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Implementing Electronic Health Records management systems in mission hospitals in Bono region of Ghana: Analysis of key factors

Master's thesis in MSc Global Health
Supervisor: Maria Lisa Odland
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Abstract

Implementation of Electronic Health Records management systems in the health care system in Ghana is an appropriate way to keep patient information safe and easy to retrieve at all times. The study aims to explore and analyse the key factors that influence the implementation of an EHR management system in mission hospitals in the Bono region of Ghana. The study was hinged on the Technology, Organisation and Environmental (TOE) model by Tornatzky & Fleischer as the key theoretical framework.

The study relied mainly on primary data sources, where structured questionnaires were used to obtain the primary data for the study. The target population (N) received from the two (2) mission hospitals was 180 healthcare professionals. The researcher adopted a confidence interval of 95 per cent (1.96 z-score) and a 5 per cent (0.05) acceptable margin of error for the sample size determination. Therefore, the study's estimated sample size (n) was 123 participants.

The researcher considered correlation and regression analysis to determine the association between the decision to implement an EHR management system and other possible predictor factors. The data suggest that all three potential predictors (technological, organisational and environmental factors) correlated positively with the outcome variable (decision to implement an EHR). The result shows that the predictors collectively can account for 45% of the variance in the outcome variable, $p < .001$. Furthermore, the data suggest the unique individual contributions of the predictors; the result shows that technological factors ($\beta=0.142$, $p=0.125$), organisational factors ($\beta=0.293$, $p=0.01$) and environmental factors ($\beta=0.483$ $p<0.001$) positively predict the implementation of an EHR management system.

Moreover, this study shows that for a facility to adopt an EHR management system, premium emphasis has to be placed on the environmental factors since the survey revealed the environmental factors as the most substantive predictor of the outcome variable (decision to implement EHR).

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First and foremost, praise needs to be given to God, who has enabled me to see this long and winding journey through to completion. This thesis would not have been possible without the guidance of the following individuals who contributed in diverse ways and extended their precious assistance towards the successful completion and writing of this thesis.

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List of Abbreviations

CDC	Centre for Disease Control and Prevention
CDE	Clinical Data Exchange
CHAG	Christian Health Association of Ghana
CHPS	Community Health-based Planning Services
DSS	Decision Support System
DHMS	District Health Management System
EDI	Electronic Data Interchange
EHR	Electronic Health Records
EMR	Electronic Medical Records
HAMS	Health Administration Management System
HIT	Health Information Technology
HMIS	Health Management Information System
ICT	Information and Communications Technology
IT	Information Technology
KMS	Knowledge Management Systems
MoH	Ministry of Health
NHIA	National Health Insurance Authority
NHIS	National Health Insurance Scheme
OECD	Organisational for Economic Co-operation and Development
PHR	Personal Health Records
REK	Regional Committees for Medicine and Health Research Ethics
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
TOE	Technology Organisation Environment

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CHAPTER ONE

INTRODUCTION

1.1: Background Information

In the 21st century, quality information is a significant element in decision-making. There is a massive power in using technology to produce and communicate valuable and reliable information to increase the delivery of health services in all parts of the world. An efficient health care system is essential for developing any country. However, access to quality health care varies across countries, socioeconomic groups, and individuals. Access to health care is determined by different social and economic factors and the health policies and plans concerning the geographic location (Reinartz, 2004).

In some countries, health care planning is a shared responsibility among market participants, whereas, in others, planning is a core responsibility of the government or other coordinating bodies. With the government's commitment and effort to support technology advancement, most functions should be digital in this technological age to have efficient and proper work plans. The introduction of electronic systems will promote remote data collection and monitoring, communication of any disease and epidemic outbreak tracking, education, awareness, and diagnostic and treatment support. In addition, quality customer service delivery in the healthcare industry has a substantial economic impact on the long-term goal. It comprises the use of newer and more effective technology that helps in saving time and provision of functional, efficient, effective and quality health services (Tam, 2005).

Electronic Health Records (EHR) management systems are currently receiving considerable attention for sharing patient information, improving processes and optimizing patient outcomes in developing countries (Johnson, 2010). In the past few years, technology has taken up a more significant role in healthcare delivery as the true reflection of the introduction of Information Communication Technologies (ICT) into the global health care system. As a result, many private and public-funded health facilities commit massive resources to develop an EHR management system globally.

There is significant interest globally in the potential of EHR management systems to cut down the cost of healthcare and improve significantly the quality of services provided in various health facilities (Holroyd-Leduc, Lorenzetti, Straus, Sykes, & Quan, 2011). Deutsch et al. in 2010 cited EHR programs as a perceived opportunity for improving the health sector. On the other hand, these programs are complex and costly, especially in the developing world, where

health care expenditure is the patient's sole responsibility. In 2010, Deutsch and colleagues further evaluated EHR programs in five advanced nations (England, Germany, Canada, Denmark, and Australia). They established five critical areas for effective implementation: acceptance and change management, demonstration of benefits and funding, project management, health policy-related goals, and implementation strategy (Deutsch, Duftschmid, & Dorda, 2010).

In the developed part of the world, EHR implementation has been encouraged by government inducement schemes to serve as a motivation for performance in various facilities. An example is the Health Information Technology for Economic and Clinical Health Act of 2009 in the United States. Health care providers have received some support for the costs of information technology (IT) systems in compensation for increasing their systems (Jha, 2010). However, the situation is different in the developing world, where similar facilities struggle with limited resources, insufficient data collection systems, the lack of incentives to collect health information, and inadequately trained personnel for effective system implementation (Muinga, et al., 2018).

In recent years, the implementation of EHR management systems has been recognized in Sub-Saharan Africa because of the belief that these systems can improve health care quality through reliable and available patient information irrespective of the facility the patient is receiving health care service. Thus, effective EHR management systems play a crucial role in reducing medical errors by providing point-of-care information to support decision-making by alerting a doctor to drug interactions through an electronic prescription platform (Bates, et al., 2001). Therefore, this study seeks to assess the key factors influencing the implementation of EHR management systems in Ghana.

1.2: Statement of the Problem

An Electronic Health Record management system is a system that manages patient information in an interoperable, easily accessible, and highly effective means. Examples of such systems in Norway are DIPS and Doculive. EHR enables easy retrieval of important health information for patients irrespective of their treatment points. EHR technology has many advantages, including monitoring and recording diagnostic data, medical accounts, and disease symptoms. However, various health industry players, such as hospitals and healthcare centres in Ghana, have continued to use old-fashioned paper medical records. Additionally, empirical investigation shows that even in the aftermath of swift changes in technology and globalization,

some developing countries face significant barriers in implementing EHR that hamper or slow down the process.

The EHR management system monitors, records, and generates accurate information about patients' improvement in every healthcare setting, suggesting possible solutions to recurring or sustained symptoms (Ash & Bates, 2005). According to the World Health Organization (2011), a health system that works effectively and efficiently requires reliable and valid information to back decisions and policies, well-maintained health provision facilities, proper logistics to deliver quality medicines and technologies, and robust financing mechanisms.

In Ghana, patients' data were recorded in files stored in a file room while patients were issued with small cards to carry home. Patients have to produce these cards every time they visit the hospitals to retrieve their files. The process is not an efficient way to record data since there are many associated losses of cards, files, untraceable files, and time wasted trying to retrieve files. This data storage method also hinders the ease of sharing information among health care practitioners and the repetition of archiving patients' reports every time they visit a hospital. Furthermore, if the patient sees a different hospital, they have to be questioned again about their historical background and other ailments. The situation has resulted in medical errors and has handicapped the government in having consolidated health records that can help them to curb epidemics that could spread or occur. Moreover, their collecting and recording methods are not cohesive with the current technological advances. Data recording is moving from the paper recording system to the electronic platform, appreciating the power of technology.

Nevertheless, despite the potential of EHR in improving the quality, safety, and efficiency of patient care, a significant proportion of them (more than50%) either fail or fail to adequately support patient care (Gesulga, Berjam, Moquiala, & Galido, 2017) and (Miller & Sim, 2005). Yet, despite the benefits mentioned above that come with EHR management systems, several studies disclose that its implementation in Ghana is still in its infancy stages.

Additionally, the factors that hinder an EHR management system implementation are financial problems, ICT infrastructure, ICT personnel, availability of resources, hardware and software costs, and power supply. Therefore, this study sought to analyse how these factors influence EHR implementation using the technology, organisational and environmental (TOE) model for technology diffusion in the Bono region of Ghana.

1.3: Objectives of the Study

These objectives guided the study:

    i.   To identify the technological factors and analyse how they influence the implementation of an EHR management system in mission hospitals in the Bono region of Ghana.

    ii.   To identify the organizational factors and analyse how they influence the implementation of an EHR management system in mission hospitals in the Bono region of Ghana.

    iii.   To identify the environmental factors and analyse how they influence the implementation of an EHR management system in mission hospitals in the Bono region of Ghana.

    iv.   To make appropriate recommendations to facilitate EHR management system implementation in mission hospitals in the Bono region of Ghana.

1.4: Research Questions

The study sought to answer the following research questions:

    i.   What are the technological factors influencing the implementation of an EHR management system in mission hospitals in the Bono region of Ghana?

    ii.   What are the organizational factors influencing the implementation of an EHR in mission hospitals in the Bono region of Ghana?

    iii.   What environmental factors influence implementing an EHR in mission hospitals in the Bono region of Ghana?

    iv.   What are the extents to which the identified factors influence the decision to implement an EHR management system in mission hospitals in the Bono region of Ghana?

1.5: Significance of the Study

Information on the quality of delivered service, available medical resources, and the problems encountered is vitally in monitoring the progress of the delivery of health services and planning future action. In this epoch of technological advancement, a few ways have been introduced to improve data collection, e.g., EHR management systems. However, an adequately organized health information system is an indispensable tool needed to provide summative, relevant and timely information to ensure quality service is offered. Mwangi (2013) underscored those large institutions and hospitals had implemented the EHR management systems in large percentages.

