synthesis, and communication and use. "The health information system collects data from the health sector and other relevant sectors, analyses the data, ensures its overall quality, relevance, and timeliness, and converts the data into information for health-related decision-making" (Vichova & Hromada, 2018).*

According to the World Health Organization (WHO), integrated, people-centered healthcare should provide the following: The four pillars of a healthy society are universal health coverage, individualised care that is catered to each patient's needs and preferences, coordinated services that support thoroughness, safety, effectiveness, timeliness, and efficiency throughout the continuum of care, and welcoming work environments with qualified and motivated healthcare professionals. Even though its definition and implementation are still up for debate, integrated care's benefits have generally been acknowledged and widely accepted in North America and Europe, particularly for the management of patients with chronic diseases (Jahanbakhsh et al., 2018).

When discussing health information systems, integration refers to the process of merging data and systems from several subsystems to be seen from a specific perspective as one. According to Michelsen et al. (2018), integration involves aggregating subsystems' data and processes into a

single system as well as dealing with subsystems working together to ensure that the system can provide the system's overarching functionality. A strong data infrastructure made up of the appropriate data assets, technology, agencies, and organisations is required for the collection, storage, maintenance, distribution, and (re)use of data by the numerous end users (Thapa & Camtepe, 2021). In the twenty-first century, information will underpin health care delivery systems, ensuring that the right information reaches the right person at the right time (Eslami et al., 2021). This enables the provision of high-quality integrated treatment for all individuals in need in addition to enhanced public health practises, health system administration, research, and innovation.

Even while health systems will continue to be structured, funded, and organised in a variety of ways, success in terms of better care, public health, system management, and research will require a comprehensive, coherent, standardised, and integrated strategy to handling electronic health data (Dash et al., 2019). An integrated health information system (Gacheri Nkanata et al., 2018; Vichova & Hromada, 2018) can immediately improve service quality, outcomes, and patient empowerment by providing patients and their healthcare providers with essential information, but it can also expand the nation's potential to use these data for other essential objectives (Tull, 2018), such as:

- Managing health system performance on national, regional and network level
- Public health monitoring and surveillance
- Opening new communications channels with patients to improve patient-centered care such as the active use of patient-reported metrics
- Introduction of new digital services such as e-prescriptions and telehealth

- Better targeting and reimbursement for services to reward value
- Biomedical research and development
- Innovation such as big data analytics and artificial intelligence that will enhance knowledge-based decisions for patient care and health system governance.

The key elements of an integrated system that enables primary and secondary uses of data are approaching health data as a public good, implementing standard data terminologies and formats (a single "language"), a common data model and standardised analytics, and a comprehensive data governance that uses a "privacy-by-design" approach (Dhagarra et al., 2020).

The major functions of IHIS (Ampaw et al., 2020; Essuman et al., 2020; Ouedraogo et al., 2019) are:

- To collect and manage the health service delivery information for all level of health service delivery outlets including services at the communities by FCHV's and community level health workers.
- To verify, process, analyze the collected data and operate data bank
- To provide feedbacks on achievements, coverage, continuity and quality of health services to programs divisions/center, RHD's, hospitals and district public/health offices
- To draw indicators and relevant information and support to the program management
- To disseminate health information through efficient methods and technologies
- To publish a comprehensive Annual Report of Department of Health Services
- To develop competent human resources for Integrated Health Information System

An integrated health information system is important not only for monitoring and evaluation but also for providing alerts and early warning capabilities (Baumann et al., 2018). It also aids patient and health-care facility management by facilitating planning and funding and stimulating research. It enables health situation and trend analysis, supports global reporting, and underpins the communication of health challenges to a wide range of users (Bao et al., 2020). Information is less significant if it cannot be accessed in formats that meet the needs of various users, including decision-makers, planners, managers, healthcare professionals, communities, and individuals (Kruk et al., 2018). As a result, the health information system's distribution and communication capabilities are critical. Multiple users and a wide range of purposes are served by health information systems. This information, which can be summarised as the generation of information that enables decision-makers at all levels of the health system to identify problems and needs, make evidence-based health policy decisions, and allocate scarce resources optimally (Attah, 2017), At various levels of the health-care system, data from various sources is used for a variety of objectives.

2.3 Benefits of Integrated Health Information Systems

When hospitals initially began to invest in IT systems, the goal was to connect departments, save burden, and improve the accuracy of health data by using electronic systems (Bao et al., 2020), linking equipment to a surgery theatre and a roster, for example, and then presenting this information on a patient's electronic health record to improve visibility and efficiency. Integrated health information systems, on the other hand, are revolutionising how hospitals run today, making life simpler for both physicians and patients (Stylianides et al., 2019). a completely comprehensive health information system that combines all components of the health care value chain sector

together (Carvalho, Rocha, van de Wetering, et al., 2019). The ability of a hospital to function inside a single system increases efficiency, minimises waste, and helps healthcare organisations provide better care for their patients (Carvalho, Rocha, Vasconcelos, et al., 2019). Hospitals can contain up to 200 separate IT systems, each of which was created for a specific purpose or for a specialised department and which is typically difficult to combine or integrate (Owusu Kwateng et al., 2021). These are not only costly to maintain, but having disparate data housed in disparate systems makes it difficult to analyse or make holistic judgments. A comprehensive integrated health information system connects patient, clinical, administrative, and financial procedures while also making data interchange across new and current systems simple (Ahmadi et al., 2017). It can enable seamless communication between legacy and third-party health systems, as well as allow hospitals to tailor the system to their own requirements. Some of the benefits of integrated health information systems are enumerated below.

Increased productivity: Hospitals may optimise the patient journey from arrival to evaluation, admission, treatment, and discharge with a fully integrated system (Tham et al., 2018). Combining all of the stages into a comprehensive system that includes everything from efficient patient administration to integrated back-office management, surgical resource scheduling, and pharmacy automation, a hospital's day-to-day operations may be sped up.

A complete picture of the patient: Providers should strive towards dynamic, patient-centered records that follow the patient's treatment throughout his or her life, in illness and health. Having a single, continuous record for a patient allows for a more holistic perspective of their general health, which aids in diagnosis and therapy throughout time.

Waste reduction: In just a few months, a single hospital information system may be up and running, and it can also be quickly implemented at additional locations within a healthcare organization. By synchronising all information systems across sites, healthcare organisations can easily measure and analyse data, improving efficiency and decreasing waste.

Providing exceptional care: Doctors and nurses have more time to deliver precise and individualised treatment to their patients because of the seamless integration of all departments of the hospital. A comprehensive hospital information system should, in theory, allow physicians to focus more on their medical knowledge and make informed choices while reducing administrative lapses (Ahmadi et al., 2017). It ensures that clinicians have the information they need to make educated and precise decisions about patient care. The single system also improves the patient's entire experience, making their visit as pleasant as possible.

Care coordination that is more effective: Clinicians can more readily coordinate and manage patient care across offices and locations using digital records. The Mayo Clinic, for example, has a "one-stop care" system that brings together all of a patient's needs—office visits, testing, surgery, and hospital stays—under one roof, allowing services to be organised and booked in a single visit rather than many times (Vest et al., 2014). Clinicians from various professions and disciplines work together as a team to improve patient outcomes.

Workflows that are more efficient: Electronic health records (EHRs) boost productivity and efficiency while reducing paperwork. Patients and employees will fill out fewer documents, giving professionals more time to visit patients (Shepheard, 2019). Referrals and medications may be sent

swiftly, reducing appointment and pickup wait times. Patients can receive automatic reminders when it is time for yearly check-ups or when they're approaching milestones that necessitate frequent checks. Billing and insurance claims may be filed quickly with integrated patient tracking (Khubone et al., 2020).

Data's Influence: Continuous data collection enables more personalised treatment and helps doctors address health concerns before they become serious (Carvalho, Rocha, Vasconcelos, et al., 2019). Furthermore, "big data" analytics and aggregated patient data may be able to alert clinicians to wider health patterns like possible outbreaks (Dash et al., 2019).

Error reduction: Digital records enable more accurate tracking and consistent documenting of patient contacts, potentially reducing errors (Haldane et al., 2021). Illegible handwriting in physicians' notes or prescriptions is no longer a concern, and coding for treatments or invoicing is easier with digital paper trails. Drug interactions and other signs of possible risk can also be flagged by integrated systems. Electronic health record keeping, when used to its greatest extent, will improve patient care. Instead of tracking data, healthcare practitioners will be able to devote more time to therapy. Electronic health records will also allow healthcare practitioners to discover patterns and share information in previously unimaginable ways, perhaps resulting in speedier and more effective remedies (Katurura & Cilliers, 2018).

2.4 Barriers to the adoption of Integrated Health Information Systems

2.4.1 Barriers related to Infrastructure

Since the majority of developing nations (Telehealth in the Developing World, 2017) lack the technology infrastructure needed to set up a national health information system, they are unable to promote HIS in both private and public institutions. It is extremely important to redesign the health system's infrastructure (Tull, 2018b). These are examples of infrastructural barriers:

- ***Poor or Inadequate Infrastructure:*** Most poor countries lack the essential infrastructure, including access to the internet, wired and wireless communication channels, computer hardware, software, and qualified professional human resources (Oleribe et al., 2019). Important ICT infrastructure elements must be accessible and operational for the development and promotion of HIS in developing countries. The current health system must have a strong IT infrastructure in place in order to plan and implement novel health care interventions that result in the accomplishment of better health goals. In less developed countries, there is a poor or inadequate allocation of resources for the application and implementation of health technology (Harris et al., 2017).

- ***Provision of Computer Hardware and Software:*** HIS needs specific software and hardware to make judgments that will promote public health (Owusu Kwateng et al., 2021). These hardware and software technologies are expensive and need adequate training to operate properly.

- ***Poor Internet Availability:*** The difficulty in accessing the internet is a significant infrastructure barrier (Darwish et al., 2019). The availability of real-time information for

healthcare practitioners is restricted, and the information offered does not accurately reflect regional reality (Kruse & Beane, 2018). With this understanding, decisions cannot be justified by facts. Without an adequate local area network and internet infrastructure, it is impossible to communicate between and inside organisations. This acts as the foundation of all information systems.

- ***Lack of Professional Human Resource Workforce:*** The effective functioning of a computerised information system requires a skilled workforce (Bodavala, 2018). Training is one of the prerequisites for using any new system. By providing the required training, the lack of skilled personnel can be addressed.

- ***Lack of Training:*** A suitable training programme on creating a reliable database's architecture should exist. The results or findings from these types of databases create unreliable results that cannot be used for either an evidence-based practise or a decision-making process if they are not put into practise (Odei-Lartey et al., 2020). Training is time- and money-consuming.

2.4.2 Cost and Time Barriers

When providing workshops and trainings for the establishment and implementation of HIS in poor countries, financial and time constraints are a significant problem (Azubuike et al., 2019). Any system transformation is a challenging task that takes time to perform. Obstacles such as cost, infrastructure, and talent shortages, as well as side effects such as temporary decreases in productivity caused by system and environment adaptation to new technology, severely limit the

introduction and use of new health technologies (Umezuruike et al., 2017).The transformation procedure takes a very long time to finish.

2.4.3 National Policies towards HIS

Conducting seminars and trainings for the establishment and implementation of HIS in undeveloped countries has significant financial and time restrictions (Azubuike et al., 2019).

2.4.4 Social and Cultural Barriers

Digital divide and e-readiness are two major social and cultural barriers to the development and use of health information systems (Sokey & Adisah-Atta, 2017). These obstacles include stakeholder disinterest, low motivation, and apprehension about utilising new technology. It might be challenging to persuade medical professionals to use new technologies. It is challenging to move the health information system from a paper-based to digital format since people are more accustomed to their conventional approach and daily routine (Kuhn & Giuse, 2017).

2.4.5 Educational Barriers

Health informatics education is badly undervalued and absent from undergraduate medical institute curricula (Ndayizigamiye & Maharaj, 2017). The use of IT in research is a topic that is taught in a postgraduate curriculum module, however it is crucial that this subject is covered in graduate-level medical professional education. Without educating healthcare staff in IT fundamentals, it is impossible to transform our current paper-based health system into a computerised information system.

2.4.6 Organizational Barriers

Organizations and individuals play a major role in the development and transformation of an information system (Tsai et al., 2020). The level of use, benefits, costs, risk analysis, and other features of health technology in the health sector of developing countries are not yet available in published studies, and if they are, they are not widely distributed (Zettel-Watson & Tsukerman, 2016). Second, people in higher-ranking positions and postings, whose reporting needs are fully satisfied by the current system, oppose HIS because they think adopting new technology is a waste of time and money. Hospitals must address physicians' worries about using HIS because they will not support its use if it makes their professional obligations burdensome (Serrano et al., 2020).

2.4.7 Absence of mutual interoperability and ethics

Fragmentation in HIS is frequent, incomplete, dishonest, and isolated. This is more obvious in underdeveloped countries. Because of this variability, there are information silos and silos of information that cannot be used for patient care or silo analysis (Hammond, 2010). In dealing with this issue, it is crucial to apply moral concepts effectively (Sass & Feko, 2011). A necessary condition for accomplishing health objectives is the readiness to share and use information across different entities (WHO, 2013). The loss of care consistency between experts is the biggest benefit of a lack of interoperability. In this regard, WHO urged member nations to adopt an ethical strategy for the efficient sharing of information between stakeholders in the health care system and the implementation of eHealth in a resolution at its 66th World Assembly (Hersh et al., 2010). Setting up interoperable systems in impoverished countries requires a lot of ethics. Such morals are comparable to those that are anticipated in industrialised countries. When several organisations pursue distinct sets of ethics for the same objective, the problem of non-interoperability occurs

(Owusu Kwateng et al., 2021). Governments and stakeholders must be aware of the overlap and devise strategies for coming to an agreement on how to apply ethics in a way that is both acceptable and effective. The process of recognising such ethics in the creation of districts should be improved and promoted through international initiatives showcasing the advantages of established ethics. The worldwide standard is to support these countries by making their values known and training personnel involved in putting these interoperability programmes in place.

2.4.8 Security and Trust

Despite numerous attempts to secure health information systems, data security breaches in health care organisations have continued to rise, and the number of threats in this area has skyrocketed (Keshta & Odeh, 2021). According to studies, over 1.5 million names were exposed to data breaches in hospitals alone between 2006 and 2007 (Keshta & Odeh, 2021). Furthermore, according to the results of a 2010 security study conducted by the Healthcare Information and Management Systems Society, more than 110 healthcare institutions have reported the loss of sensitive, protected health information. Since January 2008, about 5,306,000 people have been harmed by personal identifying information, with annual losses from patient information exceeding $6 billion in 2010 (Fan & Lederman, 2018). Theft (stolen laptops, computers, or media), loss or negligence by workers or third parties, malevolent insiders, system hacks, online exposure, and virus assaults were all reported in the study (Kisekka & Giboney, 2018). Figure 2.2 highlights the security architecture of health information systems and the processes of user access, authentication, authorization, encryption, de-identification, and security auditing. All health information systems must have these security features in place so as to serve as a guard against information theft, leakage, or health espionage.

Internal and external threats to hospitals' information have been classified by some researchers, with employees' ignorance, curiosity, recklessness, inadequate behaviour, using someone else's password, and giving the password to other employees being some of the internal threats to the health information system (Zhang et al., 2020). External threats to health information systems include viruses and spyware assaults, hackers, and intrusions (Keshta & Odeh, 2021). The majority of health institutions, on the other hand, tend to focus on external threats and have adopted technical solutions to strengthen the security of their information systems (Shahbaz et al., 2019). Legitimate users continue to be the source of the majority of internal security breaches in health information systems. Because people's actions are a significant source of danger to diverse information systems, security cannot be maintained only by technological means (Keshta & Odeh, 2021). In Ghana, the right to privacy in the processing of personal data or information was recognized, leading to the enactment of Act 843, which strengthened the right to privacy established in Article 18(2) of the 1992 Constitution.

The Data Protection Act of 2012 (Act 843) establishes the laws and principles that govern a data controller's or processor's collection, use, disclosure, and management of your personal data or information. It recognises a person's right to safeguard their personal data or information (data subject rights) by requiring a data controller or processor to handle (collect, use, disclose, erase, and so on) such data or information in line with the individual's rights (Fan & Lederman, 2018). The Data Protection Commission was formed as an independent legislative agency to ensure and enforce compliance. The legislation covers all types of personal data or information, both electronic and non-electronic, held on both electronic and non-electronic platforms. The Act is

based on the fundamental idea that anybody who processes personal data must respect an individual's right to privacy in his or her communications (Veale et al., 2018).

Information security, according to Moghadam and Colomo-Palacios (2018), is more of a human issue than a technical one. Non-technical components of information security, such as education and awareness, must be considered alongside technical aspects in this scenario. Kisekka & Giboney (2018) identified over 70 dangers to the health information system and demonstrated that human-caused threats in the role of users' technology play a significant part in many of the system's threats. Human factors are the cause of 80% of privacy breach instances, according to (Kisekka & Giboney, 2018; Keshta & Odeh, 2021) also confirm that human errors account for a substantial proportion of privacy breaches in the United States. Furthermore, a study conducted by Deloitte in 2007 indicated that 91 percent of participants were concerned about workers' security shortcomings and that human factors were cited as the primary cause of information security failures by 79 percent of respondents (Fan & Lederman, 2018). Furthermore, the majority of individuals are unaffected and do not perceive any danger (Fan & Lederman, 2018). As a result, users of health information systems must be trained and informed about risk perception biases, as well as the size and consequences of possible security breaches.

Figure 2. 2 HIS Security

Source: (Chaudhry et al., 2018)

2.5 Ghana Health Sector Reforms

The growth of information technology systems, sometimes known as IT, has made it more likely that efforts will be made to digitise and save patient records electronically in order to facilitate their handling (Bonds & Rich, 2018). Although policy analysts and decision-makers had recognised the promise of IT in the healthcare industry, the momentum was not as strong as that seen in other industries (Dodoo et al., 2022). There are not many hospitals in the developing world as compared to the developed world that use electronic records, which is similar to the health system in Ghana. One of the first tertiary healthcare institutes in Ghana to employ an electronic patient health record as a trial project was Cape Coast Teaching Hospital (CCTH) (Adu et al.,

2021). Since the facility's founding, paper records have been used. Due to its role as a referral centre for Ghana's Central, Western, and Western North regions, the hospital has seen a rise in the number of patients it sees over the years (Tchao et al., 2019). The hospital was experiencing difficulties as a result of the rising number of visitors, including a lack of patient record storage space and problems with missing patient records that hindered continuity of service.

Other difficulties include unreliable networks, inadequate training for unskilled record staff, loss of patients' supplementary data, excessive costs associated with acquiring patients' files, delays in getting patient information that increased patient wait times, and more. To address some of the aforementioned problems with the paper record system, the electronic health record system known as LHIMS was introduced in December 2017 and completely implemented on April 1, 2018 (Adu et al., 2021). LHIMS promotes legible, thorough documentation as well as accurate, streamlined coding and billing. It also lowers costs by enabling quick access to patient records for more coordinated and efficient care. Patients can be diagnosed more quickly, medical care errors are decreased, and patients receive safe care. Despite the positive effects LHIMS is having on the facility's healthcare delivery, there are still drawbacks, such as power outages and unstable internet connectivity, which impede workflow. Any system's benefit or lack thereof can only be determined once users accept and use it (Rahi et al., 2018). One of the most difficult problems in an information system is getting users to adopt new technology, and healthcare professionals are no exception (Presthus & O'Malley, 2017).

The accuracy of medical records indirectly affects patient safety since bad patient data might result in incorrect diagnoses and, as a result, incorrect patient treatment (Tsang et al., 2019). Health

professionals in many departments can make decisions more easily, thanks to the high quality and accuracy of the data recorded in the HIS system. These factors have led to the majority of hospitals in Ghana making a recent move to the HIS system; however, not all types of healthcare facilities have done so. The HIS system is currently used by the majority of teaching hospitals, regional hospitals, some district hospitals, and private hospitals. Some computers and laptops with HIS applications installed are available in the units, depending on the financial resources of the healthcare institutions. In Ghana, hospitals deploy HIS software under the "Carewex EMR," "Health Pro," "HIS," and "LHIMS" brands, to name a few (Health Sector Reforms and Health Information in Ghana, 2018; Tchao et al., 2019). For a variety of reasons, certain applications have received more praise than others. Despite the advantages cited by numerous authors, the deployment of HIS in some facilities has encountered a number of obstacles that prevent them from fully realising these advantages (Ampaw et al., 2020). Among these are insufficient computer skills, restricted or unavailable tools, budget restrictions, a lack of technological foundation, security and privacy concerns, a lack of technical competence, and adjustments to workflow.

The Ministry of Health (MoH) launched LHIMS in 2017 on a pilot basis. a national electronic medical record and patient management system to provide Ghanaians with a paperless method of healthcare delivery (Ministry of Health, Ghana). Lightwave eHealth Care Services is in charge of managing the system's deployment, which links all hospitals, clinics, and health facilities, including the Ghana Health Service and the Food and Drugs Authority. The hospital switched from using manual folders to the LHIMS programme fully in November 2020. Patients are no longer required to carry folders between service locations. Managing electronic medical records, lab management, and pharmacy management are some of the system's key features (Kipo-Sunyehzi et

al., 2020; Papa et al., 2020). Among the advantages of the system are (Bans-Akutey & Sowah, 2020):

- Reduced waiting times at service delivery points
- Support clinical and public health services at all service delivery points of the healthcare system.
- Provide a 360 degree view of a patient's health by pulling in information from all departments.
- Securely share information with patients and their family caregivers over the Internet and Mobile Phones.
- Help doctors diagnose health problems sooner and reduce medical errors.
- Support exchange of data across the public-private healthcare systems

Ghana is now the vanguard of healthcare in Africa thanks to the Ministry of Health's National E-Health Project, which uses the Lightwave Health Information Management System (LHIMS) to change healthcare delivery nationwide (Amoah & Phillips, 2018; Essuman et al., 2020). The LHIMS platform includes real-time, cutting-edge disease surveillance for early warning, integrated management capabilities, and supporting dashboards that are unparalleled on the continent. The management of patient information and data is a significant concern for all hospitals. For critical decision-making needs and good patient outcomes, the LHIMS programme provides accurate and timely data to hospital administration, management, providers, and physicians. For the future of healthcare delivery, a health information management system that addresses our hospitals' major difficulties is considered essential.

In order to collect and standardise data across the country and create a useful tool for health sector decision-making, some lower middle-income countries (LMICs) have begun a series of health information system reforms (Zimbabwe, 2015). Ghana, Kenya, Tanzania, and Sierra Leone's adoption of an open-source District Health Information System (DHIS2) offers as an example of such significant changes. These information systems are designed to harmonise data across the country and provide a foundation for analysing health trends, making wise decisions, and developing activities to enhance living conditions in these nations. The facility-based information system includes an important component that uses data to support decision-making. Despite this, the existence of reliable and high-quality data rarely results in its use. There is presently a gap between the creation, diffusion, and use of data, even though this should not be the case. An assessment of the HIS reforms in LMICs is essential to encourage better data usage and evidence-based decision making to guide policies and programmes in the health sector.

Ghana developed the District Health Information Management System (DHIMS2) as a national cluster to systematically collect and compile health data for decision-making. The DHIMS2 platform was put into place in collaboration with the University of Oslo and the Ghana Health Service (GHS). It is an all-inclusive web-based method for remotely collecting data from various health system levels and putting it in one place. To enable customization to fit the particular requirements of diverse health systems, it makes use of data warehouse concepts and a modular design. Information transmission delays have decreased as a result of the launch of the DHIMS2 platform. As of 2013, 170 out of 216 districts had access to the DHIMS2, and there were around 5163 registered users. Ghana's healthcare system continues to have flaws despite advancements in its health information systems. This has been linked to health administrators' and politicians'

inadequate use of evidence for decision-making, particularly at the district, sub-district, and community levels. Such processes lead to inappropriate prioritisation, ineffective healthcare funding distribution, and unmet healthcare requirements. Although a study was conducted to examine the DHIMS2 in Ghana's data quality, little research was conducted to assess how the data were utilised for decision-making.

2.6 Ghana's integrated health information system

In Ghana's health sector, there are numerous different management units operating and producing a lot of data that is stored in separate silos (Kipo-Sunyehzi et al., 2020). The industry's inability to convincingly demonstrate its efficacy has been largely attributed to this difficulty in exchanging information. The only option to provide the various management components with a unified platform for information sharing is electronically. In the past 10 years, numerous groups have urged poor nations to use technology in their initiatives to achieve the MDGs (Acquah-Swanzy, 2015). At the Annual Ministerial Review of the United Nations Economic and Social Council, held in Accra in June 2009, African countries were exhorted to develop comprehensive policies and plans to guide the adoption of information and communication technology in the health sector. The growing need to employ technology to boost the efficiency of the health sector is evident in several global health initiatives.

Over the past two decades, the health industry has made modest attempts to computerise a number of key processes (Yusif et al., 2022). However, only the endeavour to computerise some logistics management systems has shown some promise in terms of altering management practices. In hospitals, computerising patient data, medical records, and patient management procedures has

largely failed, particularly in the public sector (Tchao et al., 2019). The comparatively subpar quality of computing equipment in many facilities and agencies has been a significant hurdle (Achampong, 2012). One of the most fundamental building blocks for gathering, storing, and distributing electronic information within the health sector is computing infrastructure. Unfortunately, compared to other information-intensive industries over the past 20 years, the health industry has historically underinvested in computing infrastructure (Peprah et al., 2020). As a result, a large portion of the necessary infrastructure is either non-existent or underdeveloped. Therefore, it will be necessary to make investments in the creation and upkeep of an adequate baseline of computing infrastructure in all healthcare facilities in order to provide the framework for supporting e-health. Setting up a system to progressively transform the health sector into one capable of efficient data management and information distribution will be one of the main objectives in the medium term (Kipo-Sunyehzi et al., 2020). It can take some time to totally eliminate paper from records and reporting systems. Therefore, this plan aims to achieve certain noticeable advancements in the use of information and communication technology for the gathering, storing, transferring, and disseminating of health information (B. Zhou et al., 2020). In this direction, the strategy will focus on two main areas:

- To gradually transition the health sector's performance reporting toward a real-time reporting system starting at the district level.
- Put in place a working system for keeping track of patients' medical records, and eventually automate patient services.

Health information management has been the subject of numerous regional projects. It has been possible to define a health information management strategy for the sector thanks to a thorough

mapping of data gathering points within the industry. This describes the reporting structures, roles, and informational requirements for agencies. Additionally, a District Health Information Management System (DHIMS) has been created and is currently being implemented across the country (Odei-Lartey et al., 2020). The system delivers aggregate data from district-level health programmes and facilities that are combined at the regional and national levels. In response to the requirement for annual reporting based on chosen indicators, the DHIMS was created. Uncoordinated efforts have been made in a number of health facilities to implement computer-assisted management systems that will assist in managing patient data and income (Zhou et al., 2019). In order to assure accountability, attempts are being made to computerise the claims administration system with the implementation of the National Health Insurance Scheme. Nearly all service delivery sites in large hospitals have access to computers, but these systems are not networked and lack the common software needed to allow for the pooling of transactions at the end of the day. Due to skill limitations and a lack of patient management systems that permit the electronic transfer of results to consulting rooms, new diagnostic and laboratory equipment is being introduced to the system that has electronic reporting and data capturing capabilities (Yusif et al., 2020). The main initiatives for this plan will fall into these categories.

- To create an extensive patient records and service management system in healthcare facilities that will report to the DHIMS
- To enhance and broaden the use of the DHIMS to give real-time report on sector performance.
- Based on the sector's ICT policy, create detailed information and communication technology requirements for each level of service provider. This will serve as a roadmap for facilities and management units' gradual modernisation of their information

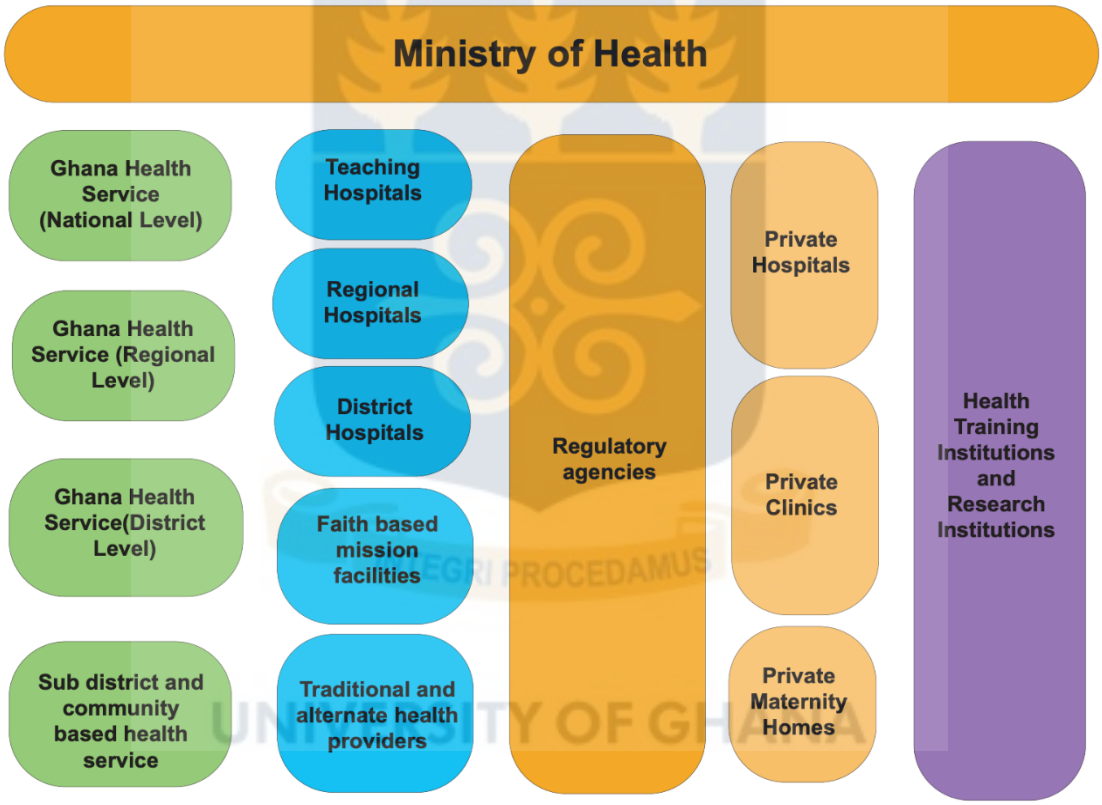
management systems. This strategy will be included in the health sector's medium-term capital program (Ghana_national_ehealth_strategy, 2010).

- To enable real-time reporting of performance at all levels, review and upgrade the DHIMS into a web-based system. A coordination committee will be formed to oversee the performance of the software and guarantee maximum coverage at all times in order to guarantee that programs are effectively catered for. To fulfil its role as the primary hub for compiling service data, the Center for Health Information Management will also undergo a significant renovation (Tchao et al., 2019).
- Establishing a national health data repository at the Ministry of Health will allow for the electronic collection of reports from all agencies as well as the provision of in-depth analyses and performance updates for the healthcare industry (Ghana_national_ehealth_strategy, 2010).

An essential element of the facility-based information system utilises data to support decision-making. Despite this, the availability of reliable and high-quality data only occasionally results in its use (Agyapong et al., 2018). There is presently a gap between the creation, diffusion, and use of data, even though this should not be the case. An analysis of the HIS reforms in lower middle-income countries is essential to promoting better data usage and evidence-based decision making to guide policies and programmes in the health sector. Ghana developed the District Health Information Management System (DHIMS2) as a national cluster to systematically collect and compile health data for decision-making (Abdulai & Adam, 2020). The DHIMS2 platform was put into place in collaboration with the University of Oslo and the Ghana Health Service (GHS). It is an all-inclusive web-based method for remotely collecting data from various health system

levels and putting it in one place. To enable customization to fit the particular requirements of diverse health systems, it makes use of data warehouse concepts and a modular design. Information transmission delays have decreased as a result of the launch of the DHIMS2 platform. As of 2013, 170 out of 216 districts had access to the DHIMS2, and there were around 5163 registered users. The organisation of the entire health system of Ghana is captured in figure 2.3 below.

Figure 2. 3 Ghana's Health System Architecture



Source: (Ghana_national_ehealth_strategy, 2010)

The University of Oslo and the Ghana Health Service (GHS) collaborated to put the DHIMS2 platform in place. It is an entire web-based solution for compiling data from several health system

levels into a single repository remotely. It uses a modular design and data warehouse concepts to enable customization to meet the particular requirements of diverse health systems.

2.7 Integrated Health Information Systems Adoption Research – Issues and Evidence

The management of health systems in many developed countries is increasingly prioritising the reform of health information systems (Stylianides et al., 2019). This development has not yet received the attention it merits in the health systems of many less developed nations (Amoah & Phillips, 2018). The fulfilment of the goals of universal health care has been recognised as requiring adequate and trustworthy health information systems (WHO, 1978). These systems have been proven to be critical in the planning and execution of such programmes as maternity and child care, family planning, and immunisation (Kruk et al., 2018). The majority of developing nations still rely on erratic and often unreliable monthly returns from various offices and divisions of ministries and departments of health in order to collect data (Bans-Akutey & Sowah, 2020). Systematic processes for acquiring health information from local authorities in rural and urban areas stand out for their deficiencies, if not their complete absence. As a result, many times occurrences like births, illness, and death are grossly underreported, resulting in poor estimates of these events (Khubone et al., 2020). It might be challenging to analyse and present such data when births and deaths are reported with incomplete dates (Khubone et al., 2020).

Inadequately trained staff, limited resources, a lack of incentives to gather health information, and other issues have made it difficult for developing countries to collect health information (Atasoy et al., 2019). In a recent study, Fatima et al. (2018) examined the interrelated elements that affect people's privacy concerns with regard to their personal health information (PHI). The study

focused on protecting the privacy and security of personally identifiable health information (PHI), which is increasingly at danger of privacy breach due to its digitization and sharing by a number of stakeholders for a variety of objectives (Adu et al., 2021). The susceptibility of PHI stored electronically to crimes (like hacking) and the simplicity with which those entrusted with people' PHI may act opportunistically (like sharing PHI). The Ponemon Institute's 2016 study, which found that insider threats and criminal attacks are the main sources of PHI privacy breaches, supports this (Keshta & Odeh, 2021). Sokey and Adisah-Atta (2017) also investigated the challenges Ghanaian rural residents have while evaluating health information systems. Ghana's rural populations face a number of health-related challenges, including a lack of healthcare facilities, poor road conditions, and a lack of access to reliable health information.

Despite the challenges rural communities experience in accessing health information, experts have not focused much on them (Sokey & Adisah-Atta, 2017). The sole academic study on the subject now accessible in Ghana was done in two rural communities in 1987 by Bosompra (Borketey, 2016). Bosompra looked into how informational sources like discussions, the town crier, the market, churches, schools, health officers, and radio were used in primary healthcare. The results of this study showed that discussions were the most widespread but least reliable source of health information. Radio came in second in terms of reputation and appeal. The study by has been the only one to examine the sources and challenges of locating health information in rural Ghana. There is a lot of literature on the use of electronic medical records in underdeveloped countries, but less is accessible in Ghana (Tsehay, 2014; Mooko, 2006; Naanyu et al. 2013; Omogor, 2013; Nwagwu & Ajama, 2011). Focus group discussions and in-depth interviews were conducted using a qualitative research paradigm in a different study by Tsehay (2014) that looked into the women's

knowledge sources for maternal health in five Ethiopian villages. The study demonstrates how, during the course of their reproductive lives, women have searched for and used a variety of social and media-related sources to satiate their desire for maternity information (Henderson & Chamberlain, 2018). All maternity sources, health extension workers, and health professionals were found to be the most popular, often used, and reliable sources of health information.

Lack of access, ignorance of health and technology, or insufficient e-health solution adoption are some other barriers (Niazkhani et al., 2020). More qualitative and quantitative research is also needed to better understand the viability, accessibility, and usage patterns of e-health apps across a variety of disciplines. This is especially true for populations that have historically received inadequate care, such as those in developing nations like Ghana. The health industry is currently unable to predict future illnesses using data mining on accessible information due to the paucity of e-health research and insufficient interoperability between medical records of various hospitals in many low-income countries, including Ghana (Essuman et al., 2020). A developing nation like Ghana's new technical strategy is lacking sufficient cutting-edge research to direct policy execution and decision-making with relation to the efficient distribution of available resources towards IHIS adoption. As a result, the objective of this study is to assess the suitability and viability of Ghana's health sector with regard to the deployment of an integrated health information system.

Table 2. 1 Empirical review of extant studies on HIS adoption and implementation

S/N	Author(s)	Study Focus	Research Method/Setting	Findings	Relevant Gaps identified
1.	(Niazkhani et al., 2020)	To identify the types of barriers to patient, provider, and caregiver adoption and use of ePHRs and to analyse their extent in chronic disease care.	A systematic review	demographic factors, health status, computer literacy, preferences for direct communication, and the patient's strategy for coping with a chronic condition; as well as factors related to medical practice or environment.	The barriers identified in this review may not be applicable to all patient populations, implementation strategies, or healthcare systems.
2.	(Khalifa, 2013)	To identify, categorize, and analyse barriers perceived by different healthcare professionals to the adoption of HIS in order to provide suggestions on beneficial actions and options.	Survey	Human barriers, professional barriers, technical barriers, organisational barriers, financial barriers, legal barriers, and regulatory barriers	A quantitative study on the barriers to HIS adoption from the perspective of health professionals should be conducted in the developing world.
3.	(Tsai et al., 2020)	aimed to present current knowledge about the effects of her implementation and the barriers to her adoption and use.	Scoping review of literature	**Positives** Improved communication Decreased workloads Improved organization of work. Improved disease and quality management. Support learning and decision making. **Negatives** Concerns of privacy and security of collected clinical data. Resource constraints Poor interoperability Poor and insufficient training	The review did not contain a quality analysis of the included papers; a lack of uniformity in the use of definitions of EHRs and a lack of detailed contextual information concerning the study settings could be observed.

4.	(Katurura & Cilliers, 2018)	To identify critical success factors for the implementation of EHRs in South Africa's public health care sector	Systematic Literature Review	The study identified technical, social, and environmental barriers to the implementation of EHRs. The barriers could be further broken down into lack of supporting infrastructure, user training and commitment, political influence or strategy, legislation and regulations, and the lack of a framework for the implementation and management of EHRs.	Unavailability of literature for reviewing implementation issues specific to EHRs in Africa A further limitation is the lack of external input on the themes and critical success factors that were identified in this article.
5.	(Essuman et al., 2020)	This study examined the factors associated with the use of electronic medical records (EMR) in public hospitals in the Eastern Region of Ghana.	Survey	The results showed that health professionals indicated low use of EMR services in their hospitals. Lack of computer competency, poor communication between users, the cost of EMR resources and facilities, a lack of technical personnel to install and operate EMR technology resources, and a lack of EMR software packages had significant negative relationships with EMR utilization.	To better understand the issues, a mixed-methods approach is recommended to be used to study healthcare workers from both private and public healthcare facilities in the Eastern Region of Ghana.
6.	(B. Owusu & Nsafoah, 2016)	Access and evaluate the Komfo Anokye Teaching Hospital's current EHR system.	Mixed method approach	The results indicated that the electronic health record is the best mode of collecting, storing, and managing patient data, although there are some challenges and areas for improvement that must be addressed.	A CDSS should be added and synchronised with the EHR to aid in major clinical decisions and ensure patients receive the best possible care.
7.	(Abdulai & Adam, 2020)	Health providers' readiness for electronic health record adoption	A cross-sectional study	It was observed that health providers were marginally ready for the adoption of electronic health records. Participants expressed dissatisfaction with	They proposed a robust informatics curriculum and capacity-building workshops for improving provider readiness for electronic health records.

				paper-based records and expressed a desire for electronic health records, but they expressed fear of the potential impact of computerised records.	
8.	(Jamshed et al., 2015)	Assessing electronic health record usage at Komfo Anokye teaching hospital	Mixed method Approach	The results indicated that the electronic health record is the best mode of collecting, storing, and managing patient data, although there are some challenges and areas for improvement that must be addressed.	A CDSS should be added and synchronised with the EHR to aid in major clinical decisions and ensure patients receive the best possible care.
9.	(Pendergrass & Crawford, 2019)	Using Electronic Health Records to Generate Phenotypes for Research	N/A	EHRs make population-scale research possible for clinical variables and clinical contexts that cannot be completely recapitulated or represented by controlled trials or epidemiologic studies.	The major bottleneck in the effective and efficient use of these data is the accurate extraction of research-grade variables, including case status. Electronic or computable phenotyping methods and approaches, along with associated evaluation metrics, are now emerging, the most common of which are described here.
10.	(Atasoy et al., 2019)	The Digitization of Patient Care: A Review of the Effects of Electronic Health Records on Health Care Quality and Utilization	Interdisciplinary overview and synthesis of this literature	EHR data and machine-learning tools may be used to better understand the consequences of medical decisions.	Two critical concerns, which may be solved by the emergence of unsupervised learning, are the ability to generalise beyond the average patient who participates in a random controlled trial (RCT) and the ability to extract information from broader sets of results across multiple RCTs.
11.	(Khubone et al., 2020)	Electronic Health Information Systems to Improve Disease Diagnosis and	A Narrative Review	A successful implementation of EHIS requires commitment from health leaders to play a strategic role in terms of the policy	To help optimise the implementation and use of EHIS in LMICs, we have proposed roles and responsibilities for

		Management at the Point-of-Care in Low and Middle Income Countries		directive, resource mobilization, and evidence-based decision-making.	stakeholders to ensure efficient and sustainable implementation of EHIS.
12.	(Odei-Lartey et al., 2020)	Utilization of the national cluster of district health information systems for health service decision-making at the district, sub-district, and community levels in selected districts of the Brong Ahafo region in Ghana	Cross-sectional study	Although 93% of the health facilities studied submitted data to the DHIMS2 platform, evidence suggests that this data is rarely used in decision-making, particularly at community-level facilities, where only 26% used DHIMS2 data to inform annual action plans and less than 20% examined findings and issued directives for action. At the district level, 58% issued directives based on DHIMS2 information, 50% used DHIMS2 information for advocacy purposes, and 58% gave feedback reports based on DHIMS2 data for action. Functional computers were lacking across all facilities.	The district and sub-district leadership's supervisory role must be expanded in terms of frequency of visits and assisting facilities on how to derive insights from DHIMS2 data and form actions to improve the lives of their catchment populations. Concerning the sporadic introduction of new form formats, the technical team responsible for introducing new forms should prepare and attach a reference manual (possibly electronic) as a user guide to the DHIMS2 platform.

2.8 Research Gap and directions for future studies

From the discussions in the previous sections, it is clear that the literature review was done in a way to highlight the contemporary issues related to the adoption of HIS in the developed world. It was then narrowed to the Ghanaian perspective to assess how fit and viable the Ghanaian public health system is for the adoption of HIS, as identified in the gaps of previous studies. This approach was adopted to expose the gap that is to be investigated. As discussed above, the purpose of this study is to investigate the preparedness or readiness of the Ghanaian public health sector to adopt HIS using the fit-viability theory approach.

A Rahimi et al. (2009) study that performed a meta-analysis on the use of health information systems. The study's goals were to organise the information discovered through qualitative studies carried out in connection with HIS implementations. This information will also be used to lay up an updated structure for implementation planning. In turn, a consistent flow of data on the system's performance was necessary for the management to contribute effectively to the deployment process. Similar to this, when organisational objectives change, the implementation plans need to change as well. Whether or not clinicians had been involved in the design and implementation was another factor that affected resistance. Thus, it was determined that alignment between organisational and individual therapeutic goals at the level of daily practise was crucial, primarily due to the fact that practitioners and stakeholders may have different perspectives on how usable the new system is. Future research should focus on the elements that encourage the domestication of HIS, the length of the process, and the situations that encourage the acceptance of the new HIS, according to the study's recommendations. The elements listed as essential to a successful

implementation are also significant. Based on this gap, the current study uses the fit and viability theory to examine the readiness and viability of Ghana's health system for the adoption of IHIS.

Another study by Khalifa (2013) tried to identify, classify, and analyse obstacles to the adoption of HIS that various healthcare professionals felt in order to offer recommendations on advantageous actions and solutions. According to this study, professional and human barriers connected to the nature of healthcare occupations and human barriers relating to beliefs, behaviours, and attitudes were obstacles to implementation. Others included organisational constraints connected to hospital management, financial barriers linked to finance, legal and regulatory barriers related to rules, regulations, and legislation, and technological impediments related to computers and IT. The study's conclusions called for additional research to clarify how these obstacles might be removed to facilitate the successful adoption of HIS. This study seeks to fill a vacuum in the literature by determining the readiness of Ghana's health sector for the adoption of HIS based on this recommendation. The constructs of the FVT, such as task and technology, organisation, economics, and IT infrastructure, along with the addition of the new construct of state policy on IT to the viability side of the theory, would allow this study to show how these barriers identified in the previous study can be overcome.

Additionally, a recent study by Tsai et al. (2020) aimed to look into and report the state of the art about the effects of EHR deployment and the obstacles to adoption and use. This study discovered once more that the installation of HIS has both beneficial and detrimental consequences. Improved communication, lighter workloads, and better work organisation are some of the benefits. Others include better illness and quality management, assistance with learning and decision-making,

increased patient data access, enhanced data quality, and improved data accuracy. A higher standard of care enables secure, organised data and information storage, increased output, and lower costs. Concerns regarding the security and privacy of the collected clinical data, resource shortages, poor interoperability, and inadequate or inadequate training are just a few of the drawbacks. The results were consistent with those of other earlier research on IHIS adoption.

Katurura and Cilliers (2018) did another study in an effort to pinpoint crucial success factors for the adoption of EHRs in South Africa's public health care system. The study found obstacles to the adoption of EHRs on the technical, social, and environmental fronts. The obstacles could be further divided into the absence of a framework for the adoption and management of EHRs, a lack of supporting infrastructure, a lack of user commitment and training, political influence, or a lack of political strategy. The absence of literature reviews on implementation problems unique to EHRs in Africa was mentioned as one of the study's weaknesses. The majority of the publications analysed, while providing pertinent information, indicated variables that might apply to the adoption of e-health technology generally, but not from the perspective of poor countries.

The parameters related to the adoption of electronic medical records (EMR) in public hospitals in the Eastern Region of Ghana were also explored by Essuman et al. (2020). According to the survey, hospitals' use of EMR services by medical personnel was minimal. The cost of EMR resources and facilities, a lack of computer literacy, and poor user communication all had a substantial negative impact on uptake. Other issues were a shortage of EMR software packages and technical staff to set up and manage technology resources. According to the report, it will be crucial for the

government to provide assistance to healthcare facilities having trouble implementing EMR in order to increase EMR utilisation.