Therefore, the ministry of health will be able to collect and analyse more data from the grassroots level on the health status in the country and plan for a better future and quality provision of health.

1.6: Delimitation of the Study

The scope of the study is on mission hospitals in the Bono region of the Republic of Ghana. These were considered due to ease of accessibility and also taking into consideration the time limit for this research because of the Covid-19 pandemic. The study targeted respondents from two (2) registered mission hospitals in the study area. Also, no other research of this kind has been done in the region. The study was delimited to analyse the impact of key factors influencing the implementation of EHR management systems in the study area, critically examining the technological, organizational, and environmental factors influencing the implementation of EHR management systems.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1: Introduction

This chapter reviews various works that have been undertaken in the field of factors influencing the implementation of an EHR management system. The chapter considers both theoretical and empirical evidence that has already been done in the area to serve as a guide to compare and contrast the findings of this work. The review in this chapter relates to variables under study, such as the ICT infrastructure, access to quality of internet, available software, the financial implications, level of ICT knowledge, health care practitioners' perception, subjective norms, social factors, and power supply in the implementation of an EHR management system.

2.2: Electronic Health Records Systems

Health Information Technology (HIT) consists of different technologies that transmit and manage health information for consumers, providers, insurers, and other groups interested in health and health care. In this study, the emphasis is on storing and processing data about patients. Even if these technologies contain many types of systems, these systems are familiar to physicians, such as the computerized storage and reporting of laboratory results, which permit clinicians to share information about patients across institutional and geographic boundaries. Many HIT types are essential, but EHR, personal health records (PHR), and clinical data exchanges (CDE) deserve specific consideration for their potential significance for health care services. The EHR is a technology that has the most critical effect on the daily work of physicians and other health care providers. According to the Institute of Medicine, EHR is a system that can do many functions electronically (Blumenthal & Tavenner, 2010).

2.2.1: Electronic Health Records

Electronic Health Record is extensively used in many countries, with variations in definitions and the extent of coverage. It is broadly accepted as a longitudinal health record with entries by healthcare practitioners in multiple sites where care is provided in today's environment. The USA definition for EHR currently includes all information in a traditional health record, including a patient's health profile and behavioural and environmental information. The content of the EHR management system also provides for the measurement of time, which permits for the addition of data across several occurrences and benefactors, and ultimately evolves into a lifetime record (Amatayaku & Mon, 2004).

2.2.2: Electronic Health Records Management Systems Benefits

Some health care providers discussed the high costs of preliminary capital investment for applying EHR in organizations. However, considering the benefits of implementing an EHR management system that can offset expenses involved in repairs, regular training of staff, and system upgrading, it is worthwhile to invest in it. EHR management systems provide many benefits to the government and health care providers as a whole. It can be accessed from multiple locations and units within the enterprise. Therefore, the time of accessing the patient's medical record is reduced; hence, productivity will increase, and the quality of care will improve. At the same time, it will allow applying the best clinical practices, especially in decision making.

EHR also gives advantages to clinical procedures like better chart access, improvement of clinical decision making, disease management, documentation enhancement, and increasing the free time spent with patients, which improves the perception of care and quality of work life. For example, the preliminary test results of the decision support system (DSS) in drug management and disease management emphasized clinical processes. Moreover, specific advantages for physicians are:

(i) Information, such as medical and family history, clinical history, vital signs, the visit duration, complaints, and recent lab test results are organized in proper format and easily retrieved,

(ii) The system prompts the physician to ask the right questions, reviews medications updates information, and checks to see whether screening and monitoring tests are completed on schedule,

(iii) Prescriptions and patient education materials can be printed with the click of a button (Andrews, 2003).

EHR can also empower individuals and communities by providing timely and understandable health-related information. With data available in real-time, the evidence-based would be strengthened and help decision-makers formulate effective health policies and monitor SDGs. In addition, it enables innovation through research, improves governance in the health industry, mobilizes new resources and ensures accountability in their use; strengthening national and health information systems will also require a collaborative effort (HMIS Need Assessment Report, 2003).

2.3: Technological Factors influencing the implementation of Electronic Health Records

2.3.1: Information and Communications Technology Infrastructure

An EHR management system software and hardware may not be deployed directly without customization. Therefore, to realize the imagined benefit, the system must be interlinked with other devices to complement it. Such interlink difficulties are a significant impediment to the massive implementation of an EHR management system (Menachem, Langley, & Brooks, 2007). Fundamentally, EHR technologies do not agree with the current operational outlines that health care practitioners are acquainted with. As such, caregivers are uncertain about abandoning familiar structures to take up a combined one comprising an EHR management system (Davidson, Elizabeth, & Heslinga, 2006).

Another study concluded that, because of the lack of consistent information customs in the setting, the information system differs across the various software packages and designs, making data exchange practically incredible (Simon, et al., 2007). Due to the diversely low facility capacities on proficiency and exposure, this dilemma is more severe on a small scale than in large-scale facilities. EHR frameworks offer the fundamental infrastructure on which other electronic care services can be laid. In Kenya, a study reviewed that physicians are prepared to carry out electronic investigations to reach and exchange health data with their counterparts in other parts of the world. However, insufficient ICT resources stalled them from performing searches (Gatero, 2011).

In another study conducted by Micevska (2005) on the flexibilities prevailing between data systems and public health advocacy in both Bangladesh and Lao, the standard of telecommunication framework is essential in public health. Transmission of health care data among health organizations, patients, and other stakeholders is challenged adversely if telecommunication and internet access is low (Mugo & Nzuki, 2014). Therefore, an adequate amount of hardware is needed to deploy an EHR management system. The absence of these foundational resources bars the broad uptake of an EHR management system (Vishwanath & Scamurra, 2007). In 2008, Ouma & Herselman underscored that computers' prices and overall absence bar the roll-out of ICT introduction in medical organizations in rural surroundings.

Additionally, the government has to control prices for this hardware to enable most citizens to acquire them and regulate internet charges (Omary, Zanifa, Mtenz, Lupiana, & Sheng, 2009). Miller and Sim (2004) maintained that many healthcare practitioners consider an EHR management system challenging due to the several monitors, replacements and management

aids. The difficulty and usability issue linked with EHRs means practitioners need to give time and effort to understand them. In addition, healthcare practitioners must master how to properly organize the EHR tools, which they regard as a problem. It is also probable that shortfall ineffectiveness motivates them to think the EHR tools are complex. In contrast, practitioners consider an EHR management system a machine-oriented tool designed and operated by IT companies (Boonstra & Broekhuis, 2010).

2.3.2: Level of ICT Knowledge and Implementation of EHR Systems

A digital divide exists between high, medium, low and non-users. As the disadvantaged users play catch up, the advantaged ICT users continually adopt newer technology and services. Electronic Health Records are hi-tech systems and multifaceted hardware and software; therefore, a certain level of computer knowledge is required for its practical use. There is scanty information personnel with capable capability for management and data analysis. The technical problems with EHRs experienced as they are being used need to be upgraded as development progresses. Therefore, some obstacles exist and are related to the technical issues of the systems, the technical capabilities of the health care practitioners, and the suppliers. Health care practitioners must show a willingness to invest in Information Technology for enhanced quality assurance (Cibulski & Hiawalyer, 2002).

2.3.3: Technical know-how

Most studies have captured ICT training among health care professionals as a critical element of electronic health. According to Ochieng and Hosoi (2005), in a study that sought to find the factors influencing the diffusion of electronic medical records in Japan, ICT skills are essential to foster positive attitudes about electronic medical records, translating to greater adoption of electronic medical records. Therefore, to raise ICT skills among clinicians, developed countries have incorporated ICT training in health courses offered at various academic levels. Additional programs of study such as health informatics, bioinformatics, computational biology, and medical informatics have been introduced into their national curriculum for study. Sood et al. (2008) note that developed countries use cutting-edge technologies like 3D simulations, virtual reality and robotics to train clinicians. Therefore, ICT is included in the curriculum of medical courses. Accessibility of ICT skills amongst healthcare professionals will lead to the acceptance and actual use of technological innovation in a healthcare setting. Thus, health care

professionals with ICT skills can appreciate the possible benefits of ICT in executing and improving the various processes they are being engaged in.

2.3.4: Insufficient Training and Support from Suppliers

In some cases, various stakeholders complain of poor service from the vendors, such as poor follow-up with technical issues and inadequate training and support for problems related to the system (Randeree, 2007). Another study showed that most system users find it very difficult to get timely services for the system from their suppliers (Ludwick & Doucette, 2009). This becomes challenging since most of these users are not technical experts, and the systems are also complicated.

In 2010, Omary et al. associated the low adoption of eHealth among developing countries with stakeholders' poor computer skills. In countries with integrated ICT training, acceptance of eHealth and actual use is relatively high (Khan, Shalid, Hedstrom, & Andersson, 2012). Regular exercise improves users' awareness and confidence levels to overcome challenges relating to the usage of the system (Sahay & Walsham, 2006). Abraham et al. (2011) added their voice by arguing that optimal use of IT towards transforming health care requires a minimum level of IT knowledge among medical personnel. The correlation between ICT skills and eHealth adoption was considered in 2012 by Juma et al.. They pointed out that inadequate ICT skills in the health sector in Kenya explain the low adoption of eHealth.

Moreover, Hogan & Palmer (2005) considered that health caregivers who have no ICT skills for handling data online spend too much time. According to Malik et al. (2008), inactive internet use among doctors in Pakistan was due to the unavailability of proper technology and lack of computer training. Therefore, the situation prevents the successful implementation of technology innovation in such health care settings.

2.4: Organizational Factors influencing the implementation of Electronic Records management

2.4.1: Organizational Size

Surveys by Miller et al. and Simon et al. show that facilities with extensive medical practice have a higher adoption rate than smaller practices. Another study indicated that health professionals in facilities with larger practices are more likely to use the system effectively than smaller facilities (Loomis, Rise, Saywell, & Thakker, 2002). The main reason is that the system users in larger organizations get additional support and training. On the contrary, larger

organizations need enough time to acquire and learn a system and transfer the paper base document into electronic form.