The study also suggested that in order to better understand the problems, healthcare workers from both private and public healthcare facilities in Ghana's Eastern Region should be studied using a mixed-methods approach. By including state IT policy on the viability side of the FVT framework, the current study tried to close this gap. As the lack of EMR software and the high cost of EMR resources were some of the adoption barriers, it will be determined how the state may aid in the deployment of IHIS through legislation and funding for the adoption and use of IHIS. This study will leverage the constructs of the FVT framework, which include task characteristics, technology characteristics on the fit side, and economic, organizational, and IT infrastructure on the viability side. Digital curiosities and the age of the health facility were also used as mediating and moderating variables, respectively, to reveal how curious health workers were and the effects of age on IHIS adoption by health institutions.

2.9 Chapter Summary

This chapter explored the literature of health information systems from a global and Sub-Saharan African perspective. It then zoomed down to the literature on the history of the adoption of digital health care delivery systems deployed in Ghana`s public health system. Also, we reviewed how the fit-viability approach will enable us to access and measure the readiness of Ghana`s public health system to adopt an integrated information system. Using the fit and viability theory approach, we reviewed literature that focused on the difficulties being faced by public health institutions in adopting an integrated health management system. The study reviewed literature on

the fit dimension to reveal the extent to which the core competencies, structure, value, and culture of public hospitals in the world and especially Ghana would accept the change from the orthodox paper system to a more rigorous computer-based system (HIS) for their daily work schedule and processes. The literature on the viability dimension was reviewed to measure the extent to which the adoption of an integrated health information system will potentially add value and meet the requirements of human resources and capital needs, among others, for Ghana's public hospitals. The literature also exposed the level of economic and IT infrastructure and the organisational structure that currently exist in the public health sector of Ghana to see if it is viable to adopt an integrated health information system.

CHAPTER THREE

THEORY AND HYPOTHESES DOPMENT

3.1 Chapter Overview

The introduction and the problem that required this investigation were discussed in previous chapters. The second chapter dove deeper into the literature in regards to integrated health information systems and how they have evolved over the years from a global perspective, an African perspective, and finally a Ghanaian perspective. The current chapter focuses on the theoretical framework of the study and the development of appropriate hypotheses.

3.2 Fit-Viability Theory

Tjan (2001) proposed the Fit-Viability Theory (FVT) to assess online efforts while consulting for Sun Microsystems at a time when business over the internet was gaining traction and attracting a lot of attention from executives. The link between the quantitative viability of the internet and its qualitative fit goals inside the SUN Microsystems firm was addressed in Tjan's (2001) research. In its early beginnings, the fit-reliability theory was known as the fit-reliability model (FVM), which provided a framework for evaluating a company's investment in an online project. This was necessary because companies were investing in various internet initiatives without knowing what would happen to them and their stakeholders (Tjan, 2001).

Furthermore, companies were depending on outdated and ineffective tactics, which failed to account for the precariousness of internet technology and the ambiguity of how the most recent application would be accepted or employed (Tjan, 2001). The model's "fit" component evaluates the internet project's qualitative measurements and alignment with the firm's tasks, goals, core

values, capabilities, ease of deploying technology, and other activities. According to SUN Microsystems, the model's "viability" components also statistically measure the return on each investment (Tjan, 2001). Furthermore, the study stated that those efforts that scored highly in both areas indicated a strong investment potential due to their high success predictive value. Those efforts that scored poorly on both criteria, on the other hand, have limited investment potential. Furthermore, if a project has both a good "viability" and a poor "fit," it suggests that the business firm is ready to execute the project, but the nature of the work does not match the technology, hence it is not a good match (Larosiliere et al., 2017). As a result, the project is either cancelled or redesigned to fit the tasks.

Furthermore, Goodhue and Thompson (1995) proposed the Task Technology Fit (TTF), which was developed in collaboration with the FVM by (Tjan, 2001; Liang et al. 2007), to incorporate a matched dimension to determine why a particular technology fit a task. When compared to the other TAM versions, the Fit-Viability Theory, according to Agnihotri et al. (2017), is superior in terms of analysing the acceptability, performance, and deployment of new technology. (F. Mohammed, Ibrahim, et al., 2017) also stated that the fit-reliability theory is appropriate for determining the degree to which technology fits as well as the value of technology in terms of application and performance, while keeping environmental factors in mind. Furthermore, according to Wickramasinghe et al. (2018), the fit-reliability theory may be used in research studies that look at the technical and organisational aspects that impact technology's deployment and problems.

The FVT has been used in a number of studies, including (Larosiliere et al. 2017; Yoo & Kim, 2019), and it has aided empirical research into the feasibility and task-technology fit of information technology (IT). Although the TTF and the FVT have certain similarities, both theories evaluate the advantages organisations receive from ICT activities in relation to their job needs. There are some notable discrepancies between the TTF and the FVT, as well. TTF, on the other hand, analyses the success of the fit to the technology through user assessments.

Tjan (2001) proposed the fit-viability theory (FVT) to link a company's online portfolio's financial performance and the internet, providing quantitative viability and qualitative fit with the company's current goals. The FVT's model reveals a link between the financial success of technology decisions and the end users' adoption of the technology, as well as the technology's alignment with the end users' goals (Mohsin et al., 2018). In other words, if a technology has a higher value of acceptability and alignment (independent variables), it is more likely to achieve the desired goal or success (a dependent variable). The TTF and FVT differ in that the TTF correlates the technology/fit and acceptance levels in financial and use results, whereas the FVT correlates the technology/fit and acceptance levels in financial and use results.

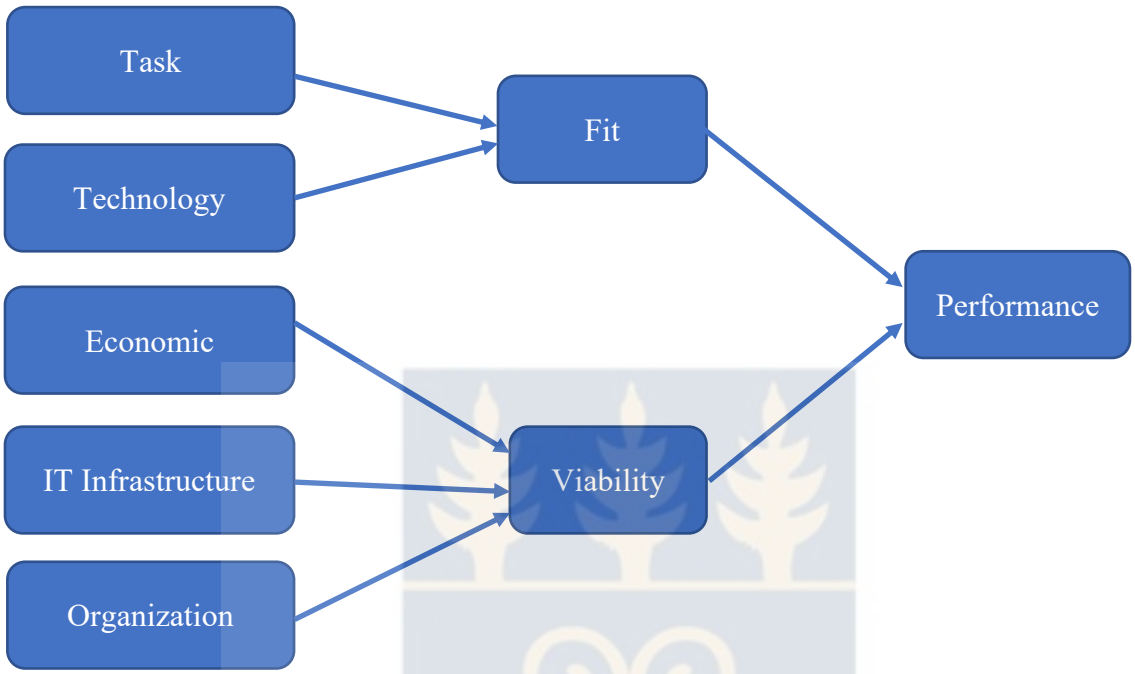
Table 3. 1 The Fit and viability framework

Viability	Low	High
High	Find Alternative Technology	Good Target
Low	Forget it	Organizational Restructuring

Fit

Source: Liang and Wei (2004)

Figure 3. 1 Framework of Fit and viability theory



Source: Adopted from (Tjan, 2001)

3.2.1 Fit Dimension of FVT

The majority of studies that deal with finding "fit" follow the assumption that people make logical assessments to determine whether or not an IT product meets their expectations (Larosiliere et al., 2017). Recent research has revealed that this is not just a rational process involving health experts but is also heavily impacted by emotional and habitual reactions. Furthermore, there is evidence that system utilisation is influenced by organisational preconditions such as incentives that encourage purposeful use as well as individual preconditions such as proper training or individual autonomy (Stylianides et al., 2019). As a result, effectiveness may be viewed as a consequence of pleasure, utilization, as well as human and organisational preconditions. In this way, a variety of plausible causes for misfit problems associated with HIS implementation are feasible (Baumann et al., 2018). This may happen in a variety of ways, as we will see in the following subsections.

4.2.1.1 Task Fit

The task dimension of the fit and viability theory seeks to measure how the task requirements match with the technology to be adopted. The core daily processes of every firm or organisation are structured in a particular way, and the technology to be adopted to help perform those tasks must be in tandem with the tasks or must fit the task to be performed (Larosiliere et al., 2017). The integrated health information system that will be adopted and used in the healthcare industry must be compatible with the daily duties that are performed by healthcare workers. A mismatch will cause the system to malfunction (Yoo & Kim, 2019). The assignment will be successfully completed if the requirements match the qualities that healthcare professionals desire in an integrated health information system. As a result, inquiries like the following help establish how well the FVM fits. Is the user able to use the system whenever necessary and complete tasks successfully and efficiently? Is the database's data presented in the best way possible for use whenever necessary? Is the response time of the system critical to task performance? If the answers to all of these questions are "yes," the task requirements have been met, and the system will be successful in terms of the task.

4.2.1.2 Technological Fit

The term "technological fit" refers to how well integrated health information systems' embedded and configurable capabilities match the functionality that a health professional requires to perform successfully and efficiently (Larosiliere et al., 2017). When the intrinsic requirements of health professionals are not properly supported by technology, a mismatch arises. According to Soh, Sia, and Tay-Yap (2017), there are three sorts of technical misfits: A mismatch between user requirements and the processing procedures offered by a technological solution is referred to as

functional misfit; a mismatch between user requirements and the availability, accuracy, and quality of the underlying data model is referred to as data misfit; and a mismatch between user requirements and the way data are represented by the system is referred to as output misfit (Yoo & Kim, 2019).

3.2.2 Viability Dimension

While "fit" has been widely studied in the current IS literature, "viability" has only hazy definitions. A common misconception is that viability is a restraining factor for businesses to achieve "IT infusion," which Cooper and Zmud (1990) describe as the last step of the IT deployment process that results in greater organisational performance as a result of employing the IT artifact. As previously said, viability determines the integrated health information system's margins. These margins, according to Wei et al. (2012), can be altered based on economic, organizational, and societal restrictions. According to the assessment of the literature, many writers blended indicators indicating IS success (or feasible end states) with indicators de facto restricting technology adoption while maintaining a triadic distinction (C. Liang et al., 2017; H. Liang et al., 2007; T. P. Liang et al., 2007).I propose to evaluate all of the aspects addressed in the literature for this study according to my understanding of the word "viability" based on the literature review.

3.2.2.1 Economic Viability

Many authors place a strong focus on the financial aspects of technology adoption (Fox & Connolly, 2018). Viability is seen as a purely quantitative factor that can be quantified using designated key performance indicators like return on investment or net payoff (Tjan, 2001). Economic viability is frequently linked to ideas such as business value or transaction cost reduction

in the IS literature when developing viability-fit models. The difficulty with employing these notions as viability restrictions is that they are essentially potential (financial) outcomes of technology adoption rather than limiting forces.

In the project phase, where HIT is implemented and integrated in an institutional environment (e.g., a national health system, a single healthcare organization, or a single department), This study distinguished between explicit costs for implementing HIT, such as one-time costs for software and hardware licencing (Goldzweig et al., 2009). acquisition costs, or internal and external personnel costs for conducting the HIT implementation project, and implicit or opportunity costs, such as the stroking costs (Kesse-Tachi et al., 2019). Additional fixed costs, such as running and maintaining an advanced infrastructure and providing support services, among others, as well as potential increases in variable costs (Mettler, 2015), The variable costs, such as augmented training requirements, recurring licensing, and other external servicing fees, are examples of viability constraints relating to the future usage phase.

3.2.2.2 IT Infrastructure

The technological aspect is the second component of the viability dimension (the IT infrastructure). This document evaluates the implementing organization's ICT infrastructure. Numerous empirical studies (Pang et al., 2021) have shown that an organization's level of ICT advancement has a favourable impact on the IT tools and services they utilize. If the institution is highly IT inclined, then it would be easy for them to adopt and use integrated health information systems. Again, an IT-inclined institution would have well-trained IT professionals managing their IT department and disseminating IT knowledge to the rest of the personnel through periodic

training. For integrated health information systems, if the IT infrastructure of the hospital is good and the personnel are task-fit to use modern technology to perform their daily work schedules, then HIS implementation would be a success (Wickramasinghe et al., 2018). This implies that the IT infrastructure of the health facility is very important to the adoption and use of an integrated health information system.

3.2.2.3 Organizational Viability

The deployment of HIT must take into account organisational viability limits as well. According to Liang et al. (2007), the willingness and ability of users are the most important predictors of organisational survival. This argument is supported by (Liang et al. 2017; Wei et al., 2012), who emphasise the importance of user happiness and system utilisation for the success of IS implementations. Despite the fact that I agree that user happiness is critical for every IT project, I feel that user satisfaction and system utilisation are both outcomes of an HIT implementation. While low user satisfaction may limit the spread of a technology (no one wants to invest in something they do not completely believe in), it has no bearing on the first choice to invest in or not engage in HIT since no prior experience with the technology has been had (Greenes, 2015). Furthermore, I feel that user satisfaction and its preceding inhibitors are already adequately reflected in the fit dimension's conception.

In accordance with Wei et al. (2012), I want to focus on elements that directly and as a priority influence enterprise-level technology adoption decisions. Adherence to such standards is sometimes a key difficulty for many HIT initiatives, and it frequently determines the overall success of a rollout. Aside from regulatory constraints, a healthcare organization's overall

workforce competency level is a key limiting issue. Although a lack of organisational competency can be mitigated to some extent by extensive training and/or external assistance (although at the expense of economic viability), much is still dependent on employees' and the company's capacity to learn and engage with new technologies and processes. Finally, whether technology is embraced or not, senior management support is critical (Greenes, 2015; Haried et al., 2019). This may be the case, for example, when senior management's objectives are not properly supported by the adoption of a new strategy.

3.3 State Policy

A purposeful collection of rules designed to regulate behaviour and produce acceptable results is known as a policy. A policy is an intention that is carried out through a process or technique. The governance board of a corporation often decides on policies, but in this study, we will concentrate on state-specific policies (Gautier & Ridde, 2017). State policy is a collection of fundamental rules, norms, and procedures that direct the exercise of governmental power (Gwyther et al., 2018). It contains frameworks and instructions for putting into effect or launching a new state programme like IHIS. Because we cannot disregard the role of government or the state in the adoption of IHIS by the Ghanaian health sector, which is run by the state, state policy was added to the original FVT theory. It is crucial to consider how these rules, regulations, and frameworks impact the effective adoption and application of IHIS (Agyepong & Adjei, 2008; Paksi, 2020). Adoption of IHIS can be made or broken by policy. Public confidence in the system will be steered by favourable data security policies and sanctions for misuse, abuse, or hacking of patient electronic medical records. Given that the study used an FVT theory, it would be wise to review the general state IT adoption policies. how these policies affect the adoption and use of information systems, particularly in a

crucial and delicate industry like health where individuals' personal health records will be collected, stored, and used for policymaking and other clinical purposes (Gwyther et al., 2018).

These records will be shared securely throughout health facilities, and all of this must be governed by policy and norms. External variables have an impact on everyday operations and task execution in every firm (Gautier & Ridde, 2017). Since the subject of this study is the government-run public health sector, the government's general information technology strategy will have a considerable impact on how a new integrated health information system is implemented in Ghana. The government must be ready and prepared to incorporate instruction in this new system into the curriculum for healthcare professionals so that they are already trained in its use before working in a hospital environment (Paksi, 2020). Because the state regulates and administers public health, the government or the state must be a focal point in the adoption and use of IHIS through policies, frameworks, and guidelines to aid in the implantation or adoption.

3.4 Justification for the use of Fit-Viability Theory

Since its design offers a reliable and tried-and-true measuring guide or instruments to help identify the factors impacting the adoption and utilisation of an integrated health information system, the fit-reliability theory has been modified for this study. These solutions will aid Ghana in delivering healthcare and making it accessible. Examining whether or not the IHIS technology is appropriate for the roles of healthcare professionals and public health officials is made easier by the theory's task and technology "fit" components. Similar to this, it is reasonable to determine how Ghanaian hospitals will adapt to the adoption and usage of IHIS based on the viability part of the theory, which involves economic variables, IT infrastructure, and organisational aspects. The task-

technology fit and feasibility of various information technology applications have been empirically established through the use of the FVT in a number of research papers (Zhu, 2017; Tripathi & Nasina, 2017). The idea has also helped to confirm the link between the adoption of new information technology at the organisational and national levels. This study has modified the theory in order to match the goal of the investigation, in contrast to other studies that have used the theory to determine and establish performance.

The first phase is to determine the influencing factors that lead to the acceptability and use of integrated health information systems in Ghana as opposed to performance, as with the original notion. Second, state policy has been added to the typical FVT components in this study as a component of the viability construct. As a mediating factor between IHIS adoption and the structures of technological fit and IT infrastructure viability, the study also used digital curiosity. As a moderating factor between the constructs of IHIS, economic viability, and organisational factors on the viability side, another variable, the age of the health facility, was used. The FVT was selected as the ideal conceptual framework for this investigation as a result of this factor.

3.5 Limitations of the Fit-Viability Theory

Despite the fact that the FVT has been acknowledged as critical for the study of factors impacting the performance of information systems and innovations (Liang et al., 2007), it does have certain limitations. The use of the FVT in assessment studies presents both theoretical and methodological obstacles. The theory was used in this study because it is important for IS researchers to apply it in key areas such as digital economy research (Haftu et al., 2018). Again, research in organisational

actor models dominates the theory, despite the necessity to examine the theory's empirical and theoretical flaws in instances where the components might be deceptive (Ansari et al., 2010).

In the current study, for example, the FVT's limitations were discovered based on literature review. For example, the theory's incapacity to describe the processes involved in project identification and need assessment using a multi-stakeholder approach (Hollingsworth et al., 2015). FVT, according to (Chatfield & Reddick, 2017), has overlooked the importance of civil society and inter-agency interactions, particularly governmental agencies as crucial players at various levels. The FVT has been viewed as a temporary measure for measuring organizational preparedness for technology adoption in recent research (Larosiliere et al., 2017). Furthermore, organizations may respond differently to the same external influences, resulting in diverse results of planned reforms (Vicente & Novo, 2014). As a result, many of these organizations are increasingly seen as change agents rather than suited for purpose (Sharon, Dawes & Helbig, 2010). Despite these drawbacks, the FVT is employed in this study since it has only been used in a few integrated health information system research in the developing country perspective.

3.6 Research Model and Hypotheses Development

3.6.1 Task Fit for Integrated Health Information Systems

Tasks are broadly defined as the actions that need to be carried out (Liang et al., 2007). Accordingly, with regards to this study, the task is to create an integrated health information system in the public health sector of Ghana. The task characteristics of interest are how health personnel within hospitals in Ghana are prepared or ready to adopt a more rigorous computerised approach to their daily work processes and routines. This will be done using the integrated health information

system, which will be integrated with all public hospitals to replace the old technology or system being used currently. Existing studies (K. Mohammed et al., 2016; Yoo & Kim, 2019) concluded that when the task requirement coincides with the chosen information technology, it results in higher performance and acceptability of the new system. Existent studies in IS (Hakim Alshammari, 2019; Larosiliere et al., 2017; F. Mohammed et al., 2017; Yoo & Kim, 2019) have made use of the FVT in various contexts.

Automation, resource sharing, multitenancy, internal knowledge, and remote implementation were identified as task features associated with cloud computing acceptance and utilisation by Agnihotri et al. (2017). Giving out information about healthy lives, offering preventative medicine, and educating communities about illness prevention, cures, and other health recommendations are all task characteristics that have a favourable impact on Fit, which in turn has a positive impact on utilisation (Yoo and Kim, 2019). According to this study, task parameters have a considerable impact on IHIS adoption and use. As a result, this study hypothesises that:

> *H1:Task characteristics will significantly influence the adoption and usage of an integrated health information system.*

3.6.2 Technology characteristics Towards Integrated Health Information Systems

The suitability of technology for a given activity is determined by both the technology, the user, and the setting (Larosiliere et al., 2017). The technological features were further described by Larosiliere et al. (2017) as the ICT used within an organisation to complete a task. The technological fit of the institution affects whether integrated health information systems are adopted. Mohammed et al. (2016) used the fit-reliability theory to design a model to analyse the

factors impacting the adoption of cloud computing as one of the options for implementing e-government services in developing countries. The study found that the technological characteristics that influence the adoption of IHIS include relative benefit, compatibility, complexity, trialability, and security. Similar to this, in their inquiry of electronic government maturity and its determinants, Larosiliere and Carter (2016) employed the Fit-Viability Framework to assess e-government maturity in various countries. The author's research indicates a more favourable relationship between fitness and technology, which benefits system usage overall. According to this study, technology can thus have a favourable impact on the acceptance and use of IHIS in Ghanaian hospitals. As a result, it is suggested that this investigation test the following hypothesis:

H2:Technology characteristics significantly influence the adoption and usage of integrated health information systems.

3.6.3 Digital Curiosity

"Digital curiosity" is the noble human driver or impulse towards better cognition, which inherently evolves and drives the acceptance and usage of technology that fits our daily work schedules (Gyrffy et al., 2020). The study adopted a mediating variable called "digital curiosity." The study sought to determine how significant digital curiosity mediates the relationship between technology fit and IHIS adoption, as well as the relationship between IT infrastructure and IHIS adoption. To investigate how health personnel were curious and anxious about new technology that would make their work easier, simpler, and more efficient, digital curiosity was added as a new construct to the viability side of the fit and viability theory. One of our strongest drivers for learning, making choices, and adopting new behaviours is curiosity, a key component of our cognitive function

(Presthus & O'Malley, 2017). First-wave adopters commonly emphasised how a technology would affect personnel, practise liability, workflow, and convenience of use, according to research by Jacobx et al. (2019). Their own pleasure and curiosity were also significant. We cannot undervalue the value of data and information in the success of today's modern business given the amount of time individuals spend globally absorbing information, whether through reading or using social media (Frankiewicz & Chamorro-Premuzic, 2020; Rich et al., 2019). Humans have an inherent demand for information that drives innovation, new thinking, and new ways of doing things (Hsu & Lin, 2018). Curiosity is often regarded by philosophers as a noble human trait. William James, a philosopher and psychologist, defined curiosity as the drive for higher intellect and insisted that it naturally develops. It can shape our intellect and our progress, which is why more leaders are re-thinking their own curiosity and how they can leverage it to shape their organisation for the future.

Digital curiosities can greatly affect the adoption and use of integrated health information systems, as demonstrated by Fang et al. (2018). It is also clear from the fact that IT infrastructure and technology compatibility have no appreciable direct impact on IHIS adoption. When digital curiosity served as a mediating factor between them and the dependent construct of IHIS adoption, both technology fit and IT infrastructure were seen as having significant influence on IHIS adoption and use, as discussed earlier. The study therefore hypothesises that;

H2a: Digital curiosity significantly mediate between technology characteristics and the adoption and usage of integrated health information systems.

3.6.4 Economic Viability Towards Integrated Health Information Systems

Economic viability, according to K. Mohammed et al. (2016), assesses whether a technology's economic advantages outweigh its economic costs. According to research by Agnihotri et al. (2017), economic stability and prosperity have a major influence on ICT adoption and use. The findings of Larosiliere et al. (2017) are compatible with Agnihotri et al. (2017). Economic viability is statistically significant in determining the viability of 56 organisations adopting and using new technology, according to Larosiliere et al. (2017). The study distinguished between explicit costs for implementing HIT, such as one-time software and hardware licencing and acquisition costs. Internal and external personnel costs for conducting the HIS implementation project, and implicit or opportunity costs, such as stroking costs, during the project phase, where HIS is implemented and integrated in an institutional environment (e.g., a national health system, a single healthcare organization, or a single department). Additional fixed costs, such as running and maintaining advanced infrastructure and providing support, Potential increases in variable costs, such as increased training requirements or recurring licencing and other external servicing fees, are examples of future usage phase viability constraints.

Adoption and integration of HIS in public health institutions in Ghana must be done taking into consideration the economic viability of investing in such a system. What would be the return on investment? Economic viability, according to Mohamed et al. (2016), assesses whether a given technology or application is cost-effective by assessing the extent to which the economic advantages of an accepted technology outweigh the economic costs. According to Tripathi and Nasina's (2017) research, both economic stability and prosperity have a substantial impact on the

adoption and use of information and communication technologies (ICTs). The claim made by Tripathi and Nasina in 2017 is in line with what Larosiliere and Carter discovered in 2016.

A study by Agnihotri et al. (2017) about the adoption of cloud computing in business found that the economic or financial standing was important to the adoption of technology. There must be an adequate budget for developing and maintaining new technology. For the project to be successful, special investments must be made in acquiring hardware and software for the adoption of technology (Agnihotri et al., 2017). The study also uncovered that it was necessary to hire employees with special expertise in order to adopt cloud computing. According to a 2016 study by Larosiliere and Carter, economic viability is statistically important in predicting whether a company should accept and use new technology. According to this study, it is presumed that a health facility's financial health affects how it adopts and uses IT systems in order to implement IHIS. For instance, a hospital that is financially secure and has sufficient or surplus cash is able to invest in modern digitization equipment or information technology. The study therefore hypothesises that:

> *H3: Economic viability significantly influences the adoption and usage of integrated health information systems in the public sector of Ghana.*

3.6.5 Age of Health Institutions

This section focuses on examining the influence and effect of the moderators (the age of the health institution) on the independent constructs (economic and organisational viability) and the dependent construct (adoption and usage of an integrated health information system). To determine the extent to which the age of health institutions influences their adoption and use of information

systems, this study adopted this variable to empirically test if the age of health facilities has any influence on the adoption of technology. Age was deployed as a moderating factor between IHIS adoption and the constructs of economic viability and organisational viability. This was done because the age of an organisation may influence that organization's willingness to adopt technology. Again, the economic wellbeing of a hospital might also be dependent on the age of that hospital. The study deployed this moderating variable to test if the age of the health institution would influence the relationship between the constructs of economic viability and organisational viability towards IHIS adoption.

H3a: The age of the health institution significantly moderates the relationship between economic viability and the adoption and use of an integrated health information system.

3.6.6 Organizational Viability Towards Integrated Health Information Systems

Organizational viability is defined as the readiness of the organisational resources that support the adoption of new information technology (Sánchez, 2017). Organizational viability is the supposed organization's ability to adopt a new technology or implement a new system, which is influenced by a set of structural factors (Mohammed et al., 2016). This context can be explained by the characteristics and resources of the firm. These include connections between employees, intra-firm communication processes, firm size, and the number of loose resources (F. Mohammed, Ibrahim, et al., 2017). Support from senior management and the level of IT knowledge of members of the organisation are factors that influence organisational IT adoption (Heyden et al., 2018).

Subsequently, Liang and Wei (2004) studied the adoption of mobile technology in business organizations. However, during the period of their study, there were few studies on how

organisations decide on adopting new (mobile) technologies and which factors determine the success or failure of adopting this new technology. Nonetheless, Liang et al. (2007) identified business process reengineering, user competence, and top management support as key influencers of an organization's readiness to adopt new technology. The authors further validated the FVT by stating that the viability of an organisation can aid in determining whether information technology is feasible in performing the required objective. Thus, this study presumes that the organisation plays a major role in ensuring the success of the adopted technology through the management and competencies of all members of the organization. A study about the adoption of cloud computing in a business found that it was important for companies to do business process reengineering if they wish to adopt a new technology (Agnihotri et al., 2017). User competence and top management support at the organisational level were key to the successful adoption of a new technology (Agnihotri et al., 2017). The study revealed that user competence in IT and cloud computing was vital to the success of adopting cloud computing.

The deployment of HIS must take organisational viability limits into account as well. According to Liang and Wei (2004), the willingness and ability of users are the most important predictors of organisational survival. This argument is supported by Liang et al. (2007), who emphasise the importance of user happiness and system utilisation for the success of IS implementations. Despite the fact that we agree that user happiness is critical for every IT project, we feel that user satisfaction and system utilisation are both outcomes of an HIS implementation. While low user satisfaction may limit the spread of a technology (no one wants to invest in something they do not completely believe in), it has no bearing on the first choice to invest in or not engage in it since no prior experiences with the technology have been had. Furthermore, user satisfaction and its

preceding inhibitors are already adequately reflected in the fit dimension's conception. In accordance with Turban, Liang, and Wu, we want to focus on elements that directly and a priori influence enterprise-level technology adoption decisions. Adherence to such standards is sometimes a key difficulty for many HIS initiatives, and it frequently determines the overall success of a rollout.

Aside from regulatory constraints, a healthcare organization's workforce's overall competency level is a key limiting issue (Geginat & Saltane, 2016). Although a lack of organisational competency can be mitigated to some extent by extensive training and/or external assistance (although at the expense of economic viability), much is still dependent on employees' and the company's capacity to learn about and engage with new technologies and processes (Al-Maatouk et al., 2020). Finally, whether a technology is embraced or not, senior management support is critical. This may be the case, for example, when senior management's objectives are not properly supported by the adoption of a new strategy. The study therefore hypothesises that:

H4: Organizational viability significantly influences the adoption and usage of integrated health information systems.

H4a: The age of a health institution significantly moderates the relationship between organisational viability and the adoption of integrated health information systems.

3.6.7 IT Infrastructure Viability Towards Integrated Health Information Systems

According to T. P. Liang et al. (2007), IT infrastructure comprises IT platforms and information services required for supporting the application. The authors added further that IT infrastructure

provides the foundation that supports technological operations and augments development within the organization. Empirical researchers who have used the FVT have observed how viable IT infrastructure impacts performance. Some of the studies include (Larosiliere et al., 2017; K. Mohammed et al., 2016; Yoo & Kim, 2019; Mohammed et al., 2016), for instance, studied the viability of IT infrastructure on technology adoption decisions by assessing the readiness with regards to IT infrastructure. The findings demonstrated that IT infrastructure is a viable metric for determining how new technology is used within an organization. Thus, this study presumes that IT infrastructure, when available and accessible, can significantly influence the adoption and usage of a new technology, since its availability encourages many to use the new technology.

Adoption of cloud computing in a business found that a company's IT infrastructure comprises software and hardware maturity, data management, and the competence of the information system (IS) staff (Agnihotri et al., 2017). The study uncovered that for cloud computing to be successfully adopted, organisations must have a qualified network management system in place. Organizations must also have established policies on data management and security if cloud computing adoption is to be successful. The study further revealed that the competence of the IS department must know the process well enough to implement cloud technology and must be experienced in system development and maintenance (Aceto et al., 2020). Adoption and integration of HIS in the public sector of Ghana must take into account the current IT infrastructure of public health institutions (Adu-Gyamfi, 2017). There are a number of technological limitations or constraints that might restrict the potential impact of an HIS investment (Afriyie et al., 2020).

The public health institution's present IT infrastructure, according to Turban, Liang, and Wu (2007) is a basic limitation to HIS implementation. It indicates that the availability and capacity of hardware components are crucial constraints. Another sticking point is the HIS software components themselves. Massive functional limitations (e.g., workflow engine flexibility), data management constraints (e.g., extensibility of the underlying data architecture), and representational constraints may stifle HIS adoption (e.g., the ability to customise user-specific views) (Shahbaz et al., 2019). According to Aier and Winter (2015) the new system must also be easily incorporated into the company's current IT architecture. Another important technological impediment in this regard might be the lack of particular coupling or decoupling procedures or interfaces. Turban and Liang (2015) also stress the importance of security constraints, such as the absence of efficient cybercrime and hacker protection techniques. This fourth requirement is, in my opinion, especially crucial for HIS that deal with sensitive and confidential data, such as patient electronic health records, health insurance, or public clinical data (Lee & Yoon, 2017). This study thus postulates that when there is basic IT infrastructure in place, it influences stakeholders to improve upon the already existing infrastructure with time (Ahuja et al., 2016). Hence, the study hypothesis is that:

H5: Information technology infrastructure significantly influences the adoption and usage of integrated health information systems.

H5a: Digital curiosity significantly mediates the relationship between IT infrastructure viability and the adoption and usage of integrated health information systems.

3.6.8 State Policy

A study by Gautier and Ridde (2017) revealed that, for a country to achieve universal health coverage through technology, the policy of the government was key. The study uncovered that the

government must own policies and actively participate in implementing and enforcing them. The study further revealed that donors to the country must not be the ones forcing the government to go a certain way regarding policy. The state itself must have the will and direct policy towards achieving universal health care through the adoption of technology. Another study by Paksi (2020) about the politics of ownership in policymaking revealed that policy was very important for any country that wanted to achieve universal health coverage. Policies must not be populist but instead be rational and tailored to the needs of the country. Policy must be focused on upgrading healthcare services and re-establishing the healthcare system. Both studies stressed the need for governments to drive universal health care coverage through well-thought-out policies. It was evident that policy is key to any adoption of technology.

State policy is a set of basic principles, norms, and activities for the implementation of state power. It includes frameworks and guidelines for implementing or introducing a new programme by the state, such as IHIS. State policy was added to the original FVT theory because we cannot ignore the influence of government or the state in the IHIS adoption by the health sector of Ghana, which is administered by the state. The state plays a critical role in terms of policy formulation, setting guidelines and frameworks for the successful adoption and usage of information systems in the public sector (Li, 2017; Paksi, 2020). It is important to look at how these policies, frameworks, and guidelines affect the successful adoption and use of IHIS.

Policy can make or break the adoption of IHIS (Li, 2017). Favorable policies in terms of the security of data and punishment for abuse, hacking, or misuse of electronic medical records of patients will steer public confidence in the system (Essuman et al., 2020). Because the study

adopted the FVT approach, it will be prudent to access the general state policy on IT adoption and how these policies affect the adoption and use of information systems, especially in a critical and sensitive sector like health where people's personal health records will be collected, stored, and used for policy making and other purposes. These stored records will be shared among health institutions and must be done securely. All of these must be controlled by policy and guidelines. In every organization, external factors influence their daily activities and how tasks are carried out. The overall information technology policy of the government will significantly have a bearing on the implementation of a new integrated health information system in Ghana since this study is focusing on the public health sector, which is being run by the government (Essuman et al., 2020). The government must be willing and able to integrate the learning of this new system into the curriculum of health workers so that they already get trained on the usage of the system before becoming part of the hospital setting.

A lot of investments must be made into equipping the public health institutions with modern technological devices so as to host the new integrated health system (Essuman et al., 2020). Computers, laptops, servers, tablets, internet connections, and many other items would be needed to enable health institutions to make effective use of the new system. Policy must be guided in a way that will not derail or hamper the smooth progress of the transition from the old system to the new system. Again, there must be adequate training of staff who are already in the field to become conversant with the new system, and there should be some excitement of digital curiosity about the new system to enable people to embrace and appreciate its effectiveness and how it will, in the long run, simplify work and increase productivity (Essuman et al., 2020). Hence, the study hypothesis is that:

H6: General State policy on information technology adoption and usage significantly influence the adoption and usage of integrated health information systems.

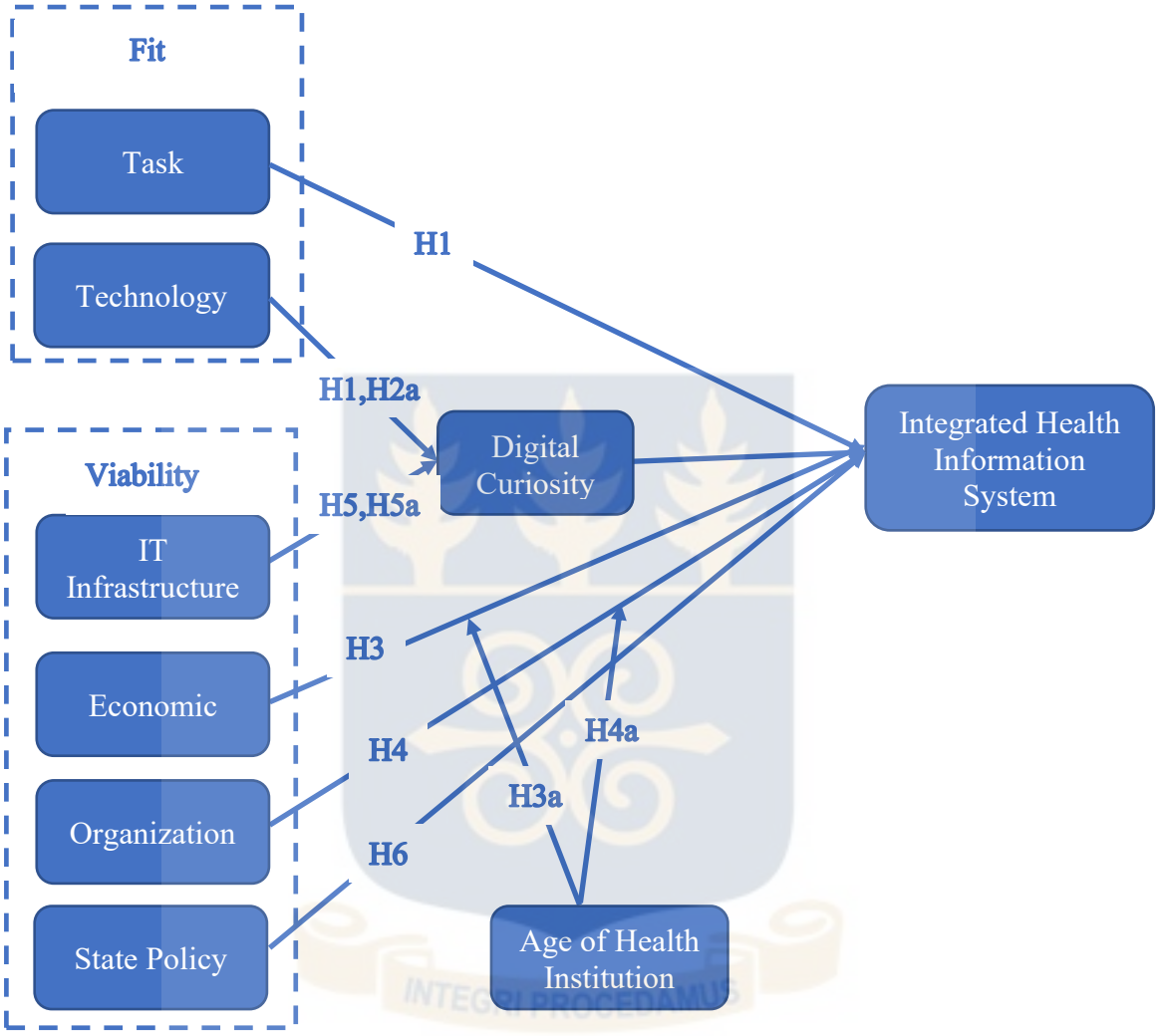


Figure 3. 2 **Conceptual framework of the Research**

3.7 Chapter Summary

This chapter began with a discussion on how the selected theory, the Fit-Viability Theory (FVT), evolved from the Task Technology Fit framework. A conceptual model for the study was developed based on the fit-reliability theory. Additionally, hypotheses were postulated to further guide the study.

CHAPTER FOUR

METHODOLOGY

4.1 Chapter Overview

The fit-viability theory was discussed in the preceding chapter, which focused on the study's theory and hypothesis development. This chapter discusses the data collection process, as well as the tools used in data collection, analysis, and quality standards. Finally, the chapter examines sampling-related concerns and clarifies the construct measure that was employed in the research. The research paradigm, research method, data collection method, sampling, and data analysis approach employed in the study are thus the focus of this chapter.

4.2 Research Paradigm

Research is founded on philosophical assumptions about the researcher's view or understanding of reality (Wyllie, 2019). A research paradigm, according to the literature (Budu & Boateng, 2020; Leavy, 2017; Nielsen, 2019), is a "common set of ideas, attitudes, and methodologies that works as a guide or map, specifying the types of issues scientists should explore and types of solutions that are acceptable to them." According to Zahran (2019), the research paradigm sets the underlying philosophical assumptions that describe what type of study is acceptable and what suitable methodologies may be employed in the research. The distinctions between or among research paradigms, according to (Creswell, 2009), are due to the collection of taxonomies that come together to constitute the paradigms. Ontology, epistemology, and methodology are three essential dimensional paradigms that underpin the differences between various philosophical beliefs (Iivari et al., 1998; Reyes et al., 2011).

While different research paradigms exist, such as critical realism and interpretivism, this research is based on the positivist paradigm. In this paradigm, hypotheses are formed from existing theories using measurement variables. Knowledge is only valid, according to the positivist paradigm, if it is based on observations of external reality (Kankam, 2019). The positivist paradigm also claims that theories may be utilised to predict research findings by describing the connection between dependent and independent factors. According to Kar et al. (2019), positivism is founded on the validity of values and facts obtained from theories and assessed empirically through quantitative processes. The positivist research paradigm, according to Cuthbertson et al. (2020), exists not just in the real world, which exists outside human cognition. It also exists in the acquisition of impartial knowledge of reality (Wahyuni, 2012), which found that positivist assumptions about the generalizability of a research's findings may be transferred across similar study environments.

The positivist paradigm, according to Park et al. (2020), aids the researcher in determining consistencies and other types of linkages between notions through reality manipulations. According to Leong et al. (2019), positivism allows researchers to investigate things empirically and then explain them using logic. According to the study, either positivism or consistency with data acquired utilising the respondent's knowledge aids in the standard assessment of the validity of a scientific theoretical prediction. Furthermore, the study is guided by the use of partial least squares structural equation modelling (PLS-SEM) to analyse the data collected from the respondents and to test and draw some hypotheses using the Fit and Viability Theory (FVT) in the context of the adoption of IHIS in the public health sector of Ghana.

4.3 Research Methods and Design

The pattern for obtaining, arranging, and interpreting data to produce relevant study conclusions is known as a research design (Creswell, 2009). Scientific researchers utilise two sorts of research processes (Creswell, 2009). The qualitative and quantitative research approaches are as follows: The qualitative research approach is used to investigate the complex nature of a phenomenon in order to comprehend and describe it from the perspective of the participants (Ofosu-Ampong, 2020).

The quantitative research approach used in this study was a survey. According to Kolog and Montero (2018), the use of a survey in quantitative research provides an in-depth quantitative description of the opinions of a population by analysing a sample of that group. Aside from the quantitative technique's suitability for this research's environment, another rationale for picking it over the other ways is that it will discover conclusive proof of the study rather than merely supplying information, as suggested by the qualitative method (Venkatesh et al., 2013). Because of the short time frame for this study, a survey technique was used to investigate the factors of social network utilisation for collaborative learning in higher education institutions.

The quantitative research approach is used in this study to investigate the correlations between variables in order to understand, predict, and regulate a phenomenon. The positivist paradigm is linked to the quantitative research approach (Kolog & Montero, 2018; Myers et al., 2004; Park et al., 2020). Because this study contains numbers and values, statistical tools and software packages such as SPSS, PLS-SEM, AMOS, and others are critical tools used in quantitative research (e.g., Adeleke1 et al., 2015; Alhassan, 2020; Straub et al., 2004).This is cross-sectional research that

uses questionnaires to collect data and generalise results from a sample to a population (Pynoo et al., 2011). This study adopts the positivist paradigm and a quantitative approach to help achieve the purpose of the study. According to Brierley (2017), positivists believe that researchers can acquire objective knowledge of reality and the existence of reality that is beyond human cognition. Gamlen & McIntyre (2018) define positivism as the intent of a researcher to form an association between the elements of reality and the management of reality with a single independent variable.

Additionally, the study analysed the gathered data with partial least squares structural equation modelling (PLS-SEM) to assess how fit and viable Ghana's public health sector is for the adoption of an integrated health information system. The system will manage the country's public health data by connecting all public hospitals to a single platform. The health information system will be used to manage the daily processes of all public health institutions and its daily work processes, while drawing on the hypotheses postulated earlier. With regards to positivism, the measuring standard in determining the validity of a scientific theory is achieved when theoretically based predictions are coherent with information gathered using one's senses (Siponen & Tsohou, 2018).

Numerous research studies on information systems have used and continue to employ the positivist paradigm. According to Heeks & Ospina (2019), there is still a considerable prevalence of positivist research studies in the IS literature. Similarly, many academics believe that positivist research dominates 81 percent of empirical IS research published (Lam et al., 2020; Siponen & Tsohou, 2018). The positivist paradigm was used for this study because it promotes using organised measuring standards to deduce objective judgments when performing research (Abbas et al., 2020). The paradigm is important in this research. As Siponen and Klaavuniemi (2021) point

out, it is a step in the right direction for providing grounded information through quantification and objectivity. According to the previous definitions, objectivity indicates that the researcher and the thing being studied are not the same (Aspers & Corte, 2019). Similarly, the positivist paradigm is used to fully comprehend the experiment and observations. Positivism enables the investigation to get scientific data objectively. As a result, the positivist paradigm is thought to be acceptable for this study.

According to Sovacool et al. (2018), "research design" refers to the steps involved in acquiring, organizing, and blending data in order to achieve the intended outcomes, or study findings. According to Agwu Kalu et al. (2018), "research methodology" is the systematic and theoretical evaluation of the procedures employed in an area of study to collect data in order to investigate a phenomenon. As a result, study design is a comprehensive approach that specifies how data will be gathered and analysed, as well as where and when data will be collected. According to Sovacool et al. (2018), social science researchers use two types of research approaches. These include both qualitative and quantitative methodologies. Levitt et al. (2018), however, added the mixed method as a third technique. The positivist worldview is most closely related to the quantitative method of answering inquiries about measurable variables. This method can be combined with statistical analysis to anticipate and explain a phenomenon (Kumatongo & Muzata, 2021). Furthermore, the quantitative method is linked to numerical data measurement, hypothesis testing to confirm or reject a problem, and data generalisation to explain the cause-and-effect relationship of a phenomenon (Alharahsheh & Pius, 2020).

Furthermore, Rahi et al. (2018) explained that the survey approach uses statistics to describe a population's attitudes and views by studying and monitoring a sample of the entire population. As a result, based on the findings of the studied sample, the researcher may generalise and make estimates about the entire population. The arguments for choosing a quantitative strategy include the fact that, unlike qualitative and mixed method methods, the quantitative technique fits the study in context and aids in the extraction of irrefutable evidence rather than simply supplying data (Bae & Lai, 2020).