2.4.2: Leadership

According to the perspective of project management, leadership play a vital role in the success of a project. During the implementation of innovation projects, leaders are the people who lead, encourage and support the change at the management level (Terry, et al., 2008). Provided they firmly believe that EHRs will bring benefits and quality improvement, they will be willing to bear the risks and costs to generate the benefits (Mille & Sim, 2004). In project management, the primary function of leaders of projects is to encourage members to participate in the change process. Miller and Sim (2004) argue that practices without EMR champions may struggle to improve quality or see financial benefits from EMRs. Therefore, the leadership of projects should be encouraged to increase the adoption rate of an EHR management system.

2.4.3: Internet Connectivity

The quality of internet connectivity plays a significant role in introducing the EHR management system since its applications are built on internet connectivity. EMRs, PHRs, telemedicine, data transfer, and access to health information applications usually depend on the internet for their functionality. Norway, Finland, Sweden, Denmark, the UK, Germany, Switzerland, and Belgium perform well in the developed world, with over 70% of households with broadband connectivity (OECD, 2013). This means that countries with high internet connectivity are more ready to accept internet-based health solutions.

In Ghana, 15.7milion population are internet users as of January 2021. The internet penetration rate also stood at 53% in January 2021. The country has an internet download speed of 9.23 megabytes per second (Mbps) as of 2021. This indicates high internet connectivity compared to its neighbouring countries.

2.5: Environmental Factors influencing the implementation of Electronic Health Records

2.5.1: Legal and Regulatory Requirements

Appropriate legal and regulatory requirements for innovation in a healthcare setting are crucial for successful implementation since the healthcare industry has broader stakeholders. But, applicable standards for therapeutic practice, interoperability of patient information, recommended software, transmission, infrastructure, architecture, medical informatics, and bioinformatics are not promulgated in developing countries (Omary et al., 2009; Kathryn,

2011; Juma et al., 2012). For instance, insufficient electronic legislation and eHealth values have negatively affected EHR implementation in Kenya, whereas the situation is not different in Ghana (Kathryn, 2011).

In Ghana, it seems that apart from a few articles contained in the Electronic Communications Act, 2008 (Act 775) Section 4(2), that limit access to electronic personal information of the customers of the telecommunications industry, there is no specific national legislation or regulation instrument to protect patient information at any level (Electronic Communications Act, 2009). This provides an excellent example of the gap in the legal framework for protecting privacy regarding patient data in information technology, which may negatively affect the adoption of information technology in the health sector.

2.6: Factors Influencing Electronic Health Records Implementation

To have a general impression of the potential factors influencing the implementation of an EHR management system, the researcher grouped these factors into three main sections in relation to the TOE model adapted for the study. Therefore, these factors are discussed according to Technological, Organizational and Environmental factors.

This category of barriers involves those related to monetary issues involved in the implementation of the EHR management systems. The overall cost of implementation is often cited as a barrier to their use. Many healthcare practitioners' primary question is whether they have the required money for the start-up and implementation of the systems and the ongoing maintenance costs. Very few of these healthcare facilities have enough cash on hand to make an upfront capital investment in an EHR management system. As a result, most do not budget it even as a start-up requirement for operation. To operate efficiently, the minimum and correct amount of resources behind it need to be available so that the health care practitioners can reach a return on investment (Soumerai, 2010). The UK government did not consider this and invested hugely in the project that ultimately failed and did not return on investment. The implementation of an EHR management system is associated with three categories of costs:

2.6.1: Preliminary Cost of Implementation of Electronic Health Records

These include the cost needed to purchase and obtain an EHR system working in the health care practitioners' practice, e.g. the software and hardware (computers, printers and network installation), annual operating license fees, maintenance and support costs of hardware and software, e.g. support staff. In addition, many industries adopted electronics-based

technologies during the 1970s and '80s**.** Again, after reviewing the impact of computers found out that complementary organizational investment could be much more than investing in the computer itself (Brynjolfsso & Lorin, 2000)**.**

2.6.2: Transition Costs

These are the costs of transferring from a paper base document to an electronic system, such as the temporary data entry from records to electronic systems. This technology transition could be difficult for productivity management, with substantial adoption costs incurred. This could include expenses like engaging data entry clerks, proofreading the entered data, which takes time and money, hiring a system administrator to take care of the system when technical issues arise, learning new skills, implementing new forms of organization etc.

ICT often involves customization and software, which remains unmeasured in official statistics. Because such complementary investments appear in official productivity statistics only as resource costs without the corresponding involvement to buy (and hence output), productivity may be wrongly-measured (Brynjolfsson and Hitt, 2000). These concealed costs that can occur over time could make the health care practitioners anxious about the future benefit of the project when they compare it with such expenses.

2.6.3: Maintenance Cost

In 1999, Kiley explored the pattern developing after adoption and established an increase in organizational costs in the '70s: wages and skill premium changes. In addition, once the system is installed and working, other costs are involved in the maintenance and support of the system's running. To have an EHR system working efficiently and effectively, extensive-term costs will be incurred, e.g. annual license fees, training, technical support staff employment, monitoring of the system outcomes, modifying and advancement and maintenance of EHR. These require proper financial planning and far-reaching commitment to circumvent system failure. In addition, vendors charge a lot of money for after-sales service.

2.7: Theoretical Framework

The identified factors influencing the adoption of an EHR management system were categorized into technological, organizational, and environmental factors. This study adapted the Technology, Organization, and Environmental (TOE) model, which was developed by

Tornatzky and Fleischer (1990) to explain the diffusion of technological innovation. The TOE framework was initially presented and later adapted in IT adoption studies.

The TOE has been carefully chosen for this study because it provides a functional, logical basis suitable for reviewing the adoption of IT innovation. In addition, the TOE framework has a solid theoretical basis, consistent empirical support and the potential for application to IS innovation domains. However, specific factors identified within the three contexts may vary across different studies. It recognizes three fundamental aspects of an enterprise's context that manipulate the adoption of technological innovation: technological context, organizational context, and environmental context in the figure below.
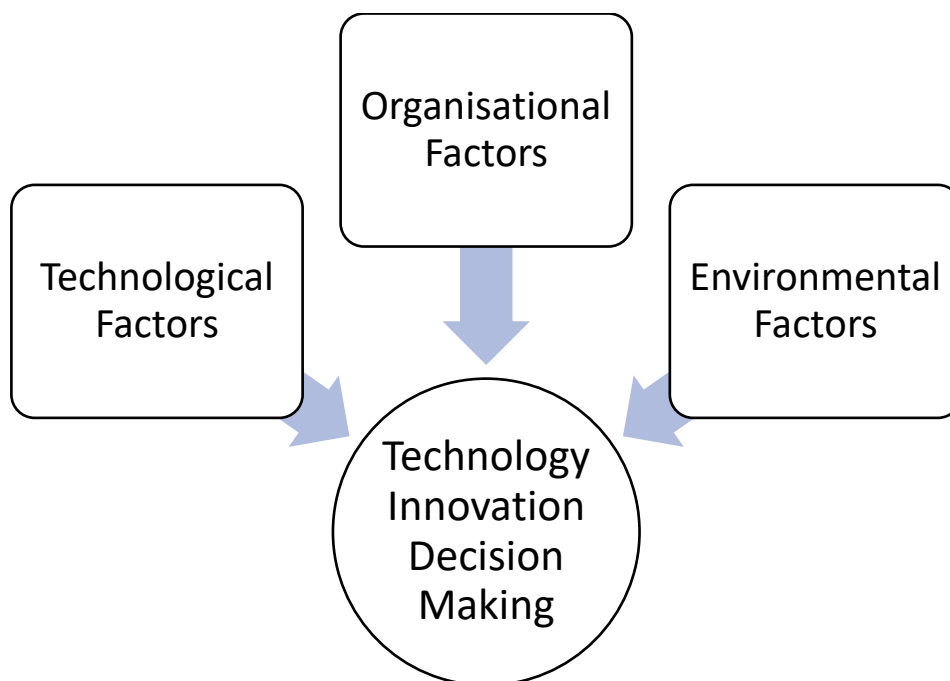
Figure 1: Adapted from the TOE model

Technology, organization and environmental framework (Tornatzky & Fleischer, 1990)

The technological context describes both the internal and external technologies relevant to the facility. It includes the level of ICT knowledge of health care practitioners (Starbuck, 1976), and the set of available ICT infrastructure external to the facility (Hage, 1980). The organizational context also refers to descriptive measures about the organization such as scope, financial and leadership structure. On the other hand, the environmental context refers to the arena in which the facility conducts its business, perceptions of health care practitioners, power supply, and dealings with the government (Tornatzky and Fleischer 1990).

Numerous writers have adapted the TOE framework in their work to understand different IT adoptions, such as Electronic Data Interchange (EDI) (Chau & Kuan, 2001) and Knowledge Management Systems (KMS) (Lee, Wang, Lim, & Peng, 2009)**,** among others.

CHAPTER THREE

METHODOLOGY

3.1: Research Design

This research sought to determine and analyse the key factors influencing the implementation of an Electronic Health Record management system in the Bono region of Ghana mission hospitals. A non-interventional (exploratory) study was conducted because the study aimed at exploring and analysing the variables under study without assigning interventions. The researcher adopted exploratory research because the main objective is to identify critical issues and variables. Consequently, the researcher employed an analytical approach to achieving the study's objectives. The study sought to identify the key factors influencing EHR implementation and analysed their impacts to recommend effective strategies for implementing EHR management systems in mission hospitals in the Bono region of the Republic of Ghana.