4.3.1 Questionnaire Design

The survey questionnaire was created using the hypotheses developed and the research questions stated in previous chapters. To stimulate replies from respondents to the study, the questionnaire was separated into three distinct portions. Section A was created specifically for the respondents' demographic information. This comprises questions on gender, age, level of education, experience, rank, department, specialty, and experience gathered from the usage of any health information system, be it integrated or segregated. The second part concentrated on the benefits and challenges of using health information systems. It delves into how the integration of these health information systems with other public health facilities will aid in improving healthcare delivery, speed of delivery, and the efficiency of services rendered within public hospitals in the country. It also looked at the bottlenecks in the health information systems being used. Ethical issues like policy issues, privacy issues, level of access, ease of use, complexity, and the overall value addition of the use of the system to deliver improved and efficient healthcare services for the clients The use of the system to generate reports that public health officials can use to manage, predict, and formulate public health policies The third and final section of the questionnaire asked respondents

a series of questions based on the theory's construct, using a five-point Likert-type scale, with 1 indicating "strongly disagree," 2 indicating "disagree," 3 indicating "neutral," 4 indicating "agree," and 5 indicating "strongly agree." With multivariate analysis, the Likert-type scale has been shown to generate reliable and consistent findings (Maher et al., 2018).

Table 4. 1 Constructs and the number of questions used in this study

Constructs	Questions	Reference/Adapted from
Task-fit	7	(Yoo & Kim, 2019)
Technology fit	6	(Larosiliere et al., 2017)
Economic viability	6	(Agnihotri et al., 2017)
IT Infrastructure viability	7	(Yoo & Kim, 2019)
Organizational viability	6	(F. Mohammed et al., 2017)
State policy	6	(Larosiliere et al., 2017)
Use of IHIS	4	(Yoo & Kim, 2019)
Digital curiosity	5	(Yoo & Kim, 2019)

4.4 Participating Settings

The respondents for the questionnaire included health professionals ranging from doctors, general nurses, midwives, pharmacists, OPD personnel, laboratory technicians, and public health officials. This was done to enable the researcher to understand how they rate the health information system being used, its benefits and bottlenecks, and how integration of this system with other public hospitals will aid in the efficiency of services delivered. Again, these people were carefully selected to ascertain how IHIS adoption would improve their internal processes. how the selected

people can help in the sharing of critical health data or electronic health records of patients within public hospitals. The fit-reliability theory (FVT) was used to generate reports for public health policies in Ghana's public sector. The respondents were chosen from public hospitals within the Greater Accra Region.

4.5 Sampling Procedures

In research studies, a sample is a portion of the overall population that the researcher uses to represent the complete population in a study (Mweshi & Sakyi, 2020). The researcher uses sampling to gather some hidden knowledge about the population under study, which aids in making conclusions and predictions about the wider public (Rahi et al., 2018). A good study sample, according to Maher et al. (2018), is one whose gathered and analysed data findings are consistent with those of the full population if collected and analysed using the same methodologies. As a result, in order to attain consistency and dependability in the results, the researcher must scrutinise the sample size employed in the study (Maher et al., 2018).

Furthermore, the PLS-SEM principles were seen to aid in obtaining sample adequacy. In PLS-SEM, the rule of 10-fold specifies the smallest sample size that may be utilised for every investigation (Kock & Hadaya, 2018). According to the guideline, the number of respondents (sample size) who reflect the population in research should be six times more than the construct with the most questions (Kock & Hadaya, 2018). With nine (9) indicators, the Task-Fit variable is the construct with the most indicators in the research framework. According to the "10-times rule," the smallest sample size for this study is 7 * 10 = 70. As a result, the study requires a minimum of seventy (70) replies.

The sampling methodology utilised for this study was a non-systematic approach called purposive sampling after the minimum sample size required was established. (Creswell, 2009) defines sampling as a statistical technique used to choose a set number of individual observations from a population in order to learn about the issues that the population is concerned about and base predictions on the sample. Because samples were chosen for this study based on its objectives and the belief that each participant would provide the study with unique and useful information, the purposive sampling strategy was employed (Liu et al., 2014).

However, the study received a total of 466 answers, considerably above the "10-times" rule's minimum sample size requirement. Furthermore, due to the large number of public hospitals within the country it will be difficult to administer questionnaires to all public health officials and healthcare workers all over the country. So the responses from some public hospitals within the Greater Accra Region served as sample and administering questionnaires to them will serve as adequate sample size for the study.

4.6 Data Collection Method

Data collection is the process of acquiring data and relevant information that is important to answering the questions posed at the start of this study (Flick, 2018). There are two types of data collection sources: primary and dependent data collection sources (Boateng et al., 2016). Primary sources, according to the author, include personal interviews, whereas contingent sources rely heavily on documentation, archival data, and physical artefacts (Boateng et al., 2016). Only primary data sources were employed in this investigation. The information was collected in three

phases. This was accomplished by creating a survey instrument, establishing a sampling frame, and assigning questionnaires to respondents.

Google Form questionnaires were used to collect information. The questionnaire was designed using the study's identified ten (10) hypotheses. This procedure was followed to ensure that the questionnaire asked the correct questions in order to answer the research questions. The information was gathered from healthcare workers or personnel, including public health professionals, at selected public health facilities within Ghana. Information about their use and experience with health information systems, as well as how these systems can help improve healthcare delivery and shape public health policy when they are integrated. The questionnaire was sent via email and other digital platforms like WhatsApp to the targeted sample size and was designed using Google Forms. Responses were limited to one per person, and data was collected from respondents from July to August 2022.

4.7 Method of Data Analysis

Following the receipt of replies from the research participants, the study's next phase involved organizing, summarizing, and analysing the collected data in order to draw conclusions. (Chu & Ke, 2017) define data analysis as "probing through the data to remove undesired information." Modifying and re-modelling the acquired data to communicate vital information that leads to the solution of the research question. With this information, the questionnaire was double-checked to confirm that all of the replies were correct and that all of the pertinent questions had been addressed.

The data was then coded and structured into a composite construct using the Statistical Package for Social Sciences (SPSS) program. The empirical analysis of the coded data was done using Smart-PLS software. Data analysis covers a wide range of topics and includes methods and techniques for describing facts, detecting patterns in large amounts of data, developing explanations, and testing ideas (Jebb et al., 2017). Structural Equation Modeling (SEM) is a statistical framework that models complicated interactions between direct and indirect observable variables, according to Molwus et al. (2017). It includes a number of multiple regression models that may show variables as both predictors and responses. Other quantitative analysis techniques include analysis of variance (ANOVA), multivariate analysis of variance (MANOVA), correlation, and multiple regression.

AMOS, Mplus, LISREL, and other computer applications are used in the covariance-based SEM, or CB-SEM. Similarly, partial least squares (SEM) employs the computer tools Smart-PLS and ADANCO to analyse variances (Hair et al., 2019). The PLS-SEM technique was used in this investigation because its procedures aid in characterising the study's facts, discovering patterns within the wide data set, and developing explanations (Rouf & Akhtaruddin, 2018). PLS-SEM may also examine the link between the dependent and independent variables, utilising effect magnitude and predictive relevance, which are not available in other quantitative analyses.

When using PLS-SEM, the evaluation of the measurement model comes first, followed by any further analysis procedures. This exercise aids in the comparison of the established framework with the data obtained from respondents. In PLS-SEM, different criteria are utilised to measure reflective and formative constructs (Hair et al., 2019). Before assessing the structural model, the

study included reflective components as well as a test of the measuring model's reliability and validity. The study evaluated indicator reliability, internal consistency for reliability, convergent validity, and discriminant validity by ensuring the use of standard judgement methods (Hair et al., 2019).

After verifying the measurement model, Hair et al. (2019) recommend assessing the structural model of the construct using the five critical phases. The procedure is as follows: first, an assessment of collinearity in the structural model, then an assessment of the structural model's significance and relevance. Next, an assessment of the data's goodness of fit (GOF) will be made, followed by an assessment of effect size (f-square) and predictive relevance (q-square). Finally, multi-group analysis was used to determine the independent and dependent constructs' moderating influence on the moderator (age of the health institution) and a mediating variable (digital curiosity).

4.8 Ethical Considerations

The researcher adhered to all ethical standards, such as informed consent, confidentiality, and disclosing the study's implications. The objective of the study was made clear, and the respondent's private information was kept private. There was no harm done to participants in this study as a result of any action or inaction on the part of the researchers (including embarrassment, stress, discomfort, or pain). The researcher respects the right of participants to decline participation (at any time) and maintains objectivity throughout the stages of data collection, analysis, and reporting. It should also be mentioned that the researcher has an ethical duty to adhere to scientific procedures in order to draw inferences and implications from the study. The research's underlying

problem was precisely stated by the researcher. The theoretical literature review supports the problem and is supervised by a lecturer. It was not possible to compromise the research design, intentionally use statistics, fabricate data, change the research findings to suit hidden goals, or misinterpret the research findings when creating this report.

4.9 Chapter Summary

The research methodologies utilised to answer the study's research questions were discussed in this chapter. The research paradigm was examined, as well as the research technique, sampling methodology, data collection, and analytic process.

CHAPTER FIVE

RESULTS AND ANALYSIS

5.1 Chapter Overview

This chapter focuses on the analysis of the data gathered for the study from four hundred and sixty-six respondents. This data spans many hospitals within Ghana, including Medical Doctors, Pharmacists, Nurses, Midwives, Laboratory Technicians, Records Office Personnel (OPD), and Public Health Personnel. The questionnaire collected responses on the demographics, general knowledge about health information systems, and five-point Likert scale questions on the constructs of the research framework. The results were then analysed using the Smart PLS-SEM. The entire analysis was grouped into three parts. The first part looked at the demographics, while the second part looked at the respondents' general knowledge of integrated health information systems. The third part of the analysis used structural equation modelling to evaluate the model and hypotheses postulated in Chapter 3 of this study.

5.2 Demographic Variables of Respondents

A total of four hundred and sixty-six (466) responses were received spanning various public hospitals in Ghana. The demographics include gender, age, level of education, profession, years of experience, and computer literacy. Table 5.1 shows a breakdown of the demographic profile of the respondents.

Table 5. 1 Distribution of respondents' demographics

Demographics	Characteristic	Frequency (N=466)	Percentage (%)
Gender	Male	240	51.5
	Female	226	48.5
Age	18 – 30 years	215	46.1
	31 – 45 years	153	32.8
	46 – 60 years	99	21.2
Level of Education	No Formal Education	10	2.1
	Primary/JHS	4	0.9
	SHS	6	1.3
	Diploma/HND	120	25.8
	Bachelor's Degree	150	32.2
	Master's Degree	100	21.5
	Doctorate Degree	76	16.3
Profession	Nurse/Midwife	147	31.5
	Doctor	123	26.4
	Pharmacist	69	14.8
	Laboratory Technician	70	15
	Records Office	29	6.2
	Public Health Personnel	23	4.9
	Others	1	0.2
Computer Literacy	Computer Literate	462	99.1
	Computer Illiterate	2	0.4
	Somehow	2	0.4

Source: Author's Construction

Of the four hundred and sixty-six (466) responses received for this study, two hundred and forty (240) were males, representing 51.5%, and two hundred and twenty-six (226) were females, representing 48.5%. Gender was well managed in the questionnaire administration by making sure that we maintained a balance of females as against males through targeted sampling. This was to know the perspectives of both sexes in the study, which will allow us to know the degree of skewness towards any particular gender set. Two hundred and fifteen (215) respondents were between the ages of eighteen (18) and thirty (30), representing 46.1%, while one hundred and fifty-three (153) were between the ages of thirty-one (31) and forty-five (45), representing 38.2%. Ninety-nine of the respondents were between the ages of forty-six and sixty, representing 21.2%.

Ten (10) respondents indicated they had no formal education, representing 2.1%, and four (4) stated they had primary or JHS education, representing 0.9%. Six (6) respondents, representing 1.3%, had an SHS education, while one hundred and twenty (120) respondents, representing 25.8%, had a diploma or HND. One hundred and fifty (150) respondents had a bachelor's degree, representing 32.2%; one hundred (100) had a master's degree, representing 21.5%; and finally, seventy-six (76) respondents had a doctorate degree, representing 16.3%.

One hundred and forty-seven (147) of the respondents were nurses or midwives, representing 31.5% of the total; one hundred and twenty-three (123) were doctors, representing 26.4% of the total; and sixty-nine (69) were pharmacists, representing 14.8% of the total. Laboratory technicians who participated in the study were seventy (70), representing 15%; records office personnel had twenty-nine (29) respondents, representing 6.2%; the public health personnel category had 23 responses, representing 4.9%; and others had one (1) response, representing 0.2% of the total responses. The years of experience of every respondent were recorded and categorised into four groups. Four hundred and sixty-two (462) of the respondents were computer literate, representing 99.1%; two (2) were computer illiterate, representing 0.4%; and two (2) said they were somehow literate in computing, representing 0.4%.

5.3 General Knowledge of Health Information Systems

Four hundred sixty-two (462) respondents, or 99.1%, claimed knowledge of health information systems, while four (4), or 0.9%, claimed no knowledge of health information systems. Four hundred and fifty-nine (459), representing 98.5 percent, said they had actually used a health information system before, and seven (7), representing 1.5 percent, said they had not used the

system before. Three hundred and three (303) of the respondents, or 65%, believed that the number of years a health institution has been in operation was a factor in the adoption and use of integrated health information systems.98.9% of the respondents believed the IT policy of the state had a significant influence on the adoption and usage of integrated health information systems, but 1.1% disagreed. One hundred and seventy-one respondents (36.7%) said they had used health information systems after the age of five. Two hundred and seven, or 44.4%, had used it for three to four years, eighty-one, or 17.4%, for less than two years, and seven, or 1.5%, had never used any health information system before.

5.4 Descriptive Statistics

The researcher assesses the descriptive statistics for each item to determine the mean, standard deviation, excess kurtosis, and skewness. By adding up the values of each element in the data stack and dividing the result by the total number of data inputs, the mean (average) is obtained. The position of the dataset or its overall picture is measured using the mean (Paliy & Shankar, 2016). The standard deviation serves as a gauge of the data's variance from the mean. A standard deviation that is close to zero (0) implies that data points are in close proximity to the mean, and similarly, a high or low standard deviation indicates that data points are respectively above or below the mean, according to Ho et al. (2015). "The skewness evaluates how symmetrical a variable distribution is." A variable's response distribution is said to be skewed if it tends to the right or left tail of the distribution.

Kurtosis is a gauge of how peaked the distribution is (Hair et al., 2017). The pattern of answers is regarded as normal when both skewness and kurtosis are zero. A typical rule of thumb for

skewness is that a distribution is considered severely skewed if the number is greater than +1 or lower than -1. "For kurtosis, the usual rule is that the distribution is too peaked if the number is bigger than +1." Similarly, an overly flat distribution has a kurtosis less than -1.Distributions with skewness and/or kurtosis over these limits are taken into consideration (Hair et al., 2017). The descriptive statistics used to test the variables that affect the adoption and use of integrated health information systems in health facilities in the public sector of Ghana are shown in Table 5.2. The summary of the variables' indicators is shown in the descriptive table. TAF (Task Fit), TEF (Technology Fit), EV (Economic Viability), IT (IT Infrastructure Viability), OV (Organizational Viability), SP (State Policy), DC (Digital Curiosity), and IHIS (Use of Integrated Health Information System).

Table 5. 2 Descriptive Statistics

Measure	Mean	Standard Deviation	Excess Kurtosis	Skewness
TAF	33.521	3.372	4.802	-10.709
TEF	28.306	2.827	8.236	-8.106
EV	27.951	3.05	6.047	-7.269
IT	32.119	3.647	2.925	-5.849
OV	28.339	3.121	13.827	-12.066
SP	28.693	2.692	39.474	-12.961
DC	28.884	2.686	2.740	-4.348
IHIS	18.928	1.909	14.838	-6.786
AOHI	1.650	0.477	-1.607	-0.632

Source: Author's construction

***Where TAF** - Task Fit, **TEF** - Technology Fit, **EV**- Economic Viability, **IT** - IT Infrastructure, **OV** - Organizational Viability, **SP** - State Policy on IT, **DC** - Digital Curiosity, **IHIS** - Use of Integrated Health Information Systems.*

5.5 Model Assessment

5.5.1Assessment of Measurement Model

According to Sarstedt et al. (2021), analysing the indicator loadings is the first step in evaluating the PLS-SEM measurement model. The assessment model's measurement gives the researcher the chance to compare the study's data with the chosen theory (Rasoolimanesh et al., 2021; Hair et al., 2021). Since every construct in this study is reflective, it is necessary to evaluate the measurement model's validity and reliability before evaluating the structural model. By following the general guidelines for each assessment model, the indicator reliability, reliability of internal consistency, convergent validity, and discriminant validity were all evaluated.

5.5.2 Indicator Reliability

The indicator reliability was initially tested during the PLS-SEM analysis, according to Sarstedt et al. (2021). Any indicator loadings below the threshold of 0.70 are removed from the list. Indicator loadings above 0.70 are preferred by researchers. This is because they demonstrate that the construct, latent variable, research question, or hypothesis accounts for more than 50% of the variation in the indicator. This demonstrates that the indicator loading is adequate in terms of item reliability, according to Sarstedt et al. (2012). When the PLS algorithm was first performed for this investigation, not all of the initial indicator loadings were properly loaded onto their associated latent variables. As a result, the variables with less than 0.70 were eliminated, and the analysis was rerun starting with the least significant variable until only those variables remained that met the criteria. Variables EV06, OV04, OV06, AOHI01, and AOHI02 all had indicators of less than 0.70, so they were removed. Results were extracted for the evaluation and measurement of the structural model after removing indicators that had loadings of less than 0.70 and maintaining the remaining

indicators with values greater than or equal to 0.70. After deleting the variables whose loadings fell short of the 0.70 threshold and rerunning the PLS-SEM algorithm, the indicator loadings are shown in Figure 5.1 below.

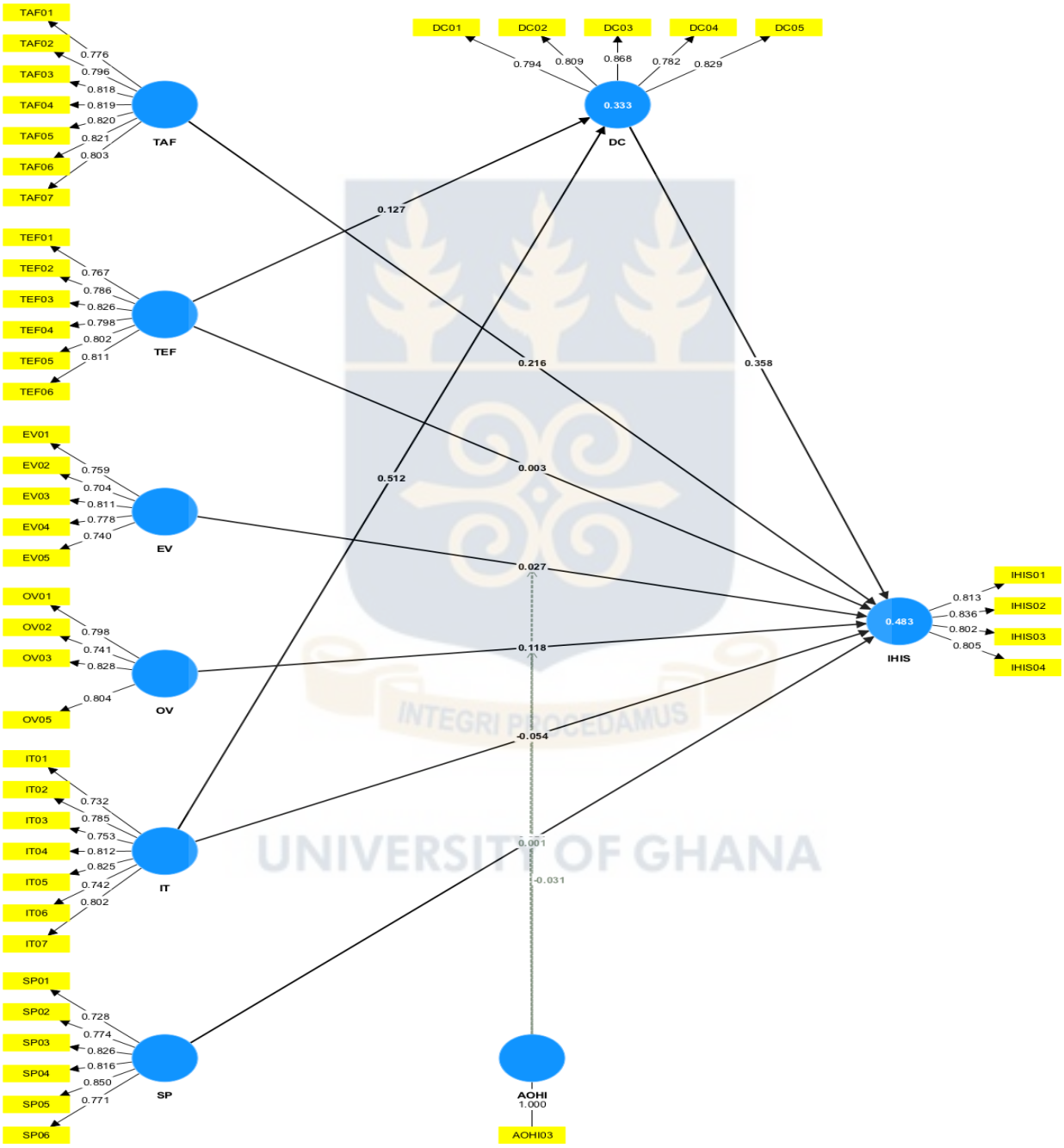


Figure 5. 1 Results of PLS analysis

5.5.3 Construct Reliability and Consistency

The internal consistency reliability test comes after the indicator loading accuracy test. Utilizing Cronbach's alpha and rho values, previous studies have reported on internal consistency reliability. However, subsequent research has criticised the Cronbach alpha and Rho A values for not being accurate for measuring internal reliability, suggesting that composite reliability instead be employed (Richter et al., 2016; Hair et al., 2019; Sharma et al., 2019). For instance, Cronbach Alpha has received criticism for producing lower values because of its unweighted components (Sharma et al., 2019; Shiau et al., 2019; Sarstedt et al., 2020). In contrast to Cronbach alpha and Rho A, the composite reliability implies that each indicator is unique and, as a result, has a separate loading (Hair et al., 2019). This makes composite reliability a preferred metric for indicator dependability (Kumar & Purani, 2018; Hair et al., 2019). As a result, a composite reliability was used in this study to evaluate the indicator items' internal consistency, as shown in Table 5. 3: Construct reliability and validity.

In terms of composite reliability, higher values correspond to higher levels of reliability. As a result, values in the range of 0.60 to 0.70 are seen as suitable for exploratory study. Additionally, results for composite dependability between 0.70 and 0.90 are considered satisfactory and good, respectively. While values of 0.95 and above are seen as problematic, this just signifies that the measuring pieces are larger than necessary. As a result, construct dependability is reduced (Sarstedt et al., 2021).The findings for the composite reliability values in this study vary from 0.869 to 0.929, which can be translated as satisfactory to good. This study reported on the values of composite reliability based on the aforementioned considerations. The Rho A is also suggested as a good substitute for the composite reliability as a way to measure reliability precision in the

SEM-PLS model (Dijkstra & Henseler, 2015). Variables with values of 0.70 and higher are suggested for inclusion and acceptance in the Rho A.