3.2: Type of Research

The researcher used a quantitative research approach in the study. A quantitative research design involves numerical data or contains data that could usefully be quantified and uses analytical techniques such as graphs, charts and statistics that explore, present, describe and examine relationships and trends within data. Muijs (2010) explained the quantitative research approach as a systematic way of explaining phenomena through numerical data collection and analysis using mathematical procedures in statistics. The researcher employed a quantitative research design because the study aimed to investigate the key factors influencing EHR implementation in mission hospitals in the study area.

3.3: Study Setting

This section of the methodology describes the study area. However, the researcher chose the study site because it is the domicile region of the researcher in Ghana; mission health facilities are the primary source of healthcare for the people of the Bono region. Mission health facilities were also selected because the researcher had the opportunity to do three (3) months of practicum in one of the hospitals during his undergraduate program. Therefore, the investigator had a better understanding of how health care services are delivered in these facilities.

3.3.1: Profile of Ghana

The study took place in the following mission hospitals in the Bono region of Ghana: Drobo St. Mary's Hospital and Wenchi Methodist Hospital. Ghana, previously known as Gold Coast, is located on West Africa's coast and shares borders with Togo on the east, Cote d'Ivoire on the west, Burkina Faso on the north, and the Gulf of Guinea on the south. Ghana was the first nation on the African continent to gain independence in 1957 from the British. As a result, Ghana accepted English as her official language, although there are about 46 different languages spoken since the country was colonized by the British.

Geographically, Ghana occupies an area of 238,533 square kilometres and is gifted with natural resources such as gold, diamond, bauxite, petroleum, rubber, manganese and timber of all kinds and among other natural resources (World Factbook, 2014). Ghana has about 31,072,940 population (Ghana Statistical Service, 2021). The country is divided into 16 regions, 261 districts and 275 constituencies and has Accra as its capital.

3.3.2: Healthcare System in Ghana

Two actors mainly provide healthcare in Ghana; public and private institutions (private commercial and faith-based or religious institutions). With its various departments and agencies, the Ministry of Health (MoH) serves as an executive regulatory body that regulates the activities of the various public and private healthcare institutions in Ghana. The MoH also oversees the country's quality and equitable distribution of healthcare. However, under Act 525 of 1996 (Ghana Health Services Act), some responsibilities and authority have been lifted from the MoH to the Christian Health Association of Ghana (CHAG). Mission health facilities are prime members of the CHAG. The CHAG is responsible for implementing national health policies under MOH, regulating and providing healthcare services (including public health) at all levels of care in Ghana (IICD, 2014). In providing healthcare services, the CHAG is also required by law to improve healthcare quality and manage resources available to provide healthcare cautiously.

Healthcare delivery in Ghana is ranked through seven main delivery channels: Community Health-based Planning Services (CHPS), Health centres, Clinics, Polyclinics, District hospitals, Regional hospitals, and Teaching hospitals. Thus, cases are referred from the lower level to the next higher level for immediate attention until it gets to the Teaching hospitals.

In Ghana, healthcare is mainly financed by the National Health Insurance Scheme (NHIS), individual payment methods, and government and other donor support. The NHIS covers about

16,769,158 of Ghana's population. Out of the total subscribers, 973 246 subscribers are from the Bono region. The NHIS Scheme allows subscribers to do advance registration to access the required benefits provided by the scheme. The scheme accredited all public health facilities and some private facilities to provide services to NHIS subscribers in advance. Nonetheless, the scheme does not cover all medical procedures and treatments and hence requires clients to pay for the uncovered therapies. Individuals who are not NHIS subscribers pay directly from their pockets for any services rendered to them by healthcare providers.

Inadequate medical personnel and the inequitable distribution of health workers amongst the various levels of care delivery are significant challenges faced by the Healthcare system in Ghana. Almost all the trained health professionals and equipment are located in the cities. As a result, people in remote areas find it extremely difficult to access quality healthcare. As of 2010, the ratio of doctors and nurses per 1000 population in Ghana was 0.11 and 1.14 (Bedeley & Palvia, 2014).

3.4: Study Population

The research was conducted in the Bono region of Ghana, specifically in the mission hospitals. The study recruited health professionals working in mission hospitals in the Bono region. The target population for the survey included health workers involved in the health care delivery in the facilities directly. Though the hospitals have various categories of personnel, the researcher focussed on the clinicians, administrative staff and medical records staff in the facilities for reliable data for the study. The study considered these healthcare professionals because it is believed that they are the people who have direct involvement in the implementation of the EHR management system. Therefore, it was appropriate for the researcher to involve these people in the sample frame. Below is the list of health professionals that were involved in the sample frame:

Table 1: The population of Health professionals in the selected facilities

The population of Health professionals in the selected facilities

Category	Number of personnel
Clinicians	130
Administrative staff	8
Medical Records staff	42
Total	**180**

Source: Field Survey, 2022

3.5: Sampling Procedure

3.5.1: Sampling Frame

A sample frame is the entire list of potential respondents who can be involved in a study project. The sample frame generally contains the name of the respondents and possibly appropriate contact information. However, the sampling frame for the study was a complete list of health professionals on the nominal staff roll in the selected mission hospitals in the Bono region of the Republic of Ghana. These health professionals comprise clinicians, administrative staff and medical records staff.

3.5.2: Sample Size and Technique

A significant matter in inferential studies is appropriate sample size determination. Suitable sample size is needed for a survey to provide reliable and reproducible evidence to notice a study instrument's required uniformity or stability (Mohamad, Evi, & Nur, 2018). In this study, the researcher used the StatCal function in Epi info 7 software to determine the appropriate sample size for the study. The Epi info software was designed by the Centre for Disease Control and Prevention (CDC) to facilitate their operational mandate.

The target population (N) obtained from two (2) mission hospitals was 180 healthcare professionals. The researcher adopted a confidence interval of 95 per cent (1.96 z-score) and a 5 per cent (0.05) acceptable margin of error for the sample size determination. Therefore, the study's estimated sample size (n) was 123 participants. See appendix 1 for sample size from StatCal function from Epi info 7 software.

The researcher employed a non-probability (purposive) sampling approach to select the study participants. A purposive sampling method is based on the researcher's judgment on who will provide the correct information to succeed in the study's objectives (Etikan & Kabiru, 2017). Therefore, the researcher needs to focus on those with the same opinion to have the required information and be eager to share it. As a result, the researcher settled on the administrative staff, clinicians and the medical records staff for answers to the research questions.

3.6: Data Collection Method

Data collection in research is a logical compilation of relevant data for the study (Best & Kahn, 2006). In research, data collection is assembling and measuring relevant information on a particular variable of interest. Data collection establishes a systematic way that enables an investigator to answer specified study questions. The component of data collection in research is common to all fields of study, including physical and social sciences, humanities, business, etc.

The study relied mainly on primary sources of data. The researcher used structured questionnaires to obtain the primary data for the study. The questionnaire helped gather data on implementing the EHR management system in mission hospitals in the Bono region of Ghana: Analysis of key factors. The questionnaire, as earlier mentioned, consisted mainly of close-ended pre-coded questions. The questions in the questionnaire were based on the validated constructs in the TOE model that was adapted for the study. The response sets were made up of numerical responses, Likert scales and ranking scales. This study used a questionnaire as a primary tool for data collection due to its advantage of allowing the researcher to get first-hand information from the study participants.

The questionnaire contains five sections. Section 1 captures information on the demographic characteristics and profiles of the respondents, such as gender, age, level of education, and job description. Sections 2, 3 and 4 contain questions relating to the TOE model's technological, organizational, and environmental context developed by Tornatzky and Fleischer (1990). The last section considered the factors influencing the implementation of the EHR management system.

The study instrument contains only structured (close-ended) questions. For closed-ended questions, a five-point Likert Scale was used, which includes: (5) strongly agree, (4) Agree, (3) Neutral, (2) Disagree and (1) strongly disagree. After data collection, the five-point Likert scale

was recoded to a three-point Likert scale which includes: (3) Agree/Strongly agree, (2) Not sure and (1) Strongly disagree/Disagree. Closed-ended questions were considered because they are easier to administer and examine.

Moreover, the researcher investigated the study questions through the following descriptions during data collection:

i.   The study sought to find the technological factors influencing the implementation of an EHR management system. As a result, the study participants were requested to specify the extent to which they agree with the statements in Appendix A.

ii.   The study considered the organizational factors influencing the implementation of an EHR management system. Hence, the respondents were asked to indicate the extent to which they agree with the statements in Appendix A.

iii.   The study further considered environmental factors influencing the implementation of an EHR management system. Therefore, the study participants were requested to specify the extent to which they agree with the statements in Appendix A.

3.7: Pre-testing

The research instrument was pre-tested to assess its validity and reliability to check the appropriateness of the questionnaire. The study instrument was pre-tested at the Techiman Holy Family Hospital in the Bono East region since that was not part of the selected facilities for the study. The Techiman Holy Family Hospital is also a mission hospital and therefore has similar governance and operation procedures. In addition, the facility offers similar services that the selected facilities do. Consequently, it was appropriate for the study to use the facility for piloting the research instrument. For the study instrument, 30 copies were distributed to the health professionals. The data were screened and coded into SPSS version 21. Also, the reliability of the questionnaire was examined. The Cronbach's Alpha scores were determined to indicate the reliability of the individual items.

3.8: Reliability and Validity of the Research Instrument

A questionnaire is one of the most commonly used tools for data collection in health system research. The core objective of such a research instrument in a study is to acquire the most reliable and valid data for the researcher to achieve the study's intended purpose. Therefore, the researcher was mindful of the internal consistency of the study questionnaire. Then, the researcher employed SPSS version 21 software to assess the reliability and validity of the

questionnaire. Finally, the researcher conducted a reliability analysis for each construct (technological, organizational, and environmental). Thus, the researcher conducted a construct reliability analysis with all the constructs and an overall reliability analysis with all the items in the questionnaire. The results can be obtained in the table below:

Table 2: Reliability Statistics

Dimension	Cronbach's Alpha	Number of Items
Overall	0.917	50
Technological Factors	0.799	13
Organisational Factors	0.849	11
Environmental Factors	0.828	8
Factors Influencing Implementation	0.865	14

Source: Survey, 2022

The researcher used Cronbach's Alpha to determine the reliability of the study instrument, which is the measure of the internal consistency of the variables under study. Cronbach's alpha coefficient suggests high internal consistency when the alpha value is closer to 1. Thus, a reliability coefficient of 0.70 is considered acceptable, assuming that the study instrument is reliable. The research instrument had excellent internal consistency since the reliability analysis gave Cronbach's alpha coefficient 0.917.