Table 5.3's construct reliability and validity provide evidence for this since all of its Rho A values are greater than the required minimum of 0.70. The outcomes for composite reliability and AVE values are displayed in Table 5. See "Construct Reliability and Validity" below. Construct reliability and validity rho A findings are provided in SmartPLS-SEM 4's "Quality Criteria" output report. Additionally, this matrix offers output information on Cronbach's alpha (CA), composite reliability (CR), and average extracted variance (AVE). The fact that these reliability metrics are shown together is helpful since a value of rho A between Cronbach's alpha and composite reliability is a reliable indicator of dependability. The measures are shown side by side, with rho A between CA and CR, on the data output report. This is useful for figuring out whether the value, which is between the CA and CR values, is good. The output information is particularly beneficial because it intuitively displays the data in green for good results or red for inadequate results.

Table 5. 3 Construct Reliability and Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
DC	0.875	0.876	0.909	0.667
EV	0.816	0.819	0.872	0.577
IHIS	0.830	0.830	0.887	0.663
IT	0.892	0.895	0.915	0.608
OV	0.803	0.809	0.871	0.629
SP	0.883	0.890	0.911	0.632
TAF	0.911	0.915	0.929	0.653
TEF	0.886	0.889	0.914	0.638

Source: Author's Construction

5.5.4 Convergent Validity

Convergent validity tests confirm the existence of relationships between constructs that are predicted to be connected (Hair et al., 2019). A subclass of construct validity is convergent validity. Construct validity is a measure of how accurately a test captures the idea it was intended to capture. Convergent validity is a little more complex because it assesses the reality of relationships between constructs that, in theory, ought to be related to one another. (Fornell and Larcker, 1981) used the Average Variance Extracted (AVE) to analyse all of the items associated with the specific assessed construct in order to explain convergent validity (Sarstedt et al., 2021).The AVE's cut-off value is 0.50, which means that 50% of the construct's item variability is explained by it, making convergent validity acceptable (Hair et al., 2019). The AVE values used in this investigation are shown in Table 5.3 above. The fact that all of the study's values are higher than the cut-off point of 0.50 indicates that the study's convergent validity was attained.

5.5.5 Discriminant Validity

The discriminant validity phase is the fourth stage in evaluating the measurement model. Discriminant validity is defined as "the amount to which a construct is actually distinct from other constructs by empirical standards" (Henseler et al., 2015). This means that the researcher must guarantee that the components were included in the phenomenon and were labelled uniquely from one another to prevent replication of other constructs in the model, as stated in Table 5.4, in order to assess the discriminant validity.

Cross-loadings and the Fornell-Larcker criterion were previously proposed as the two primary methods for assessing discriminant validity in a model. The outer loading indicators should not be

less than their correlations (cross-loadings) on other constructs, using cross-loading as the initial method. Cross-loadings that exceed the outer loading indications contradict the discriminant validity requirements and do not accurately reflect the outcomes of discriminant validity. As shown in Table 5.4, the correct way to report cross-loadings is to express the rows with the indicators and the columns with the constructs (i.e., the latent variables) in a table format. As a result, the current study's findings in Table 5.4 provide an appropriate analysis of cross-loading that achieved discriminant validity.

Table 5. 4 Indicator Items Cross-Loadings

	DC	EV	IHIS	IT	OV	SP	TAF	TEF
DC01	0.794	0.278	0.402	0.482	0.225	0.316	0.246	0.211
DC02	0.809	0.32	0.417	0.451	0.218	0.32	0.225	0.278
DC03	0.868	0.348	0.455	0.463	0.270	0.357	0.237	0.254
DC04	0.782	0.395	0.498	0.432	0.321	0.357	0.314	0.36
DC05	0.829	0.359	0.470	0.481	0.279	0.348	0.253	0.280
EV01	0.329	0.759	0.337	0.479	0.405	0.330	0.392	0.514
EV02	0.445	0.704	0.297	0.595	0.289	0.242	0.366	0.422
EV03	0.313	0.811	0.325	0.466	0.37	0.369	0.466	0.535
EV04	0.297	0.778	0.339	0.44	0.299	0.356	0.345	0.407
EV05	0.208	0.740	0.296	0.372	0.436	0.406	0.323	0.435
IHIS01	0.442	0.349	0.813	0.303	0.406	0.466	0.378	0.392
IHIS02	0.483	0.353	0.836	0.319	0.379	0.428	0.358	0.326
IHIS03	0.393	0.311	0.802	0.258	0.404	0.500	0.342	0.338
IHIS04	0.475	0.356	0.805	0.339	0.365	0.369	0.400	0.384
IT01	0.399	0.548	0.312	0.732	0.311	0.295	0.305	0.362
IT02	0.432	0.489	0.270	0.785	0.259	0.245	0.266	0.290
IT03	0.329	0.510	0.285	0.753	0.396	0.284	0.355	0.417
IT04	0.492	0.490	0.311	0.812	0.323	0.271	0.328	0.326
IT05	0.45	0.511	0.297	0.825	0.293	0.264	0.289	0.317
IT06	0.484	0.419	0.260	0.742	0.273	0.218	0.259	0.256
IT07	0.471	0.423	0.308	0.802	0.298	0.214	0.300	0.330
OV01	0.234	0.367	0.373	0.271	0.798	0.439	0.330	0.381
OV02	0.209	0.349	0.333	0.317	0.741	0.453	0.292	0.388

OV03	0.245	0.396	0.400	0.312	0.828	0.577	0.323	0.402
OV05	0.329	0.387	0.403	0.343	0.804	0.529	0.398	0.406
SP01	0.224	0.276	0.344	0.188	0.513	0.728	0.164	0.238
SP02	0.308	0.363	0.394	0.248	0.527	0.774	0.238	0.361
SP03	0.311	0.331	0.454	0.215	0.497	0.826	0.231	0.322
SP04	0.374	0.399	0.451	0.276	0.498	0.816	0.274	0.371
SP05	0.366	0.361	0.477	0.306	0.539	0.850	0.306	0.408
SP06	0.381	0.399	0.444	0.308	0.456	0.771	0.281	0.406
TAF01	0.303	0.365	0.348	0.34	0.256	0.155	0.776	0.517
TAF02	0.263	0.378	0.316	0.326	0.323	0.188	0.796	0.541
TAF03	0.234	0.421	0.378	0.310	0.307	0.282	0.818	0.566
TAF04	0.211	0.419	0.347	0.268	0.347	0.272	0.819	0.569
TAF05	0.238	0.392	0.337	0.311	0.354	0.236	0.820	0.572
TAF06	0.287	0.461	0.408	0.333	0.403	0.329	0.821	0.635
TAF07	0.235	0.379	0.411	0.284	0.394	0.302	0.803	0.585
TEF01	0.271	0.400	0.337	0.258	0.385	0.364	0.574	0.767
TEF02	0.271	0.462	0.329	0.352	0.404	0.360	0.590	0.786
TEF03	0.290	0.530	0.387	0.338	0.444	0.394	0.543	0.826
TEF04	0.247	0.471	0.336	0.341	0.380	0.310	0.559	0.798
TEF05	0.241	0.534	0.338	0.373	0.395	0.361	0.545	0.802
TEF06	0.304	0.521	0.384	0.339	0.371	0.347	0.581	0.811

Source: Author's Construction

The Fornell-Lacker criteria measure the correlations between the latent variables and the values of the square root of the average variance. extracted as the second method for evaluating discriminant validity (AVE). The Fornell-Larcker criterion states that the AVE values for each concept should be greater than the correlation between those constructs. According to the Fornell-Larcker criterion, constructs in the model must have a higher variance with their indicators than with other constructs in the model in order for discriminant validity to be effectively attained. Table 5.5 Discriminant Validity (Fornell-Larcker Criterion) below shows that the AVE values of 0.817, 0.759, 0.814, 0.780, 0.793, 0.795, 0.808, and 0.799 are higher than the correlations with the individual model constructs for each of these values.

Table 5. 5 Discriminant Validity (Fornell-Larcker Criterion)

	DC	EV	IHIS	IT	OV	SP	TAF	TEF
DC	0.817							
EV	0.418	0.759						
IHIS	0.551	0.421	0.814					
IT	0.565	0.618	0.375	0.780				
OV	0.323	0.473	0.477	0.392	0.793			
SP	0.417	0.449	0.542	0.326	0.632	0.795		
TAF	0.313	0.499	0.454	0.383	0.425	0.317	0.808	
TEF	0.34	0.61	0.442	0.417	0.497	0.446	0.707	0.799

Source: Author's Construction

Researchers have drawn attention to the drawbacks of the Fornell and Larcker criterion for assessing discriminant validity in recent years (Hair et al., 2019). The Fornell and Larcker model does not work effectively, according to the authors, when the indicator loadings on a latent variable are marginally different. I agree with the authors because the Fornell-Lacker criterion fails to detect discriminant validity in common research situations. According to recent studies, the Fornell-Larcker criterion may be ineffective in some situations (Henseler et al., 2014; Rönkkö & Evermann, 2013), which may indicate a flaw in the most often applied discriminant validity criterion. However, there is no systematic evaluation of the Fornell-Larcker criterion's performance in evaluating discriminant validity in this research. In addition, although cross-loadings are often noted to be more lenient in terms of indicating discriminant validity (i.e., the assessment of cross-loadings will support discriminant validity when the Fornell-Larcker criterion fails to do so; (Hair et al. 2012; Henseler et al. 2009), prior research has not yet tested this idea.

Given the shortcomings of the Fornell and Larcker criteria, Heenseler et al. (2015) proposed heterotrait-monotrait ratio (HTMT) correlations as a better metric for discriminant validity. The geometric mean of the average associations of indicators assessing the same construct is used to define the HTMT as the mean value of the indicator correlations across constructs (Sarstedt et al., 2021). When compared to cross-loadings and Fornell and Larker's 0.00% and 20.28%, respectively, the HTMT produced by the Monte Carlo simulation study and findings has far higher sensitive and specific values, 97% and -99%, respectively. The threshold value for discriminant validity in studies is 0.90. (Henseler et al., 2015; Hair et al., 2019; Sarstedt et al., 2021). When the HTMT value is greater than the 0.90 threshold value, it means discriminant validity is lacking. To determine whether the HTMT values significantly differ from 1.00 or a lower threshold value, such as 0.85 or 0.90, which is often determined based on the context of the study, bootstrapping analysis is performed in these circumstances (Franke & Sarstedt, 2019). From Table 5, 6: Discriminant Validity—Heterotrait-Monotrait Ratio (HTMT), no values were above the 0.90 threshold.

Table 5. 6 Discriminant Validity- Heterotrait-Monotrait Ratio (HTMT)

	AOHI	DC	EV	IHIS	IT	OV	SP	TAF	TEF
DC	0.082								
EV	0.089	0.495							
IHIS	0.052	0.644	0.51						
IT	0.114	0.635	0.731	0.435					
OV	0.043	0.38	0.585	0.583	0.467				
SP	0.047	0.468	0.526	0.628	0.367	0.751			
TAF	0.025	0.349	0.576	0.517	0.428	0.491	0.343		
TEF	0.053	0.383	0.715	0.513	0.474	0.589	0.499	0.784	

Source : Author's Construction

5.6 Structural Model Assessment

The evaluation of the structural model comes after assessing the measurement model (Hair et al., 2019; Sarstedt et al., 2021). This section examines multicollinearity problems, the significance of the path coefficient, goodness of fit, effect magnitude, and predictive value.

5.6.1 Assessing Structural Model for Multicollinearity Issues

In a multiple regression analysis, multicollinearity occurs whenever there is a combination of predictors, according to (Shrestha, 2020). The multicollinearity of each independent construct is evaluated via an analysis of the variance inflation factor (VIF). VIF values less than 5.0 indicate collinearity between a group of predictor constructs.(Sarstedt et al., 2021). VIF values from the PLS-SEM technique that are less than the normal threshold of 5.0 indicate the presence of a continuous linear combination in variables that are independent of the construct being observed.

Every value in Table 5.7 Multicollinearity Statistics (Inner VIF) has a VIF that is less than 5.0, except Economic Viability, which had a figure way higher than the threshold.

Table 5. 7 Multicollinearity Statistics (Inner VIF)

	AOHI	DC	EV	IHIS	IT	OV	SP	TAF	TEF
AOHI				1.043					
DC				1.648					
EV				2.254					
IHIS									
IT		1.211		2.055					
OV				1.950					
SP				1.932					
TAF				2.110					
TEF		1.211		2.658					

Source: Author's Construction

5.6.2 Assessing Structural Model for the Significance of Path Coefficient

Regarding the links or structural routes between the constructs, the strength and significance of the path coefficients are assessed. The importance of the path coefficient was evaluated and examined using the Smart-PLS software's bootstrapping process. Bootstrapping, a non-parametric resampling technique, evaluates the statistical data's erraticness or variability. Instead of evaluating the accuracy of the estimates using parametric conventions, it examines the variability in the sample data (Streukens et al., 2017). The algorithm was run using the bootstrapping procedures with a subsample size of 5000 and a 5%, or 0.05, two-tailed distribution. A t-statistic was made available by the bootstrapping process to analyse the direct and indirect impacts (Hair et al., 2016; Sarstedt et al., 2021). If zero (0) does not lie within the 95% percentile confidence interval, a route coefficient is said to be significant at the 5% probability of error level (Sarstedt et al., 2021). Path coefficients are between -1 and +1 in terms of relevance, with coefficients closer to +1 denoting

strong positive relationships and those closer to -1 denoting strong negative relationships. However, technically, values below -1 and above +1 may also occur, for example, when collinearity reaches critical levels (Sarstedt et al., 2021). Based on the findings, a critical value of 1.65 is recommended and customary for a significance level of 5% in a two-tailed test (Hair et al., 2015). According to Table 5.8, five (5) out of the ten (10) hypotheses had t-values higher than 1.65, indicating that their route coefficients were significant. Table 5.8 exemplifies this.

Table 5. 8 Direct Relationships for Hypothesis Testing

Hypothesis	Relationship	Std beta (β)	T Values	Std error	Decision	2.50 %	97.50 %
H1	TAF -> IHIS	0.063	3.415	0.001	Supported	0.092	0.34
H2	TEF -> IHIS	0.069	0.047	-0.001	Rejected	-0.136	0.137
H2a	TEF -> DC -> IHIS	0.019	2.409	0.000	Supported	0.011	0.083
H3	EV -> IHIS	0.063	0.047	0.002	Rejected	-0.093	0.153
H3a	AOHI x EV -> IHIS	0.049	0.639	-0.002	Rejected	-0.137	0.054
H4	OV -> IHIS	0.056	2.113	0.001	Supported	0.011	0.228
H4a	AOHI x OV -> IHIS	0.045	0.024	-0.002	Rejected	-0.097	0.081
H5	IT -> IHIS	0.062	0.858	0.000	Rejected	-0.174	0.070
H5a	IT -> DC -> IHIS	0.032	5.804	0.001	Supported	0.125	0.248
H6	SP -> IHIS	0.061	4.108	0.000	Supported	0.126	0.367

Source: Author's Construction (2022)

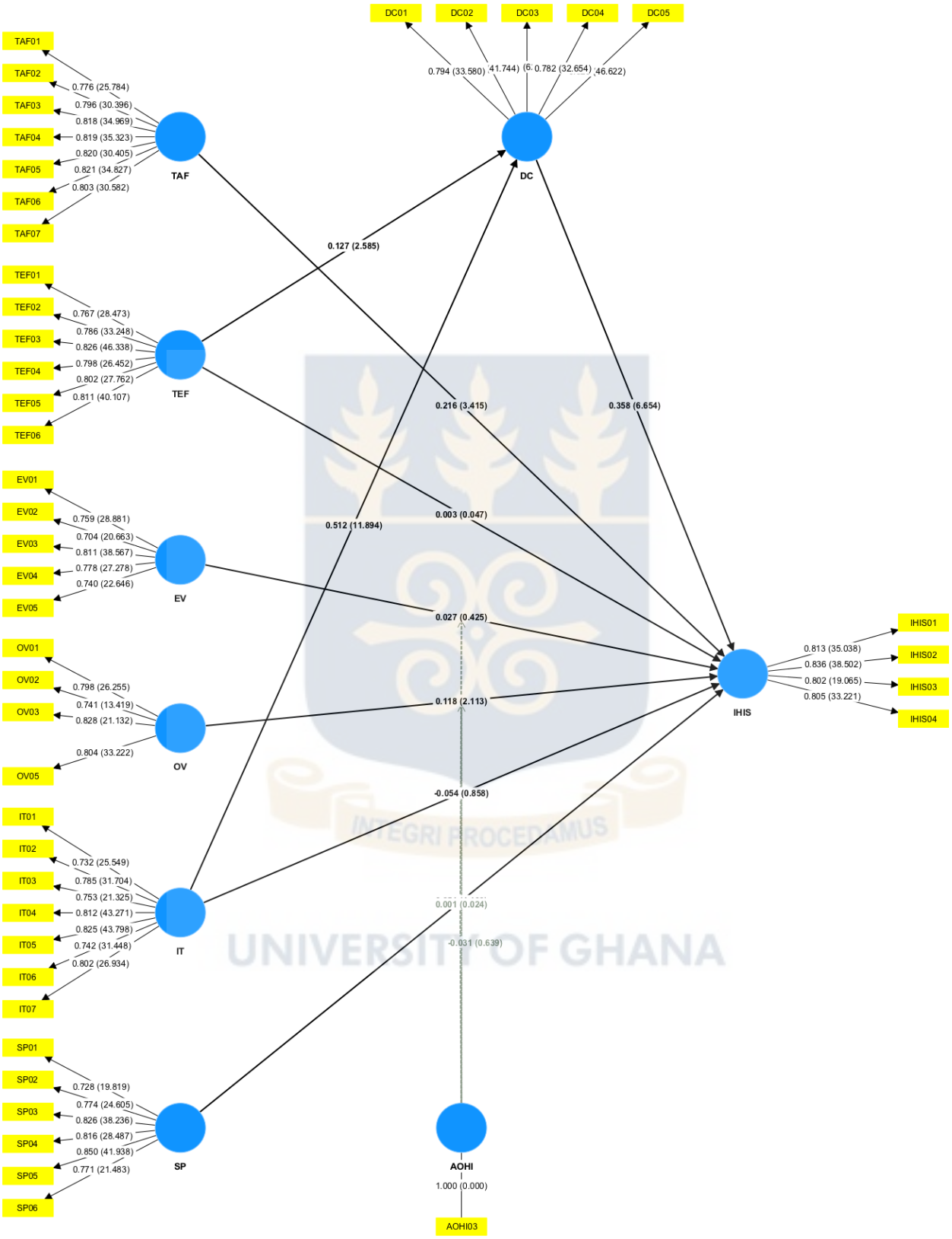


Figure 5. 2 Hypothesis Testing for Direct Effects

5.6.3 Model Fit

The model's goodness of fit evaluation reveals how well or poorly the model fits the study (Henseler et al., 2015; Sarstedt et al., 2021). The GOF test also assists in identifying over specified measurement and structural model parameters (Dijkstra and Henseler, 2015). In order to assess the model's fit, this study focuses on the R squared (R2) determination coefficient and the standardised root mean squared residual (SRMR). The change described by the endogenous constructs is evaluated by R2. Thus, the R square is used to evaluate the model's explanatory power (Shmueli and Koppius, 2011). The term "in-sample predictive power" may be used to describe this (Rigdon, 2012). The R2 ranges from 0 to 1, with higher values indicating greater explanatory power. R2 values of 0.75 are considered large, 0.50 are considered moderate, and 0.25 are considered to have weak explanatory power (Henseler et al. 2015; Hair et al. 2019).

Sarstedt et al. (2021) claim that the context of the study dictates what acceptable R2 values are. For instance, an R2 value of 0.10 is considered adequate in several disciplines. The forecasting of stock returns is one such instance (Raithel et al. 2012). Similarly, several research studies favour R2 levels greater than 0.65.Applications of the American Customer Satisfaction Index model are one example of such investigations (Fornell et al. 1996). IS researcher Chin (1998) classified R2 values of 0.190 and lower as weak. Values between 0.333 and 0.660 are regarded as average, while values over 0.670 are considered significant. Furthermore, R2 is exactly proportional to the predictor construct, according to Sarstedt et al. (2021). Therefore, the R2 value increases as the predictor construct is used more frequently. The authors further stated that the R2 should be discussed in relation to the study's context and that references to and comparisons with earlier studies that are analogous to the current investigation should be made. R2 values in some research

can record exceptionally high values in instances of an overfit model, according to Sharma et al. (2002).

According to researchers, a partial regression model is said to be overfit when it is complex and has many facets; as a result, the model tends to fit the sample's inherent noise rather than the population as a whole (Sharma et al. 2018; Sarstedt et al. 2021). While values between 0.333 and 0.660 are considered average, values above 0.670 are considered significant. Table 5.9 shows the current study's R2. The study's R2 value is 0.333 for digital curiosity and 0.498 for adoption and usage of an integrated health information system, and according to IS researchers, any number above 0.67 is significant and recommendable (Chin, 1998; Hair et al., 2019), so our exogenous variables have an average effect. This is further explained by the fact that between 33% and 49% of all endogenous factor fluctuations are represented by the combined or total exogenous latent variables. (Hair et al., 2019; Urbach and Ahlemann, 2010).

Table 5. 9 R Squared

	R-square	R-square adjusted
DC	0.333	0.330
IHIS	0.483	0.471

Any one of the metrics listed below in Table 5.10, according to Heenseler et al. (2016), can be used to evaluate and explain the goodness of fit (GoF): the geodesic discrepancy, the unweighted least squares discrepancy, and the standardised root mean squared residual (SRMR) (dG). As a relevant and appropriate measuring instrument for evaluating the goodness of fit of a model in PLS-SEM, the SRMR has been widely acknowledged and utilised by many researchers in a significant number of studies, which is why this study chose to employ it (Henseler, 2017; Zhang

et al., 2021). The general guideline for the SRMR criteria is that the closer the SRMR is to zero, the better the fit of the model. As a result, when SRMR is zero, an absolute fit is obtained. However, SRMR values of exactly 0.08 or lower are considered satisfactory (Henseler et al., 2016; Zhang et al., 2021). Studies having SRMR values above or exceeding 0.08 are considered unfit. According to the analysis, the study's estimated SRMR value is 0.056 for the saturated model and 0.065 for the estimated model, as shown in Table 5.10 below. These values are significantly lower than the 0.08 threshold value. Thus, the model is well-fit and does not contain any measurement misspecification in the study.

Table 5. 10 Goodness of Fit (SRMR criteria)

	Saturated model	Estimated model
SRMR	0.056	0.061
d_ULS	3.279	3.819
d_G	1.200	1.218
Chi-square	3171.883	3175.534
NFI	0.765	0.764

5.6.4 Effect Size

The size of the effect determines whether a dependent construct is significantly influenced by an independent construct (Cohen, 1988). When determining if a certain exogenous construct has a significant impact on the endogenous constructs, the F2 is the change in the R2 value when the exogenous construct is removed from the model (Sarstedt et al., 2021). Consequently, the F2 evaluates the impact the dependent construct has on the independent construct (Janadari et al., 2016). According to convention, F2 values below 0.02 indicate a small impact size, F2 values between 0.15 and 0.350 indicate a medium effect size, and F2 values over 0.35 indicate a big effect size of an exogenous latent variable (Chin, 1998; Cohen, 1988; Gefen et al., 2000). If the F2 value

is less than 0.02, no influence is seen (Sarstedt et al. 2021). According to Table 5.8 Digital Curiosity, state policy on IT, task fit, and age of the health institution have a medium effect on the exogenous latent variable. Economic viability, IT infrastructure, organisational viability, technology fit, and the moderation factor of the age of the health institution over economic viability all have little or no impact on the exogenous latent variable.

Table 5. 11 f-square (f^2)

	AOHI	DC	EV	IHIS	IT	OV	SP	TAF	TEF
AOHI				0.001					
DC				0.150					
EV				0.001					
IHIS									
IT		0.325		0.003					
OV				0.014					
SP				0.063					
TAF				0.043					
TEF		0.020		0.000					

5.6.5 Predictive Relevance

The final structural model component is the predictive relevance evaluation. How well the model predicts the endogenous latent variables is determined by its predictive significance (Stone, 1974; Geisser, 1975). The predictive relevance is evaluated using a non-parametric Stone-Geisser test known as the Q-square (q2). The SmartPLS blinding process was used to provide estimates of the remaining variances under the presumption that a certain number of instances were missing from the sample. Following the initial blindfolding process, the predictive relevance incorporated (Q2 Included) for each unique independent variable was recorded. The blindfolding or predictive relevance operation was then started to determine the predictive relevance excluded (Q2 excluded) for all independent constructs. This was accomplished by excluding each independent construct

one at a time while using the SmartPLS algorithm and maintaining an omission distance of seven (7). Finally, using the formula q2 = (Q2 included - Q2 excluded)/(Q2 included), the predictive relevance of each independent variable on the dependent variable was calculated (Henseler et al., 2015).Meaningful q2 values are greater than zero, and values above 0, 0.25, and 0.50 indicate the PLS path model's moderate, medium, and large prediction accuracy, respectively (Hair et al., 2019). The study's predictive relevance (q2) values are displayed in Table 5. 12 Q-square (q2), which shows that our model has a significant level of predictive power because the PSL-SM RMSE values are lower than the LM-RMSE values when compared. Table 5.12 shows the calculations. From the table, it is clear that the LM RMSE values are higher since six of them are higher than the PLS-SEM RMSE values, and we can conclude from this that our model has a significant level of predictive power.

Table 5. 12 Q-square (q^2)

	Q^2predict	PLS-SEM_RMSE	LM_RMSE	PLS-SEM RMSE - LM RMSE
DC01	0.218	0.470	0.460	0.010
DC02	0.205	0.467	0.453	0.014
DC03	0.209	0.471	0.476	-0.005
DC04	0.206	0.501	0.501	0.000
DC05	0.230	0.479	0.476	0.003
IHIS01	0.215	0.400	0.412	-0.012
IHIS02	0.144	0.455	0.468	-0.013
IHIS03	0.196	0.461	0.493	-0.032
IHIS04	0.158	0.419	0.437	-0.018

Author's Construction

5.7 Mediating Variable

The study adopted a mediating variable called "digital curiosity." The study sought to determine how significant digital curiosity mediates the relationship between technology fit and IHIS

adoption, as well as the relationship between IT infrastructure and IHIS adoption. A mediating effect is created when a third variable or construct intervenes between two other related constructs that are an independent variable and a dependent variable. A mediator specifies how (or the mechanism by which) a given effect occurs (Baron & Kenny, 1986; James & Brett, 1984). An independent variable will have a causal influence on the mediator, causing the outcome (Shadish & Sweeny, 1999).Individual indirect effects and the corresponding standard deviation from the bootstrapping of, e.g., 5000 samples are obtained to be used for the t-statistics calculation on the indirect effects following the recommendations of Hass & Preacher (2014).

5.7.1 Digital Curiosity

A bootstrapping in SmarpPLS was used to perform a mediation analysis. After the normal PLS-SEM algorithm is run and all indicator loading less than 0.70 is removed, A two-tailed bias-corrected bootstrapping using 5000 samples, which gave us the mediation analysis results, was performed. The results are grouped into categories, but we are much interested in the indirect effects, which tell us the significance of mediation between the dependent and independent variables. In order to statistically report mediation analysis using SmartPLS, we need certain ingredients to help us. The first item on the list is the indirect effects, total effects, direct effects, and type of mediation. Full mediation exists if the predictor exerts its total influence on the dependent variable via the mediating variable. Partial mediations occur when the predictor exerts some of its influence on the mediation variable. It also exerts some of its influence on the dependent variable via the mediating variable. If the direct effects and the indirect effects are both significant, then we have partial mediation, and if the indirect effect is significant and the direct effect is significant, then we have full mediation.

Mediation analysis was performed by bootstrapping to assess the mediating role of digital curiosity in the relationship between technological fit and IT infrastructure viability. Table 5.13 Results of Mediation Analysis shows that the t-statistics from the results of the mediation analysis after bootstrapping were greater than 1.65 for a two-tailed test per the rule of thumb. When a mediating variable's t-value in a two-tailed 1% significant level analysis is higher than 1.65, it is considered to be significantly moderating the link between two constructs (Hair et al., 2019). What this means is that digital curiosity has a significant mediating role between the independent constructs of technology fit and IT infrastructure and the dependent construct of adoption and usage of integrated health information systems.

Table 5. 13 Results of Mediation Analysis

	Original sample (O)	Sample mean (M)	T statistics (STDEV)	P values	Bias	2.50 %	97.50 %
IT -> DC -> IHIS	0.184	0.184	5.804	0.000	0.001	0.125	0.248
TEF -> DC -> IHIS	0.045	0.046	2.409	0.016	0.000	0.011	0.086

5.8 Moderating Variable

This section focuses on examining the influence and effect of the moderators (the age of the health institution) on the independent constructs (economic and organisational viability) and the dependent construct (adoption and usage of an integrated health information system). To determine the extent to which the age of health institutions moderates the relationship between economic and organisational viability towards the adoption and use of an integrated health information system, a two-tailed bias-corrected bootstrapping analysis using a path with 5000 samples was used. This process gave us all the results that we need to report on moderation. This study did not undertake a multigroup analysis since the moderating variable, age of health institutions, was not categorized.

The age of a health facility was used to determine how the number of years it has been in operation will affect its adoption and use of integrated health information systems. The age of the health institutions was not categorized, say, 1–5 years, 6–10 years, 11–15 years, and so on. As a result, instead of a multi-group analysis, direct bootstrapping was used in this study.

5.8.1 Age of Health Institutions

An age analysis of health institutions was carried out using the PLS-SEM algorithm to determine the impact of age on the link between the dependent constructs Adoption and Usage of Integrated Health Information Systems and the independent constructs Economic and Organizational Viability. The t-value provides the researcher with results regarding the moderating effect of the moderator and the dependent and independent variables. The interpretation of the t-value is governed by a general principle.

When a moderating variable's t-value in a two-tailed 1% significant level analysis is higher than 1.65, it is considered to be significantly moderating the link between two constructs (Hair et al., 2019). This study used the age of the health institutions as a moderating factor, and data was collected to study how the moderator influences the adoption and usage of health information systems. After performing a bootstrapping analysis in SmartPLS-SEM 4 using a two-tailed bias-corrected approach with 5000 samples, the findings are then reported in Table 5. 14 Analysis Results of Age as a Moderating Variable. Where the t-value is less than 1.65 per the rule of thumb, it means the age of the health institutions does not have a moderating effect between the independent constructs of economic and organisational viability and the dependent construct of adoption and usage of an integrated health information system.

Table 5. 14 Analysis Results of Age as a Moderating Variable

	Original sample (O)	Sample mean (M)	T statistics (STDEV)	P values	Bias	2.50%	97.50%
AOHI x OV -> IHIS	0.001	-0.001	0.024	0.981	-0.002	-0.099	0.079
AOHI x EV -> IHIS	-0.031	-0.033	0.639	0.523	-0.002	-0.140	0.052

5.9 Chapter Summary

The chapter offered an analysis of the collected data. The chapter started off with a thorough analysis of the demographic makeup of the survey respondents. The evaluation of the measurement model and the study's structural model came next. Finally, the effects of the mediating factor digital curiosity and the moderating factor age of the health institution were also examined.

CHAPTER SIX

DISCUSSION OF RESULTS

6.1 Chapter Overview

The empirical results of the study have been reported in the preceding chapter. To address the study's questions, this chapter discusses the results. There are two sections in the chapter. The first section examines the relationship between the dependent constructs of adoption and use of integrated health information systems and the independent constructs of task, technology, economic factors, IT infrastructure, organisational factors, and state policy. The impact of the mediating and moderating variables on the relationship between the independent constructs (technology fit, IT infrastructure, economic viability, and organisational viability, respectively) and the dependent construct, adoption and usage of integrated health information systems, is covered in the second section of this chapter.

6.2 Towards Integrated Health Information System in Ghana

The study seeks to understand how fit and viable Ghana's health sector is for the adoption of an integrated health information system. Another goal of the study was to comprehend how digital curiosity affects the viability of IT infrastructure and technological fit. Once more, the study aims to comprehend how the age of healthcare facilities modifies the relationship between organisational and economic viability toward IHIS adoption. In order to empirically examine the fit-viability of Ghana's health sector toward the adoption and use of IHIS, the study used the fit-viability theory and added state policy as another measurable construct to the original theory. It then relied on 466 replies obtained from respondents through an online 5-liker scale questionnaire

designed using Google Forms. Five (5) of the ten (10) research hypotheses were accepted, while five (5) were rejected. The supported hypotheses were task fit (H1), organisational factors (H4), state policy (H6), and digital curiosity (H2a, H5a), which confirmed the hypothesis that the above-mentioned independent constructs and the mediating variable digital curiosity significantly influence IHIS adoption and usage, as stated earlier in Chapter 3. However, the hypothesis that technology fit (H2), IT infrastructure (H5), economic factors (H3), and the moderating effect of hospital age (H3a, H4a) significantly influence IHIS adoption were not supported, as shown in Table 5.8.

6.2.1 Task Characteristics

Using the threshold of the "t-value" for the basis of the discussion, it can be observed that the hypothesis is supported. Hence, task characteristics significantly influence the adoption and usage of IHIS. The corresponding t-value for the relation between task characteristics and the adoption of IHIS was 3.415. This implies that the task characteristics are a major influencer of IHIS adoption. Health sector workers or personnel are of the view that IHIS fits their daily tasks or routine processes. The effects of IHIS on their daily tasks were positive and would make their work much more effective and efficient.

Yoo and Kim's (2019) study confirmed that task characteristics influence Fit, which subsequently influences performance or adoption of cloud computing. The findings of this study with regards to task characteristics corroborate those of other extant studies that have employed the FVT, such as (Larosiliere and Carter, 2016; Mohammed et al., 2017).

6.2.2 Technology Characteristics

The relationship between technology fit characteristics and IHIS adoption was not supported. The t-value for the relation was 0.047, and this indicates that the hypothesis was not supported. This implies that, contrary to our hypothesis, technological characteristics did not have a significant impact on IHIS adoption. According to the findings of this study, technology fit characteristics were not a major influencer of IHIS adoption. Larosiliere and Carter (2016) defined technology characteristics as the information and communication technology (ICT) used within an organisation to complete a task. It was evident from our study that most respondents confirmed that they lacked ICT equipment within their hospitals, which made most of the systems deployed at the hospitals redundant. This is confirmed in a study by Abdullai and Adam (2020), where respondents said they lacked the necessary ICT equipment to carry out tasks or use electronic health records. This research recommended equipping health institutions with the necessary ICT devices needed for the successful deployment of electronic health records as well as the training of personnel to use the system. They again recommended that user manuals need to be developed to help individuals learn how to use electronic health records on their own or through internal workshops.

A study was conducted on the utilisation of the national cluster of district health information systems for health service decision-making at the district, sub-district, and community levels in selected districts of the Brong Ahafo region in Ghana (Odei-Lartey et al., 2020). This study revealed that technology was a driver of technology adoption, but most of the health facilities within the Ghanaian context lacked the necessary ICT tools to take advantage of the district health information system, which was a hindering factor in decision making in the Brong Ahafo region

of Ghana. Thus, this study confirms that IHIS adoption and usage in Ghana were not necessarily and significantly influenced by technology, per the findings of this study.

6.2.3 Economic Factors

The third hypothesis is economic viability, which measures the degree to which economic conditions influence the adoption and usage of IHIS. The corresponding t-value was 0.047, which implies that economic conditions do not significantly support the usage and adoption of IHIS. This means that our proposed hypothesis for economic factors was contrary to the findings of our study. This means that the current economic conditions of health institutions have no bearing on the adoption and use of information technology. This manifests in the lack of hardware purchases (smart phones, tablets, desktop computers, laptops, servers, routers, etc.) to access the technology or the deployed system, as well as the purchase of internet data to use the application. Additionally, existing studies have produced similar outcomes.

Tripathi and Nasina (2017), from their study, reported that economic wellbeing does not significantly influence the usage and adoption of information and communication technology (ICT), especially in the public sector, where the responsibility of ICT tool deployment is the responsibility of the government. This outcome is inconsistent with the study findings by Larosiliere and Carter (2016), who stated that economic wellbeing impacts the overall readiness, implementation, and usage of IT in all sectors and endeavors, but our study had findings contrary to this. This difference may be due to the fact that Larosiliere and Carter (2016) carried out their study in a developed world where ICT penetration is very high, whereas this study was carried out in a developing world where ICT penetration is relatively low. This was confirmed by this study

since most respondents claimed they lacked the necessary ICT tools and skillset to operate or use IHIS.

6.2.4 Information Technology Infrastructure

Mohammed et al. (2016) define IT infrastructure viability as IT resources that influence the adoption, usage, and performance of a new technology or system in an organization. However, the result from the current study was contrary to the hypothesis. The t-value corresponding to the hypothesis was 0.858, which falls short of the threshold value of 1.65, hence the hypothesis was rejected. This can be explained such that with regards to IHIS, the health institution as an organisation or health sector only has to recommend a particular application (IT infrastructure) for the government or management to subscribe to or adopt.

Chavoshi and Hamidi (2019) observe that IT infrastructures in themselves are not enough to influence the usage of a new technology in any organization. However, the findings of (Mohamed et al., 2016; Larosiliere and Carter, 2016) demonstrate that IT infrastructure has a significant impact on the performance of information technology. For instance, Larosiliere and Carter (2016) reported that IT infrastructure contributes the most among the viable resources in their study to investigate electronic government maturity and its determinants in the United States of America. The findings of the study demonstrated that IT infrastructure is critical to the adoption and performance of information technology systems within business organizations. Nevertheless, the above-mentioned study was carried out in a developed country. Such findings cannot represent developing countries' perspectives or be generalised to all countries. there are differences with

culture, legislation, education per capita, and technological infrastructure. This current study provides a perspective from a developing country.

6.2.5 Organizational Factors

Furthermore, the fourth hypothesis of this study postulated that organisational viability is significantly associated with IHIS adoption and use. Sánchez (2017) defines organisational viability as the readiness and availability of the needed organisational resources for the adoption of new information technology. Similarly, health organisations or institutions encourage their employees to use deployed information technology systems in their facilities, such as EHR or HIS. This finding affirms extant studies (Liang et al., 2007; Mohamed et al., 2016; Larosiliere & Carter, 2016) on organisational viability's influence on the adoption and use of new information technologies or systems.

For instance, Larosiliere and Carter's (2016) study findings demonstrated that the viability dimension of an organisation has a significant relationship with e-government performance. The study's findings further suggest that with the right organisational support and encouragement from leaders of the local hospitals, clinics, or health sectors, the use and adoption of new information technology can blossom.

6.2.6 State Policy

State policy was introduced into the fit-viability framework to access how state regulatory policies will significantly influence the adoption and use of IHIS since this study primarily focused on the public health sector of Ghana. The study uncovered that state regulatory policies significantly

influence the adoption and use of IHIS due to its T-statistic, which is captured in Table 5.8. This confirms our hypothesis that state policy was a significant influencer of IHIS in the Ghanaian public health sector. This finding is affirmed by an earlier study by Li (2017). The reason for its significance is that many of the respondents firmly believed that the state must play a key role in the adoption and use of IHIS. This is because the state administers the public health sector through the Ghana Health Service and the Ministry of Health. Again, the E-Health strategy of Ghana, which was launched by the government in 2010, was the blueprint for technology adoption in the health sector. This confirms that the state, through its policies, influences significantly the adoption and usage of IHIS in the public sector of Ghana.

They also firmly believed that the individual health institutions could not undertake this massive integration project without the support of the state. This showed clearly in the descriptive section of the previous chapter, where I indicated that about 98.9% of respondents were of the view that the government must be responsible for adopting and deploying this IHIS within public hospitals. This is because they own the hospitals and are the employers of the health workers, thereby being responsible for providing them with all the necessary working tools and equipment, including systems that will aid them in delivering on their core duties. This finding is also affirmed by Prathus and O'Malley (2017). This hypothesis was widely accepted because public hospitals cannot operate independently of the government because technology adoption is capital intensive and must be coordinated with Ghana's national E-Health strategy, which was launched in 2010 by the Ministry of Health.

6.3 Moderating effect of Age

This section focuses on the effect of age as a moderator on the independent constructs of economic viability and organisational viability on the adoption or use of IHIS in the public health sector of Ghana. Extant IHIS, HIS, and EHR studies (Essuman et al., 2020; Owusu & Nsafoah, 2016; Abdulai & Adam, 2020; Pendergrass & Crawford, 2019; Odei-Larety et al., 2020) have called for more studies on IHIS adoption from developing countries as well as from different sectors, especially rural Ghana. Thus, the authors believe that an increase in IHIS literature can lead to a better understanding and appreciation of the concept of IHIS adoption and usage, as well as increase its patronage in developing countries.

6.3.1 Moderating effect of Age on Economic viability towards IHIS adoption

The third hypothesis, which assessed the relationship between economic viability and IHIS, had another hypothesis that used age as a moderating variable. This hypothesis was rejected because its t-value was less than the threshold of 1.65. When the age of the hospital was used as a moderating factor to see if economic viability would have a significant influence on IHIS adoption and use, the results clearly showed, as captured in Table 5.8, that there was no significant relationship between economic viability, organisational viability, and IHIS adoption when the age of the hospital served as a moderating factor. This clearly shows that no matter the age of a hospital, technology or information systems can be deployed. The age of the hospital has an insignificant bearing on the adoption and use of IHIS, especially in the public sector. This is confirmed by (Dhagarra et al., 2020; Gomes & Romo, 2018; Papa et al., 2020) in their earlier studies. Similarly, Niazkhana et al., 2020; Khalifa, 2013) have reported on the lack of theoretical support in extant IHIS studies and have called for future studies to address this gap in the literature. In response to

the above-stated gaps, this study has used the fit-reliability theory to investigate the moderating effect of age on the adoption and use of IHIS in the health sector of Ghana.

This study finding affirms the study by (Odei-Lartey et al., 2020; Tsai et al., 2020), which observed that many health personnel in the various hospitals of varying ages prefer to use their IHIS or other health technologies like EHR and HIS for their daily tasks as well as communicating with other departments of the hospital. For instance, in the various hospitals, patients, through the use of information technology devices, are able to communicate, have access to consultations and medications in real time, have access to health information or commentaries, etc. These additional resources are a benefit of using digitalized services at hospitals. This technology should be appreciated and used by hospitals or health facilities of all ages.

6.3.2 Moderating effect of Age on Organizational viability towards IHIS adoption

Additionally, the fourth hypothesis, which proposed a significant relationship between organisational viability and IHIS adoption, also had another hypothesis proposing a significant relationship between organisational viability and IHIS adoption with age serving as a moderating variable. The results of this study contradict the hypothesis. This means that the hypothesis was rejected because the t-value was less than the threshold of 1.65. This demonstrates that, while OV has a direct influence on the adoption and use of IHIS, the significance level of influence is greatly reduced by the hospital's age acting as a moderating factor. That is why the t-statistics for AOHI x OV -> IHIS were less than the threshold, as captured in Table 5.8.

MacDonald et al. (2020) explained through their study that it is just recently that some applications, such as Facebook, YouTube, and Google, have created kids' versions of their applications for

persons below the age of eighteen (18) years. The findings of Francis et al. (2019) highlighted the inequalities that older adults are confronted with when it comes to the use of IT infrastructure. The authors observe and conclude that designers of digital devices do not consider older adults because the goal is to satisfy middle-aged and younger generation users who are more IT savvy. Similarly, Ball et al. (2019) mentioned that the peculiar needs of older adults, such as font sizes and other ergonomic features, are not considered by the designers (Francis et al., 2019). Thus, the lack or unavailability of IT infrastructure for different age groups can be attributed to health institutions not factoring in or considering different age groups when making IT infrastructure-related decisions.

6.4 Mediating effect of Digital Curiosity

This section primarily focuses on the effect of digital curiosity as a mediator between the independent constructs of technology and IT infrastructure and the dependent variable, integrated health information systems. Digital curiosity was used as a mediating factor within the fit and viability theoretical framework to access how curious and anxious health personnel were about new technology that would make their work more easy, simple, and much more efficient. Curiosity, a fundamental element of our cognitive function, is one of our greatest motivators for learning, making decisions, and adopting a new way of doing things through technology (Presthus & O'Malley, 2017).

Extant studies on IHIS adoption in the developing work perspective (Acquah-Swanzy, 2015; Adu et al., 2021; Kesse-Tachi et al., 2019; Kipo-Sunyehzi et al., 2020; Peprah et al., 2020; Sokey & Adisah-Atta, 2017; Tchao et al., 2019; Yusif et al., 2022) have called for more studies on IHIS

adoption from developing countries as well as from different sectors, especially rural areas. Thus, the authors believe that an increase in IHIS literature can lead to a better understanding and appreciation of the concept of health technology and also increase its patronage in developing countries. Similarly, (Amo et al., 2020; Holzer et al., 2020) have reported on the lack of theoretical support in extant IHIS studies and have called for future studies to address this gap in the literature. In response to the above-stated gaps, this study has used the fit-reliability theory to investigate the moderating effect of age on the adoption and use of IHIS by health institutions. This section focuses on a detailed discussion of the effect of the age of health institutions on the adoption and usage of IHIS for effective and efficient healthcare delivery.

6.4.1 Mediating effect of digital curiosity on Technology towards IHIS adoption

The proposed hypothesis explores the mediating effect of digital curiosity between technology characteristics and IHIS adoption and use. The hypothesis postulates that digital curiosities significantly mediate the relationship between technology characteristics and IHIS adoption. The analysis of the data as captured in Chapter 5 affirmed the proposed hypothesis. The t-value for the mediating effect was 2.409. This implies that digital curiosity significantly influences the relationship between technology characteristics and IHIS adoption. The empirical analysis of the data confirmed the hypothesis the study proposed because the t-value for the mediator digital curiosity shows a significant influence on the adoption and usage of IHIS through technology fit. Table 5.8 shows that digital curiosity contributed the fourth highest level of significance to the adoption and usage of health information systems. Digital curiosity therefore significantly influences the adoption and usage of integrated health information systems. This is affirmed by Fang et al. (2018), and that is also evident in the fact that technology fit and IT infrastructure do

not have any direct and significant influence on the adoption of IHIS. When digital curiosity served as a mediating variable between them and the dependent construct of IHIS adoption, technology fit was seen as having a significant influence on IHIS adoption and use, as discussed earlier.

6.4.2 Mediating effect of digital curiosity on IT Infrastructure towards IHIS adoption

This study postulated that age significantly mediates the relationship between IT infrastructure viability and IHIS adoption and use. The results demonstrated support for our hypothesis because the t-value for this relationship was 5.804. This relationship contributes the highest level of significance to IHIS adoption, per the findings of this study. This implies that the IT infrastructure of hospitals has a significant influence when digital curiosity serves as a mediating variable. This suggests that health institutions should focus more on their employees' digital curiosity in order to drive acceptance of IT infrastructure toward IHIS adoption and usage. The majority of IT infrastructure, both hardware and software, has been designed with young adults or middle-aged people in mind, to the detriment of the entire workforce's digital curiosity.