On the other hand, the researcher considered the validity of the same instrument using SPSS version 21. The validity of the questionnaire describes how well the collected data covers the actual area of investigation. According to Mugenda and Mugenda (2003), validity is the accuracy and significance of inferences based on the research results. For a data collection instrument to be considered valid, the content selected and included must be relevant to the need or gap established. According to Orodho (2004), piloting helps establish whether the questions measure what they are supposed to measure. The results obtained from the data analysis should represent the study's variables. During the validity assessment, the researcher discovered that three variables were not valid in the questionnaire and were ignored in the analysis.

3.9: Data Analysis

This study used descriptive statistics in analysing the data collected. Descriptive data analysis is the most common form of data analysis in quantitative research. Descriptive data analysis also involves describing, summarising, and finding patterns by calculating the mean, median, mode, percentage, frequency, and range. Generally, descriptive data analysis is considered the starting point from which other data analysis commences. Therefore, the researcher employed descriptive data analysis and conducted correlation and regression analysis.

The survey data were coded according to the research themes and analysed as per the research questions. The researcher employed Statistical Package for Social Sciences (SPSS) version 21 and Microsoft Excel 2019 to analyse the data from the survey. The SPSS and Microsoft Excel software was used to summarise data using- measures of central tendency (mean), frequency distribution tables and percentages. Also, the SPSS was used to conduct correlation and regression analysis to assess the relationship between the key variables and the implementation of the EHR management system. The researcher conducted all the analyses at a 95% confidence level ($\alpha = .05$).

The researcher employed correlation and multiple regression analyses as the principal analysis to examine the relationship between the decision to implement EHR and other potential predictors. Correlation and multiple regression analysis were considered because the study sought to investigate how Technological, Organisational, and Environmental factors influence mission health facilities' decision to implement an EHR management system in the study area. The following are the descriptions of the analysis performed for each of the research questions:

Question 1: The extent to which technological factors influence the implementation of an EHR management system. Question 1 was analysed using Pearson correlation and p-value. The dependent variable for research question 1 was technological factors influencing EHR implementation, as measured by the availability of ICT infrastructure, Perceived compatibility, level of security and technical know-how. These were Likert scale questions coded into continuous variables. These variables were coded from the responses to questions 1 through 16. In addition, the study participants were requested to specify the extent to which they agree that the availability of ICT infrastructure, perceived compatibility, security and technical know-how influence EHR implementation in their facilities. These responses were further coded into

continuous variables. Therefore, the relationship between the dependent and independent variables was analysed using Pearson correlation.

Question 2: The extent to which organisational factors influence the implementation of an EHR management system. Question 2 was analysed using Pearson correlation and p-value. The dependent variable for research question 2 was organisational factors influencing EHR implementation, as measured by the size of the facility, scope of business operation and subjective norms. These were also Likert scale questions coded into continuous variables. The variables were coded from the responses to questions 17 through 27. The study participants were further asked to specify the extent to which they agree that the size of the facility, scope of business operation and subjective norms influence EHR implementation in their facilities. These responses were further coded into continuous variables. Therefore, the relationship between the dependent and independent variables was analysed using Pearson correlation.

Question 3: The extent to which environmental factors influence the implementation of an EHR management system. This question was analysed using Pearson correlation and p-value. The dependent variable for research question 3 was environmental factors influencing EHR implementation, and it was measured by government support and external support. These were also Likert scale questions coded into continuous variables. The variables were coded from the responses to questions 28 through 35. Again, the study participants were further asked to specify the extent to which they agree that government support and external support influence EHR implementation in their facilities. These responses were additionally coded into continuous variables. Therefore, the relationship between the dependent and independent variables was analysed using Pearson correlation.

Moreover, the study considered factors affecting the decision to implement an EHR management system. This was measured by financial cost, technical issues and social issues. These were Likert scale questions coded into continuous variables. These variables were further coded from the response to questions 36 through 49. Therefore, the study participants were asked to indicate the extent to which they agree with the named factors influencing the decision to implement an EHR management system. The association between the dependent and independent variables was analysed using Pearson correlation and p-value.

Finally, the study used technological, organisational and environmental constructs from the adapted model to run a correlation and regression analysis with factors influencing the implementation of an EHR management system.

3.10: Ethical Consideration

The Regional Committees for Medicine and Health Research Ethics (REK) approved the study without ethical clearance since the study does not form part of the category of studies requiring ethical approval from REK. Consequently, the researcher sought permission from the health service administrators of the hospitals involved in the survey before the questionnaires were administered.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF RESULTS

4.1: Demographic Response of the Respondents

The demographic characteristics of the respondents of the study are presented in the table below. Among the study participants, 34 (51%) and 33 (49%) were male and female. The majority of the participants were in the age groups of 26-33 and 34-41 years, with both having 22 (33%) respondents. On the contrary, 7 (11%) and 3 (5%) were found in the 18-25- and 50-58-years groups, respectively. Also, 24 (36%) and 19 (28%) of the respondents have a Diploma and Degree as their highest level of education, respectively. Among the study participants, 38 (59%) were clinicians, whereas 21 (32%) were medical records staff.

Table 3: Demographic Characteristics of the Participants in the Study

Variable	Category	Valid Percentage
Gender (N=67)	Male	33 (49%)
	Female	34 (51%)
Age(N=66)	18-25	7 (11%)
	26-33	22 (33%)
	34-41	22 (33%)
	42-49	12 (18%)
	50-58	3 (5%)
Educational Level (N=67)	Post Graduate	6 (9%)
	Graduate	19 (28%)
	HND	13 (19%)
	Diploma	24 (36%)
	Certificate	5 (8%)
Job Type (N=65)	Administrative staff	6 (9%)
	Clinician	38 (59%)
	Medical records staff	21 (32%)

Source: Field survey 2022

4.2: Availability of Information and Communication Technology Infrastructure

In table 4, you can see the participant's responses on the availability of ICT infrastructure. Only 31 (46%) of the respondents agree/strongly agree that their facilities have adequate computers for operation, whereas 22 (32%) strongly disagree/disagree that their facilities have enough computers for operation. Also, 29 (43%) of the respondents agree/strongly agree that their facilities have access to quality internet coverage. Moreover, 53 (78%) respondents indicated that they are unsure if mobile devices are available in their facilities.

Table 4: Responses to the Availability of ICT Infrastructure

Variable	Category	Valid Percent
Adequate computers for operation(N=68)	Strongly disagree/disagree	22 (32%)
	Not sure	15 (22%)
	Agree/Strongly agree	31 (46%)
Quality of the internet (N=68)	Strongly disagree/disagree	19 (28%)
	Not sure	20 (29%)
	Agree/strongly agree	29 (43%)
Availability of software at the facility(N=68)	Strongly disagree/disagree	19 (28%)
	Not sure	20 (29%)
	Agree/strongly agree	29 (43%)
Availability of mobile devices (N=68)	Strongly disagree/disagree	15 (22%)
	Not sure	53 (78%)

Source: Field survey 2022

4.3: Responded Rate of Perceived Compatibility

The table below presents the results of the respondents from the survey on perceived compatibility**.** As seen in Table 5, the majority of the respondents, 42 (62%), agree/strongly agree that they can use database software like DHMS, HAMS and Microsoft Access very well. However, on the other side, 12 (18%) of the respondents strongly disagree/disagree that they can use database software like DHMS, HAMS and Microsoft Access very well. Another 44 (65%) also agree/strongly agree that they can use office utility software like Microsoft Word and Excel very well. In contrast, only 3 (4%) strongly disagree/disagree that they can use office utility software like Microsoft Word and Excel very well.

Table 5: Responded Rate of Perceived Compatibility

Variable	Category	Valid Percent
I can use database software, e.g. DHMS, HAMS, Access, very well (N=68)	Strongly disagree/disagree	12 (18%)
	Not sure	14 (21%)
	Agree/Strongly Agree	42 (62%)
I can use internet search engines like google.com very well (N=68)	Strongly disagree/disagree	12 (18%)
	Not sure	14 (21%)
	Agree/Strongly agree	42 (62%)
I can use e-mailing communication, e.g. yahoo, Gmail etc., very well (N=68)	Strongly disagree/agree	7 (10%)
	Not sure	21 (31%)
	Agree/Strongly agree	40(59%)
I can use office utility software/word/excel very well (N=68)	Strongly disagree/disagree	3(4%)
	Not sure	21 (31%)
	Agree/Strongly agree	44 (65%)

Source: Field survey 2022

4.4: Responded Rate of Security of Electronic Health Record Management System

Table 6 shows the rate of security of the Electronic Health Record management system and indicates that 47 (69%) of the study participants agree/strongly agree that patient information is well secured and protected. On the other hand, 11 (16%) strongly disagree/disagree that patient information is well maintained in their facilities. Also, 48 (71%) of the participants agree/strongly agree that the integrity of patient information is well managed in their facilities. On the contrary, 8 (12%) of the participant strongly disagree/disagree that patient information is well maintained in their facilities. Finally, 41 (61%) of the participants in the survey

agree/strongly agree that their facilities have a reliable data recovery system, whereas 8 (11%) of them strongly disagree/disagree with that assertion.

Table 6: Responded Rate of Security of EHR Management System

Variable	Category	Valid Percent
Confidentiality of patient information is well secured (N=68)	Strongly disagree/disagree	11 (16%)
	Not sure	10 (15%)
	Agree/Strongly disagree	47 (69%)
The integrity of patient information is well managed (N=68)	Strongly disagree/disagree	8 (12%)
	Not sure	12 (18%)
	Agree/Strongly agree	48 (71%)
Proper policy for the protection of patient information (N=68)	Strongly disagree	7 (11%)
	Not sure	15 (22%)
	Agree/Strongly agree	46 (67%)
Reliable data recovery system (N=68)	Strongly disagree/disagree	8 (11%)
	Not sure	19 (28%)
	Agree/Strongly agree	41 (61%)

Source: Field survey 2022

4.5: Responded Rate of Technical know-how

According to the table below, 41 (60%) of the respondents agree/strongly agree that their facilities have regular staff training on ICT applications, but 14 (21%) of them strongly disagree/disagree with that. Also, 37 (54%) of the study participants agree/strongly agree that their facilities have accessible technical/maintenance units, whereas 8 (12%) of them considered otherwise. Moreover, 37 (54%) of the participants in the survey agree/strongly agree that their facilities have enough technical officers for operation, while 10 (15%) of them strongly disagree/disagree with that claim.

Table 7: Responded Rate of Technical know-how

Variable	Category	Valid Percent
Regular training of staff on ICT (N=68)	Strongly disagree/disagree	14 (21%)
	Not sure	13 ((19%)
	Agree/Strongly agree	41 (60%)

Variable	Response	Valid Percent
Accessible technical/maintenance unit (N=68)	Strongly disagree/disagree	8 (12%)
	Not sure	23 (34%)
	Agree/Strongly agree	37 (54%)
Accessible service providers and spare parts (N=68)	Strongly disagree/disagree	5 (7%)
	Not sure	27 (40%)
	Agree/Strongly agree	36 (53%)
Adequate technical officers employed for the operation (N=68)	Strongly disagree/disagree	10 (15%)
	Not sure	21 (31%)
	Agree/Strongly agree	37 (54%)

Source: Field survey 2022

4.6: Responded Rate of Size of the Facility

The below table proves that 39 (57%) of the study participants agree/strongly agree that their facilities have enough resources for operation, while 14 (21%) of the participants thought otherwise. Another 40 (59%) of the study participants agree/strongly agree that their facilities can adapt and return to their shape after the crisis, whereas 11 (16%) of them strongly disagree/disagree with that. Moreover, on the issue of operational agility of their facilities, 37 (54%) of the respondents agree/strongly agree that their facilities can adapt successfully and efficiently to unexpected changes, but 8 (15%) of the respondents strongly disagreed/disagreed with that.

Table 8: Responded Rate of Size of the Facility

Variable	Response	Valid Percent
Enough resources for operation (N=68)	Strongly disagree/disagree	14 (21%)
	Not sure	15 (22%)
	Agree/Strongly agree	39 (57%)
High level of resilience (N=68)	Strongly disagree/disagree	11 (16%)
	Not sure	17 (25%)
	Agree/Strongly agree	40(59%)
Operational agility (N=68)	Strongly disagree/disagree	8 (15%)
	Not sure	21 (31%)

	Agree/Strongly agree	37 (54%)

Source: Field survey 2022

4.7: Responded Rate of Scope of Business of Operation

Table 9 shows that 44 (64%) of the respondents agree/strongly agree governance structure of their respective facilities makes an EHR management system implementation. On the contrary, 6 (9%) respondents thought otherwise. Furthermore, another 48 (71%) of the participants agree/strongly agree that the communication channel in their facilities affects the implementation of an EHR management system. Finally, 44 (65%) of the study participants also agree/strongly agree that the commitment of the management of their facilities affects the implementation of an EHR management system in their respective facilities.

Table 9: Responded Rate of Scope of Business of Operation

Variable	Category	Valid Percent
Governance structure makes implementation of EHR complex (N=68)	Strongly disagree/disagree	6 (9%)
	Not sure	18 (26%)
	Agree/Strongly agree	44 (65%)
Communication channel affects the implementation of EHR (N=68)	Strongly disagree/disagree	6 (9%)
	Not sure	14 (20%)
	Agree/Strongly agree	48 (71%)
Management commitment affects implementation(N=68)	Strongly disagree/disagree	2 (3%)
	Not sure	22 (32%)
	Agree/Strongly agree	44 (65%)
Source of funding is affecting implementation (N=68)	Strongly disagree/disagree	6 (9%)
	Not sure	16 (23%)
	Agree/Strongly agree	46 (68%)

Source: Field survey 2022

4.8: Responded Rate of Subjective Norms

The table below indicates that 50 (73%) of the health professionals who took part in the survey agree/strongly agree that other similar facilities influence implementing an EHR management system in their facilities. In comparison, 8 (12%) of those participants thought otherwise.

However, 41 (61%) of the health professionals who took part in the survey agreed/strongly agreed that staff are not comfortable implementing the new system, whereas 10 (15%) thought different. Also, 37 (54%) of the study participants agreed/strongly agreed that staff readiness affects the implementation of the new system, while another 10 (15%) of them thought otherwise.

Table 10: Responded Rate of Subjective Norms

Variable	Response	Valid Percent
Influence by other facilities is affecting implementation (N=68)	Strongly disagree/disagree	8 (12%)
	Not sure	10 (15%)
	Agree/Strongly agree	50 (73%)
Staff comfortability is affecting implementation (N=68)	Strongly disagree/disagree	10 (15%)
	Not sure	17 (25%)
	Agree/Strongly agree	41 (60%)
Fear of loss of jobs(N=68)	Strongly disagree/disagree	13 (18%)
	Not sure	14 (21%)
	Agree/Strongly agree	41 (61%)
Staff readiness (N=68)	Strongly disagree/disagree	10 (15%)
	Not sure	21 (31%)
	Agree/Strongly agree	37 (54%)

Source: Field survey 2022

4.9: Responded Rate of Government Support

According to the table below, 48 (71%) and 7 (10%) of the survey participants agree/strongly agree and strongly disagree/disagree that government policies affect implementing an EHR management system, respectively. Also, 46 (68%) of the participants in the study agree/strongly agree that government commitment through budget allocation makes the implementation of an EHR management system extremely difficult. In other words, 5 (7%) of the participants strongly disagree/disagree that government commitment through budget allocation affects the implementation of the new system. Another 44 (65%) of these

participants agree/strongly agree that government subsidies make implementation extremely difficult, whereas 7 (10%) of these participants strongly disagree/disagree with that assertion.

Table 11: Responded Rate of Government Support

Variable	Category	Valid Percent
Policy direction affects implementation (N=68)	Strongly disagree/disagree	7 (10%)
	Not sure	13 (19%)
	Agree/Strongly agree	48 (71%)
Government commitment through budget allocation makes implementation difficult (N=68)	Strongly disagree/disagree	5 (7%)
	Not sure	17 (25%)
	Agree/Strongly agree	46 (68%)
Government subsidies make implementation extremely difficult (N=68)	Strongly disagree/disagree	7 (10%)
	Not sure	17 (25%)
	Agree/Strongly agree	44 (65%)
Legal and regulative requirement makes implementation difficult (N=68)	Strongly disagree/disagree	6 (9%)
	Not sure	19 (28%)
	Agree/Strongly agree	43 (63%)

Source: Field survey 2022

4.10: Responded Rate of External Support

According to Table 10, 48 (71%) of the health professionals who spent time in the survey agree/strongly agree that there is an adequate power supply to their respective facilities, whereas 7 (10%) provided a contrary view. Another 39 (58%) of the study participants agree/strongly agree that patients are ready to support implementing an EHR management system. On the other side, 5 (7%) believed that patients were not prepared to keep the system. Moreover, 37 (54%) of the participants in the survey agree/strongly agree that there is a suitable technology for operation in their respective facilities, but 8 (12%) thought the opposite.

Table 12: Responded Rate of External Support

Variable	Category	Valid Percent
There is an adequate power supply to the facility (N=68)	Strongly disagree/disagree	7 (10%)
	Not sure	13 (19%)
	Agree/Strongly agree	
		48 (71%)
Patients are ready to support (N=68)	Strongly disagree/disagree	5 (7%)
	Not sure	24 (35%)
	Agree/Strongly agree	
		39 (58%)
There is suitability technology for operation (N=68)	Strongly disagree/disagree	8 (12%)
	Not sure	23 (34%)
	Agree/Strongly agree	
		37 (54%)
There are enough suppliers in the market (N=68)	Strongly disagree/disagree	5 (7%)
	Not sure	18 (27%)
	Agree/Strongly agree	
		45 (66%)

Source: Field survey 2022

4.11: Responded Rate of Financial cost

Table 13 shows that 47 (69%) of the study participants agree/strongly agree that hardware cost affects implementing an EHR management system in their respective facilities, while 11 (16%) considered otherwise. However, 51 (75%) of the participants agree/strongly agree that software cost affects implementing an EHR management system in their facilities, whereas 8 (12%) of them thought the opposite. Again, 45 (66%) of the participants in the survey agree/strongly agree that training and consultancy cost affects the implementation of an EHR management system in their facilities.

Table 13: Responded Rate of Financial Cost

Variable	Category	Valid Percent
Hardware cost (N=68)	Strongly disagree/disagree	11 (16%)
	Not sure	10 (15%)
	Agree/Strongly agree	
		47 (69%)
Software (N=68)	Strongly disagree/disagree	8 (12%)

	Not sure	9 (13%)
	Agree/Strongly agree	
		51 (75%)
Training and consultancy cost (N=68)	Strongly disagree/disagree	5 (7%)
	Not sure	18 (27%)
	Agree/Strongly agree	
		45 (66%)
System maintenance cost (N=68)	Strongly disagree/disagree	4 (6%)
	Not sure	16 (24%)
	Agree/Strongly agree	
		48 (70%)
Staff cost (N=68)	Strongly disagree/disagree	8 (12%)
	Not sure	16 (23%)
	Agree/Strongly agree	
		44 (65%)

Source: Field survey 2022

4.12: Responded Rate of Technical Issues

The table below indicates that 49 (72%) of the participants in the survey agree/strongly agree that the security and integrity of patient information are well protected. On the contrary, only 3 (4%) of the study participants strongly disagreed/disagreed. Moreover, 52 (66%) of the participants agree/strongly agree that privacy and confidentiality of patient information affect the implementation of an EHR management system in their facilities. Another 53 (78%) of the health professionals agree/strongly agree that data communication and storage affect the implementation of an EHR system in their facilities.