This study's findings affirm the study by (Elisave, 2021; Frankiewicz & Chamorro-Premuzic, 2020; Presthus & O'Malley, 2017; Straughan & Bissell, 2021), which observed that digital curiosity is a major driver of technology acceptance. These studies confirmed that humans' curiosity about anything, including technology, drives them to use or adopt such a phenomenon. This study buttresses these findings since this hypothesis had the highest t-value, which means it has the most significant influence on IHIS adoption and usage in Ghana.

6.3 Chapter Summary

By contrasting the study's findings with the hypotheses and the body of existing literature, this chapter elaborates on the analysis's conclusions. This made it easier to respond to the research questions. This evaluation's goal was to determine whether the stated hypotheses about the adoption and use of an integrated health information system are supported or not. Additionally, the impact of the mediating variable (digital curiosity) and the moderator (the age of the health institution) on a few particular independent and dependent constructs were evaluated.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Chapter Overview

In the previous chapter, the analysis of the study was explained by contrasting the results with both the study's hypotheses and the body of existing literature. The investigation is summarised in this final chapter, which also provides the findings in response to the research questions. The chapter makes several suggestions for future research that will take the study's limitations into account and highlight them.

7.2. Summary of Previous Chapters

The main purpose of this research was to investigate the fit and viability of Ghana's health sector towards the adoption of integrated health information systems. It also sought to ascertain to what extent IHIS correlates to improved health care delivery and the cost and benefits of the system when deployed. Chapter one of this study focused on the background of the study, the research problem, the objectives, the research questions, and the significance of the study. Chapter two focused primarily on the literature review, where we dug into previous research in the area and its findings (Amadu et al., 2018; Boateng & Amankwaa, 2016; Koranteng & Wiafe, 2019; Otu, 2015; Owusu-Acheaw & Larson, 2015; Owusu et al., 2019). The fit-viability theory was covered in Chapter 3, along with some of the theory's drawbacks. The FVT was chosen because its components can be used to assess how appropriate and practical IHIS technology is for the health sector. There was enough literature to justify the use of FVT. The data was analysed in Chapter 5, and the results were then presented. Questionnaires were designed using Google Forms to gather

data from health personnel at various hospitals in Ghana. The collected data was then exported in CSV format into SmartPLS-SEM 4 for analysis.

7.3 Summary of the Study Findings

The findings of the study are categorised into three distinct aspects following the research objective set in Chapter 1 of this study. To investigate the fit and viability of Ghana's public health sector towards an integrated health information system. To access the cost and benefit of an integrated health information system within the public health sector of Ghana. Finally, to evaluate the correlation between integrated health information systems, quality health care delivery, and public health management,

7.3.1 The fit and viability of Ghana's public health sector towards IHIS

The research findings revealed that many hospitals were using health information systems that were hospital-based. These systems were not integrated with other hospitals to enable the sharing of data. This was evident in the number of different health information systems that respondents mentioned when asked to give the name of the health information systems they were using at their hospital. From the empirical analysis of the data collected, it was evident that organisational viability, task characteristics, and state policy were major influencers of IHIS adoption. The data analysis also revealed that IT infrastructure viability and technology characteristics were major influencers of IHIS adoption if digital curiosity served as a mediating variable. The study has also revealed that economic viability, IT infrastructure, and technological characteristics did not influence IHIS adoption on their own. Even when the age of health institutions was deployed as a

moderating variable between economic and organisational viability, they both had an insignificant influence on IHIS adoption.

It can be concluded from these findings that Ghana's health sector is fit and viable for IHIS adoption if attention is paid to the key influencers of IHIS adoption. This conclusion is buttressed by the fact that most hospitals involved in this study indicated that they had knowledge of HIS and had the same deployed at their health facility, but the problem had to do with integration and a lack of resources and training for personnel to use the system. Most of the hospitals had redundant systems that were not being maintained or upgraded to meet the daily tasks of the users of the systems. For instance, many of the respondents saw the need and significance of integrating these systems and were well aware that it will go a long way to aid the health sector in delivering quality healthcare and also help make work schedules far more efficient (Kara et al., 2020; Ozer, Karpinski, & Kirschner, 2014; Raspopovic et al., 2017; Redecker et al., 2010).

7.3.2 Benefits of IHIS within the public health sector of Ghana

The research findings reveal that the benefits of IHIS as compared to its cost are viable since most respondents believe that IHIS should be an integral part of Ghana's public health system. 87.8% of respondents believe that IHIS should be an integral part of the public health system, and the government should be the one footing the bill or deploying the system. This is because they believe that the cost of deployment and continuous use will be lower than the expected outcome or benefits of this system. In a nutshell, the respondents believed that because they work in the public sector, any national deployment would have gone through a value for money or cost analysis, with the benefits weighed before the decision to deploy was made. Secondly, the central government knows

the long-term benefits of having an IHIS within the public sector of Ghana, so if they decide to deploy such a system, it is for the benefit of the public since the benefits will outweigh the cost, be it a recurrent cost or a fixed cost of deployment. Several other prior studies agreed with this finding (Owusu-Acheaw & Larson, 2015; Stathopoulou et al., 2019; Amadu et al., 2018).

7.3.3 Correlation between IHIS, Quality Health Care Delivery and PHM

The research findings show that there is a positive correlation between health care delivery and IHIS adoption. This is evident in the Task Fit hypothesis being accepted. What it means is that many health personnel who served as respondents firmly believed that the tasks they perform at their various facilities can be replaced by technology, which will make their work very smooth, easy, and much more efficient than the manual or older way of performing their tasks. This is also evident in the fact that about 87.8% of the respondents affirm that IHIS must be an integral part of the Ghanaian health system. Again, about 92.9% of respondents affirmed that they had used a health information system before, even though it was not integrated to connect or link all hospitals, and 76.8% of those who once used HIS claimed the system was very effective.

Across the world, IHIS is critical to health care delivery, and Ghana is no exception, so if the respondents, per these percentages, are affirming the need for and effectiveness of the HIS, then it is imperative to say that IHIS has a positive correlation with quality health care delivery. This is evident in a study by Phillips et al. (2018) on scaling up health system strengthening interventions in Ghana. Again, deploying IHIS would enable public health personnel to gather critical health data from the IHIS, analyse that data, plan and forecast on public health issues, and shape public health policy in both the short term and the long term. Many developed countries are in the process

of integrating the entirety of their health sector, and Ghana's public health sector can do the same if the state's policy towards IT in the health sector and its willingness to deploy, maintain, and train staff towards the use of IHIS is positive (Ouedraogo et al., 2019).

7.4 Linking Research Objectives with the Study Findings

Table 7.1 shows the summary of research findings backed with literature and the study's research findings

Table 7. 1 Mapping of study findings with research objectives

Research Objectives	Research Findings	Supported Literature	Contributions, Implications and Recommendations
To investigate the fit and viability of Ghana's public health sector towards an integrated health information system.	Many different hospitals in Ghana's public health sector have been using various types of health information systems on an individual basis, but this study seeks to test the fit and viability of the public health sector toward the integration of health information systems in Ghana's public health sector. ♦ Some of the popular health information systems used by hospitals and uncovered by study are EHR, pHIS, Medlink, HMIS, EMR and eHMIS. ♦ Using the fit-viability theoretical framework it was uncovered by this study that out of the two traditional constructs of the model, technology fit significantly influences the adoption and usage of IHIS in Ghana's public sector. Technology characteristics were however rejected. ♦ The viability side of the traditional model had economic viability, organizational viability and IT infrastructure all rejected but most respondents felt the onus lies on	(Liang et al., 2021) (Sokey & Adisah-Atta, 2017) (Ahuja et al., 2016)	The study contributed to the literature by unearthing new constructs that showed positive significance towards IHIS adoption and usage. The implication is that, while most traditional constructs of the fit and viability theory were rejected in this study, it is important to note that other factors influence technology acceptance, such as digital curiosity, state policy aside from task fit, and organisational viability.It is recommended that more studies be focused on other factors that influence technology acceptance instead of the traditional constructs of fit and viability. Again, other theoretical approaches could be used to test technology acceptance, like the Technology Acceptance Model (TAM).

	government to provide policy and direction towards the adoption and usage of IHIS since the public hospitals cannot adopt an IHIS on their own since its capital intensive and its nationwide scope cannot be borne by the hospitals themselves. ♦ This study adopted two other constructs including State Policy and Digital Curiosity as well as Age of the Hospitals as a moderating variable and digital curiosity serving as a mediating variable. Even though the viability side of the constructs were rejected, digital curiosity was accepted as a major influencer of IHIS adoption and use. Again when digital curiosity served as a mediating variable between Technology fit and IT Infrastructure towards IHIS adoption and use were both accepted. Again age of the health institution as a construct was accepted as having a significant influence on the adoption and use of IHIS but unfortunately age of the health institution as a moderator between economic viability and IHIS adoption was however rejected.	(Yoo & Kim, 2019)	
To access the cost and benefit of integrated Health Information System within the public health sector of Ghana.	It was obvious from our research findings that most personnel in the public health sector believe that IHIS should be an integral part of the public health system. They also believe that the government should be responsible for adopting and deploying IHIS since the public health system is controlled and administered	(Owusu et al., 2020.) (Liang et al., 2021)	It is recommended that in the public sector of Ghana, most of the technology deployments are done by the central government, and there should be a value for money audit to check the viability of the project before implementation. In the case of

	by the government. Adoption of IHIS by public hospitals would require the government, which would have conducted a value audit on adoption prior to deployment to all public hospitals.notwithstanding that the economic viability side of our model was rejected.		this study, it was obvious from our respondents that they felt the economic burden lies with the government since public hospitals on their own could not adopt and use IHIS without government support since the sector is regulated and administered by the government.
To evaluate the correlation between integrated Health Information Systems, Quality Health Care Delivery and Public Health Management.	The study found that health personnel feel that there is a significant relationship between IHIS adoption and usage and quality health care delivery. About 98% of respondents were of the view that IHIS would lead to improved healthcare delivery and would enable seamless communication between departments of a hospital as well as communication between separate hospitals that would help offer superior quality care and timely information for health practitioners in the public sector. The majority of respondents said the stand-alone health information was very effective, so integrating it with other hospitals would offer them the opportunity to share data and offer seamless communication between health institutions, which will ultimately lead to superior health care delivery.	(Larosiliere et al., 2017) (Lippeveld et al., 2000) (Bedeley & Palvia, 2013)	This study contributed to the literature by revealing that IHIS should be an integral part of the public health sector of Ghana and would lead to improved health care services. It was obvious that adoption and use of IHIS would lead to high health care efficiencies, improved communication between departments of a hospital, and communication between different hospitals.

Source: Author's Construction

7.5 Research Contributions and Implications

There have been significant contributions made to research, practice, and policy with this current study.

7.5.1 Implication for Research

Existing research on the adoption and application of integrated health information systems has noted the field's many potentials and as a result has called for additional research studies to reveal new findings that can supplement existing literature, particularly in developing countries, in order to achieve the millennium development goal three (SDG3). Specifically, integrating theories with the IHIS adoption study In light of this, this study examined the adoption and use of IHIS from the perspective of a developing nation like Ghana, focusing on the public health sector. Thus, responding to requests from ongoing IHIS empirical studies into new, unexplored areas and opening up a new research avenue for IHIS that has numerous prospects for subsequent research that may produce diverse research findings and opinions More research is needed to explore the dynamics of IHIS adoption from different theoretical perspectives apart from fit-reliability theory.

The Fit and Viability theory has been used extensively by researchers in the field of IS, but this study introduced a new construct, digital curiosity, and state policy on IT to the original theory to give it a new dimension. This new construct was introduced to ascertain how curious employees were about digitalization and, by extension, the adoption and use of IHIS. The second new construct looks at the role of the government's policy on IT within the broader framework of the government's IT plan for the country. State policy delves into how the central government's policy towards IT could drive a wave of digitalization in various sectors of the country, especially in the public health sector. Using the Fit and Viability theory, this study

adds to the existing literature on the adoption and use of information technology in the Ghanaian health sector.

7.5.2 Implications for Practice and Policy

The fit and viability theoretical framework chosen for this study identified many other influencers of the adoption of technology, especially digital curiosity and state policy on IT, as influencers of technology adoption from the perspective of developing countries. It was obvious from this study that in a developing country like Ghana, where most of the provision of social services is the responsibility of the central government, it is important to measure the influence of the state on technology adoption, especially in a sector that is wholly controlled and administered by the government. First, the study identified task characteristics as a very important influencer of IHIS adoption. Again, digital curiosity among health personnel and state policy were significant technology influencers in developing countries. What this means is that most health personnel interviewed believed that whatever technology was going to be deployed had to meet their daily tasks. Again, the psyche of health personnel must be high in terms of digital curiosities. Personnel must yearn for new technology that would make their work more efficient, easy, and simple. Most health personnel feel the state must play a critical role in IHIS adoption through policy and direct investment since this study focused on the public health sector, which is wholly controlled and administered by the state.

Many researchers are therefore encouraged to delve more deeply into researching other factors that contribute to IHIS adoption other than the traditional constructs of fit and viability theory to unearth other drivers of technology like state policy and digital curiosity. It is important to note that this study was carried out in Greater Accra, where the most advanced and well-equipped hospitals can be found, so it is important to note that the responses might not represent

those of the rural setting, and the dynamics may be different there. From this study, it is very important for the government to consider task characteristics, organisational characteristics, digital curiosity, and state policy as very critical for implementing IHIS in the Ghanaian context. The government must also consider infusing the training of health personnel into the academic courses for health personnel so that they graduate with in-depth knowledge about IHIS before practising as licenced health personnel.

7.6 Limitations and Suggestions for Future Research

As with every study, this one had its own limitations, and below I enumerate a few of them. Most of the fit-viability theoretical framework was used to investigate IHIS in the developed world without much attention to the developing world. As the case may be, this study chose the most developed part of Ghana, which is the Greater Accra region, as its sample size without considering the rural setting. The study had four hundred and sixty-six (466) respondents spanning various departments within the hospital, including public health officials. It is important to know that the majority of Ghana is a rural setting, and considering only the Greater Accra region was one of the limitations of this study.

Again, the study focused on only health personnel in the public sector without considering the private health sector, which has a lot of well-advanced hospitals. The perspectives of those health personnel in the private sector would have made this study a holistic one. Currently, our findings can only be attributable to the public health sector, which is regulated and administered by the government. Once again, those who access health care and whose data will be harnessed in this IHIS to help health personnel deliver superior health care services are omitted from this study. It is important to know the views of Ghanaians on IHIS, where their health records will be collected, stored securely, transmitted, and used as and when necessary. People might have

reservations about the security of their electronic health records in this volatile cyber environment. This limitation is critical because without the involvement of society, people may not trust the IHIS system and might reject or rebel against it, which will lead to the failure of adoption. Further research, inclusive of society at large, is required to ascertain society's views on the adoption and use of IHIS. Further studies could use the UTAUT theory or other technology adoption theories to seek diverse views of health personnel towards an integrated health information system in Ghana's health sector. The scope of the study needs to be broadened to include rural areas, which were not covered in this research.

Lastly, this study adopted a quantitative approach. Further studies need to be carried out using other methodologies, like a qualitative or mixed-methods approach, to ascertain the direct views of users of IHIS and what they think about the integration of the whole public health sector. Because the qualitative approach generates rich insights and experiences of respondents rather than structured questions that may not be flexible for personal views of respondents, this will aid in generalising the express findings of this study. Again, government must be considered in future studies to learn its perspective on IHIS adoption, as well as the overall strategic state policy on digitization or IT adoption in the public health sector, so that a holistic approach to IHIS adoption and use in Ghana can be drawn.

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QUESTIONNAIRE

University of Ghana Business School

Dear Respondent,

My name is **Sancho Ackoussah,** an MPhil student at the Department of Operations and Management Information Systems of the University of Ghana Business School. I am conducting a study on "**Towards Integrated Health Information System in Ghana using Fit and Viability Theory".** I would be glad if you could take a few minutes of your busy schedule to fill this questionnaire for me. Participation is voluntary and therefore, there is no cash payment for participating in this research study. Please read carefully and pick the appropriate choice for each statement. Make sure to pick **only one** answer. All information provided shall be used purely for research purposes and shall be treated with confidentially.
For further information, please contact me through: ackoussah@st.ug.edu.gh or my supervisor: eakolog@ug.edu.gh

Prelude: An integrated health information system enables the secure flow of data where they can be used, to provide information to strengthen integrated care delivery, enable public health monitoring and management, and foster medical and health research and innovation.

Section A
General Information and Demographics (please choose [√]) where appropriate

1. Gender
   a. Male [ ]
   b. Female [ ]

2. Age
   a. 18-30 [ ]
   b. 31-45 [ ]
   c. 46-60 [ ]

3. Your highest of education
   a. No Formal Education [ ]
   b. Primary/JHS [ ]
   c. SHS [ ]

d. Diploma/HND [ ]
e. Bachelor [ ]
f. Masters [ ]
g. Doctorate [ ]

4. Select your field of profession
   a. Nurse/Midwife [ ]
   b. Doctor [ ]
   c. Pharmacist [ ]
   d. Laboratory Technician [ ]
   e. Records Office [ ]
   f. Public health Personnel [ ]
   g. Others [ ]

5. Years of experience……

6. Are you computer literate?
   a. Yes [ ]
   b. No [ ]
   c. Somehow [ ]

7. Indicate the name of your health facility……

SECTION B

Knowledge about Health Information Systems, its significance to health care delivery and how its integration would help the public health sector of Ghana. Please tick where appropriate.

1. Do you have any knowledge on health information systems?
   a. Yes [ ]
   b. No [ ]

2. Have you ever used any health information system before?
   a. Yes [ ]
   b. No [ ]

3. What is the name of the health information system you used?.....
   ……..

4. Do you believe that the age of a health facility is a determinant to the adoption and usage of integrated health information system?
   a. Yes [ ]
   b. No [ ]

5. Will the overall IT Policy of the state be a factor in the adoption and usage of integrated health information system.
   a. Yes [ ]
   b. No [ ]

6. How long have you used health information systems?
   a. Never used
   b. Less than two (2) years [ ]
   c. Three (3) to four (4) years [ ]
   d. Above five (5) years [ ]

7. How effective was the health information system you used?
   a. Very effective [ ]
   b. Effective [ ]
   c. Not too effective [ ]
   d. Not effective [ ]

8. Do you agree or disagree that health information systems should be an integral part of any public health facility?
   a. Strongly agree [ ]
   b. Agree [ ]
   c. Strongly disagree [ ]
   d. Disagree [ ]

9. Do the ethics of the health profession play any role in the usage of health information system to manage patients clinical data?
   a. Yes [ ]
   b. No [ ]

PART C

Towards an Integrated Health Information System.

Kindly read each statement carefully and choose the most appropriate answer. Strongly Agree **(5)**, Agree **(4)**, Neutral **(3)**, Disagree **(2)**, Strongly Disagree **(1)**

S/N	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	**4**	**3**	**2**	**1**
Task Fit						
TAF1	I find health information systems as very critical to efficient health care delivery and shaping public health policy.					
TAF2	Using health information system simplifies the workflows of public hospitals.					
TAF3	There is increased productivity with the use of health integrated information systems in public hospitals.					
TAF4	Fragmentation of patient clinical data will be greatly improved with the adoption and usage of integrated health information systems.					
TAF5	Health information systems are far efficient than the manual way of carrying out daily work flows.					

TAF6	Health care delivery becomes very effective and efficient when integrated health information system is deployed within the public health sector.					
TAF7	Communication within various departments of hospitals and other hospitals will be greatly improved by the adoption and usage of integrated health information systems.					
Technology Fit		**5**	**4**	**3**	**2**	**1**
TEF01	Data privacy is key to successful adoption and implementation of integrated health information systems.					
TEF2	There is a positive correlation between integrated health information systems and quality health care delivery.					
TEF3	The integrated health information system deployed must match the daily business processes of the health institution in terms of task execution.					
TEF4	Available IT infrastructure in public hospitals play a key role in the adoption and usage of health information systems.					
TEF5	Many health workers are curious and anxious about using an integrated health information system instead of the old manual system.					
TEF6	Integrated health information systems offer seamless communication between hospitals and their various departments which makes healthcare delivery speedier.					
Economic Viability		**5**	**4**	**3**	**2**	**1**
EV1	The net pay off from adoption of integrated information system outweighs the cost of deployment in the long run.					
EV2	Most public hospitals are reluctant in adopting and using health information system due to financial/economic constraints especially the recurrent expenditures on adoption and usage					
EV3	Adoption of integrated health information reduces the cost involved in the management of public hospitals.					
EV4	The use of integrated health information systems will significantly reduce the cost of referring patients to more advanced health facilities for reviews.					
EV5	One way to reduce recurrent cost in training of personnel to use the integrated health information system is to infuse the training on the system into the academic course outline of health workers.					
EV6	My hospital has the economic resources needed to adopt and use integrated health information system as well maintain it.					
IT Infrastructure Viability		**5**	**4**	**3**	**2**	**1**
IT1	Most hospitals within the public sector of Ghana do not have the requisite IT infrastructure to adopt, use and maintain integrated information systems.					
IT2	Most public hospitals are not yet ready to adopt integrated information systems due to unavailability of IT Infrastructure.					
IT3	Health institutions must be ready to use the Internet and related network technology if they are to adopt an integrated health information system.					

IT4	The adoption of integrated health information system needs obtainment of special hardware/software.					
IT5	Most public hospitals do not have the technical personnel to manage health information systems deployed thereby making the systems redundant.					
IT6	I have a high intention of accepting new technology in the performance of my duties.					
IT7	The local IT team in my hospital provides education on how health information system could help improve service delivery.					
Organizational Viability		**5**	**4**	**3**	**2**	**1**
OV1	Success of an integrated health information system is dependent on the acceptance of the system by end users.					
OV2	Training of staff on the usage of health information systems is essential to the success of adoption and usage of health information systems.					
OV3	Organizational structure, norms, values and flow of daily work schedule play a vital role in the adoption and usage of integrated health information systems.					
OV4	The relationship between senior management and junior health workers play a key role in the acceptance, adoption and usage of health information systems.					
OV5	The organization must have established policies on data management and security.					
OV6	My health institution provides regular training, tutorials and documentation on how to use health information system.					
State Policy on IT		**5**	**4**	**3**	**2**	**1**
SP1	Government should be responsible for the adoption of an integrated health information system in the public hospitals.					
SP2	It should be compulsory for all health personnel to be IT literate to make integrated health information systems a success story in Ghana's public hospitals.					
SP3	National policy on IT is a factor in the adoption and usage of health information systems in public hospitals.					
SP4	The health institution must have adequate hardware for adopting and operating an integrated health information system through government support.					
SP5	There should be a positive drive by the state towards digitalization in the public health sector if integrated health system is to be adopted and used.					
SP6	Policies of the government within the public health sector will either cause the success or failure of adoption of integrated health information system.					
Digital Curiosity		**5**	**4**	**3**	**2**	**1**
DC1	The curiosity of health workers towards a new technology will influence the success or failure of the new technology.					
DC2	My hospital is always excited about new and advanced technology that makes work easier and efficient.					
DC3	Staff of my hospital are quick to adopt, adapt, learn and use new technology once it has been approved by management.					

DC4	Internal rewards and motivation packages drive health personnel into accepting new technology in the performance of their duties.					
DC5	In order to improve service delivery and be much more efficient, health personnel are always curious about new technology in their field.					
Use of Integrated Health Information System		**5**	**4**	**3**	**2**	**1**
IHIS1	Integrated health information use in the health sector will significantly improve health care delivery.					
IHIS2	Usage of integrated health information system will significantly reduce mortality.					
IHIS3	Integrated health information system is a fit technology that can be used to deliver efficient healthcare services seamlessly across the public health sector.					
IHIS4	Integrated health information system is a viable technology that can help the public health sector deliver superior timely health care services.					