Table 14: Responded Rate of Technical Issues

Variable	Category	Valid Percent
Security and integrity (N=68)	Strongly disagree/disagree	3 (4%)
	Not sure	16 (24%)
	Agree/Strongly agree	
		49 (72%)
Privacy and confidentiality (N=68)	Strongly disagree/disagree	4 (6%)
	Not sure	12 (18%)
	Agree/Strongly agree	
		52 (76%)

Variable	Category	Valid Percent
Data communication and storage (N=68)	Strongly disagree/disagree	3 (4%)
	Not sure	12 (18%)
	Agree/Strongly agree	53 (78%)
Suitability of available technology (N=68)	Strongly disagree/disagree	4 (6%)
	Not sure	9 (13%)
	Agree/Strongly agree	55 (81%)

Source: Field survey 2022

4.13: Responded Rate of Social Factors

The table below shows that 44 (65%) of the study respondents agree/strongly agree that fear of job loss by some workers affects the implementation process, whereas 10 (15%) thought otherwise. Also, 50 (74%) of the study participants agree/strongly agree that staff retraining affects the implementation of the EHR management system. Another 39 (57%) of the respondents agree/strongly agree that they entertain fear of using new technology.

Table 15: Responded Rate of Social Factors

Variable	Category	Valid Percent
Fear of loss of jobs (N=68)	Strongly disagree/disagree	10 (15%)
	Not sure	14 (20%)
	Agree/Strongly agree	44 (65%)
The need for retraining (N=68)	Strongly disagree/disagree	4 (5%)
	Not sure	14 (21%)
	Agree/Strongly agree	50 (74%)
Change resistance (N=68)	Strongly disagree/disagree	4 (6%)
	Not sure	20 (29%)
	Agree/Strongly agree	44 (65%)
Health issues (N=68)	Strongly disagree/disagree	7 (10%)
	Not sure	20 (30%)

	Agree/Strongly agree	
		41 (60%)
	Strongly disagree/disagree	12 (18%)
Fear of the use of technology by some employees (N=68)	Not sure	17 (25%)
	Agree/Strongly agree	
		39 (57%)

Source: Field survey 2022

4.14: Determination of Association between Technological, Organizational and Environmental factors influencing the implementation of Electronic Health Record

The researcher considered correlation and regression analysis to determine the association between the decision to implement an EHR management system and other possible predictor factors. The table below summarizes the correlation and regression analysis results in relation to the study's objectives. From the table, all three potential predictors (technological, organisational and environmental factors) correlated positively with the outcome variable (decision to implement an EHR). The result shows that 45% of the variance in the outcome variable can be accounted for by the predictors collectively, $F(3, 64) = 19.52$, $p < .001$. The data suggest the unique individual contributions of the predictors; the result shows that technological factors ($\beta=0.142$, $t=1.556$, $p=0.125$), organisational factors ($\beta=0.293$, $t=2.655$, $p=0.01$) and environmental factors ($\beta=0.483$, $t=4.397$, $p<0.001$) positively predict the implementation of an EHR management system. Again, the researcher considered the unstandardized coefficient in the determination of the regression equation since it includes the constant (beta zero). The unstandardized coefficient from the table below gave the regression equation as: $Y=0.336+0.092_{(TECH)}+0.191_{(ORG)}+0.339_{(ENV)}$

Table 16: Results of Correlation and Multiple Regression Analysis

Variable	B	Beta	*P*-value	t	Correlation with DM	95% CI	
						Lower	Upper
(Constant)	0.366		0.292			-0.322	1.054
TECH	0.092	0.142	0.125	1.556	0.066	-0.026	0.209
ORG	0.191	0.293	0.010	2.655	0.549	0.047	0.334
ENV	0.339	0.483	0.000	4.397	0.638	0.185	0.493

a. Dependent Variable: Decision to implement (DM)

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1: Discussion

This study aimed to analyse how technological, organizational, and environmental factors affect the implementation of an EHR management system in mission hospitals in the Bono region of Ghana. Therefore, the study adopted the TOE model by Tornatzky and Flesher (1990) to assess how these factors affect the implementation of an EHR management system in the Bono region of Ghana. However, the data suggest a strong relationship between technological, organizational and environmental factors and the decision to implement an EHR management system. On the other hand, based on the beta (β) value, the study discovered that the most substantive predictor of the outcome variable (decision to implement EHR) was Environmental factors, followed by Organizational factors and Technological aspects. Therefore, for every one standard score (i.e.z-score) unit increase on each of the predictors, there is a predicted increase in standard score unit on the outcome variable (decision to implement an EHR management system).

Moreover, the descriptive analyses found that despite only a few of the study participants being in the age group of 50-58+ years, most of them suggested that they entertain much fear of using new technology. This indicates that most respondents were in the receptive technology age group; therefore, the participants should not consider any fear in their jobs. Also, most of the respondents believe that the source of electric power and quality of internet connectivity to their facilities affect the implementation of an EHR management system.

5.1.1 Technological context of an Electronic Health Records management system implementation

In this study, the technological context captured the availability of ICT infrastructure, perceived compatibility, security issues and technical know-how. Implementing an EHR management system hinges on the level of technology in the facility.

5.1.1.1: Availability of Information and Communications Technology

An EHR management system incorporates ICT tools, uninterrupted power supply and suitable software for operation. The study established that less than half of the study participants agree/strongly agree that their facilities have adequate computer gadgets for operation. Therefore, the availability of computer gadgets for operation in the study sites is problematic for implementing an EHR management system. Because computers and their other accessories

are the major components of an EHR management system. Hence, the functionality of an EHR management system depends mainly on the availability of ICT infrastructure in these facilities.

The findings confirm Miller's (2005) literature that for an electronic system to work efficiently, there has to be some ICT infrastructure of which the system developers give the required specifications. To him, the higher the specifications, the harder it is to find the hardware and the higher the costs of purchase (Miller, 2005). Every technological innovation has a minimum requirement that an organization must meet before functioning as expected.

5.1.1.2: Perceived Compatibility

Since an EHR management system is new technological advancement in the health care setting, various stakeholders must have the required competence to work between the latest and the existing technologies and fit between the latest systems and the current work procedure. The study revealed that many of the respondents claimed that they are very comfortable using database software like DHMS, HAMS and Microsoft Access. This means that many health professionals have the required competence to operate with an EHR management system in their facilities. This is because DHMS, HAMS and Microsoft Access are database software commonly used to capture vital information about patients in most hospitals in Ghana.

5.1.1.3: Security Issues

The main objective of an EHR management system in the health care setting is to manage patient information in the form of cloud storage so that the data can be accessed at any care given point within a defined jurisdiction. As a result, the system must guarantee the confidentiality and integrity of patient information. The study established that most of the study participants claimed that the system guarantees confidentiality and integrity of patient data. Again, many of these respondents believe that their facilities have reliable data recovery systems in place. This means that patients' information and other valuable data for the facilities are well secured.

5.1.1.4: Technical Know-how

Effective implementation of an EHR management system requires active players with technological competencies and access to service providers. The technical know-how of the stakeholders of an EHR management system can be improved/built through regular training of staff on ICT, accessible technical/maintenance unit, adequate technical officers employed for operation and finally, accessible service providers and spare parts. Therefore, the study further

revealed that most participants claimed that their facilities have staff with technological competencies to manage the system for daily operations.

5.1.2: Organizational context of an Electronic Health Records management system implementation

The study captured the following organizational context in its analysis: the size of the facility, scope of business operation and subjective norms. The study considered these predicted variables since they are likely to influence the decision-making process in an organization.

5.1.2.1: The Size of the Facility

It is essential to acknowledge the size of the facility in the decision-making process since it has a significant influence on any decision that will take place in the facility. Thus, the size of any health care facility is influenced by resource availability, the level of resilience and operational agility. In today's technological advancement availability of resources is a critical element of innovation adoption. Therefore, introducing an EHR management system by any health facility considers both human and technical resources available for operation. This study pointed out that most of the participants agree/strongly agree that there are enough resources in their facilities to implement an EHR management system. A study emphasizes that smaller enterprise (health facility) often lacks the requisite resources to adopt innovation (Awa, Ukoha, & Emecheta, 2016). On the other hand, these facilities' operational agility and resilience were considered to assess their ability to adapt and return to their shape after a crisis. However, the data suggests that many of the participants pointed out that their facilities have a high level of resilience. This indicates that their facilities are ever ready for unforeseen circumstances regarding EHR implementation.

5.1.2.2: Scope of Business Operation

The researcher considered the scope of operation in the study sites to ascertain the governing structure/organogram, communication channel, management commitment and source of funding in the facilities. Thus, it believes that structure and communication channels affect organizational operation. The hierarchy of hospital management influence the decision-making process in the health care settings. The junior staff has no space in the decision-making process. The study showed that most of the participants affirmed that communication channels in their facilities affect the implementation of an EHR management system. The communication channel is a vital element in organizational management, especially when there is a change in operational procedure. The organization's structure often affects the communication channel

and makes daily operations difficult. The study further suggests that many of the participants believe that the governance structure/organogram makes the implementation of an EHR management system difficult. Finally, more than half of the study participants further agreed/strongly agreed that the commitment of the management of their facilities affects the implementation of an EHR management system in their respective facilities. The study affirmed these participants' claim that the source of funds for their facilities makes implementation difficult. Again, a review of the impact of computers found that complementary organizational investment could be much more than investing in the computer itself (Brynjolfsso & Lorin, 2000)**.** Therefore, for the effective functioning of an EHR management system, there must be available funds for operations.

5.1.2.3: Subjective Norms

The current study refers to subjective norms as a belief about whether stakeholders in these mission hospitals support the decision to implement an EHR management system. The study considered the following norms: the influence of other facilities, staff comfortability, fear of loss of job and staff readiness. It is significant to note that the success of an innovation in an organization influences the adoption same or similar creation in another organization. The study indicated that most health professionals who took part in the survey believe that other similar facilities have implemented an EHR management system; therefore, management needs to introduce EHR in their facilities. This finding corresponds with the study by Andreas, Sven, & Tim (2008) that innovation of technology in an organization is influenced by the subjective norms of superiors and peers. Thus, organizations implement subjective norms of leaders and peers most often.

5.1.3: Environmental context of an Electronic Health Records management system implementation

Under the environmental context, the study measured government and external support to assess their influence on implementing an EHR management system. The data showed that government and external supports significantly impact implementing an EHR management system.

5.1.3.1: Government Support

Government support plays a critical role in adopting innovation in health care settings. Support from the government is in policy direction, commitment through budget allocation, subsidies

and legal and regulative requirements. In 2005, the Ministry of Health released the health sector ICT policy and strategy for implementation in Ghana. This document indicated the integration of ICT into the health sector to improve health care delivery in Ghana. Hence, the study considered the support hospitals receive from the central government. Most survey participants confirmed that government policies affect their facilities' management system implementation. Moreover, most study participants confirmed that government subsidies and budget allocation affect an EHR management system. In effect, these facilities will be handicapped in purchasing the required ICT tools and gadgets for the EHR implementation.

5.1.3.3: External Support

In this study, external support included the supply of electricity to the facility, readiness of patients, suitability of technology and suppliers in the market. The environment in which the facility is located must provide an adequate amount of support during innovation adoption. The study showed a significant impact of this support on the implementation of an EHR management system. Most study participants confirmed that electricity supply to their facilities is a significant challenge. Thus, there is an interrupted power supply to their facilities, which affects their work. Therefore, an EHR management system remains handcuffed if electric power does not flow adequately in the facilities since ICT tools and gadgets depend mainly on electric power for operation. Also, the data suggests that many of the respondents affirmed that the availability of suitable technology for operation affects implementation in their facilities.

5.1.4: Factors influencing Electronic Health Records Management System

The research further revealed that the following factors influence the implementation of an EHR management system in mission health facilities:

5.1.4.1: Financial Cost

As clearly stated in the previous sections, an EHR management system hinges on ICT tools and other gadgets for operation. Therefore, the facilities need enough financial resources to acquire the appropriate tools for operation. Financing an EHR management system is not limited to purchasing ICT tools and gadgets alone; system maintenance and operational costs are all-inclusive. The data suggests that many of the study participants believed that hardware and software costs affect the implementation of an EHR management system in their facilities. The results align with another study which established that the major challenges that impede the implementation of an EHR management system are the cost of purchasing hardware and

software for the system. They further found clinicians' concerns about technically supporting a system and their ability to use the new system (Gans, Kralewski, Hammons, & Dowd, 2005).

Apart from purchasing ICT tools and gadgets, there are other costs involved in transferring data from a paper base to an electronic system which could be temporary work on data entry from a paper base to an electronic system. It includes expenses like engaging data entry clerks, proofreading the entered data, which takes time and money, hiring a system administrator to take care of the system when technical issues arise, learning new skills, and implementing new forms of organization.

5.1.4.2: Technical Issues

The current study considered the following technical issues: security and integrity of patient data, privacy and confidentiality of patient information, and data communication and storage as technical factors affecting the implementation of an EHR management system. The study revealed that many of the participants in the survey confirmed that the security and integrity of patient information affect the implementation of the system. Also, most health professionals agreed that data communication and storage affect the implementation of an EHR system in their facilities. An effective EHR management system provides a platform for patient data to be shared with multiple users in a defined jurisdiction. Therefore, such a system should be mindful of the privacy and confidentiality of patient data.

5.1.4.3: Social Issues

The study further took into consideration social issues affecting the implementation of an EHR management system. Therefore, the following variables were considered: fear of loss of job, the need for retraining, change resistance, and fear of technology by some employees. The data suggest that most of the health care professionals who took part in the survey claimed that some personnel are likely to lose their jobs when an EHR management system is fully implemented in their facilities. Therefore, their intention to adopt EHRs is influenced by change resistance and retraining of staff. These very findings correspond with a study that found social issues to be a significant factor in physicians' behavioural intention to adopt an EHR management system (Hossain, Quaresma, & Rahman, 2019). It is not shocking since the end-users of the system may improve their intentions on the foundation of evidence shared by others who have adopted similar information technologies already.

5.1.5: Limitations of the Study

This study encountered significant challenges such as the financial, time and scatted nature of the target population. Due to the difficulties mentioned, any other barriers brought up during the study were recommended for further research. Moreover, health care practitioners are busy people. Due to the time constraint, it was a challenge during data collection, especially in the engagement of the staff to fill out the questionnaires. This was overcome through a drop and pick later method of the questionnaires to allow the staff to complete the questionnaires during their free time.

5.2: Conclusion

This study shows that for a facility to adopt an EHR management system, premium emphasis has to be placed on the environmental factors drawn from the Technology, Organizational and Environment model propounded by Tornatzky & Fleischer in 1990. The analytical tool that dealt effectively and efficiently with the descriptive, correlation, and regression all pointed out that the environmental factors played an indispensable role in EHR management system adoption.

This analysis corresponds with Soumerai's (2010) study that the UK government invested hugely in the ICT infrastructure necessary for adopting an EHR management system, which resulted in a fiasco without an impact analysis of the critical factors.

5.3: Recommendation

In light of the findings and conclusions of the study, the following recommendations are made to the various participants involved in the provision of health care in the Bono region, with a solid emphasis on the Government, Christian Health Association of Ghana, Ministry of Health and Health training institutions to ensure high commitment and innovation in the adoption of EHR.

First, medical and other health institutions should train their students to adapt to EHR usage. Training medical students to use computer-aided programs as their decision support tools can only serve to accelerate EHR adoption. In addition, it will give them the confidence to use the technology once they join the practising field.

Second, technical support should be much considered when institutions operate according to EHR systems to provide backup support.

Third, in the midst of this era of unreliable power supply, institutions must be ready to provide alternative power supply to complement their system if the unexpected happens.

Fourth, there should be governmental and institutional budgets and policies to drive the idea of the implementation of EHR in mission health facilities in the Bono region.

5.3.1: Areas for further Studies

Further studies can be carried out in all government health facilities in the Bono region to compare findings on different types of organizations from a broader perspective since my focus was on only mission hospitals.

Another critical area that further research could be delved into is the analysis of the cost implications of adopting EHR in the whole country.

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QUESTIONNAIRE FOR HEALTH CARE PRACTITIONER

SECTION ONE

DEMOGRAPHIC INFORMATION

1. Gender? Male [   ] Female [   ]

2. Age. 18-25 [   ]   26-33 [   ]   34-41 [   ] 42-49 [   ]   51-58 [   ]   58+ [   ]

3. Highest level of education. Post Graduate [   ] Graduate [   ] HND [   ] Diploma [   ]

Certificate [   ]

4. Job description. Administrator [ ] Human resource [ ] Clinician [ ]   Record

manager [   ]

SECTION TWO

TECHNOLOGICAL CONTEXT OF ADOPTION OF EHR SYSTEM

Specify the extent to which you agree to the following statements. Use the scale of: 5= strongly

agree, 4= agree, 3= not sure 2=disagree 1=strongly disagree

ICT Infrastructure	1	2	3	4	5
Adequate computers for operation					
The quality of the internet					
The facility has software					
Mobile devices					

Perceived Compatibility	1	2	3	4	5
I can use database Software e.g. DHMS, HAMS, Access etc. very well					
I can use internet e.g. search engines like google.com very well					
I can use e-mailing communication e.g. yahoo, Gmail, etc very well					
I can use office utility software/ word/excel					

Security	1	2	3	4	5

Confidentiality of patient information is well secured					
Integrity of patient information is well managed					
Proper policy for protection of patient information					
Reliable data recovery system					

Technical know-how	1	2	3	4	5
Regular training of staff on ICT					
Accessible technical/maintenance unit					
Accessible service providers and spare parts					
Adequate technical officers employed for operation					

SECTION THREE

ORGANIZATIONAL CONTEXT OF ADOPTION OF EHR SYSTEM

In your opinion, specify the extent to which you agree to the following statements. Use the

scale of: 5= strongly agree, 4= agree, 3= not sure 2=disagree 1=strongly disagree

Size of the facility	1	2	3	4	5
Enough resources available for operation					
High level of resilience (the ability for the facility to adapt and return to its shape after crisis)					
Operational agility (being able to adapt successfully and efficiently to unexpected changes)					

Scope of business operation	1	2	3	4	5
Governance structure/organogram makes implementation of EHR difficult					
Communication channel affects implementation difficult					
Management commitment affects implementation					
Source of funding is affecting implementation					

Subjective norms	1	2	3	4	5
Influence by other facilities is affecting implementation					

Staff comfortability is affecting implementation					
Fear of loss of jobs					
Staff readiness					

SECTION FOUR

ENVIRONMENTAL CONTEXT OF THE ADOPTION OF EHR SYSTEM

In your opinion, specify the extent to which you agree to the following statements. Use the

scale of: 5= strongly agree, 4= agree, 3= not sure 2=disagree 1=strongly disagree

Government support	1	2	3	4	5
Policy direction affects implementation					
Government commitment through budget allocation makes implementation extremely difficult					
Government subsidies makes implementation extremely difficult					
Legal and regulative requirement makes implementation difficult					

External support	1	2	3	4	5
There is adequate power supply to the facility					
Patients are ready to support					
There is suitability technology for operation					
There are enough suppliers in the market					

SECTION FIVE

FACTORS AFFECTING THE DECISION TO IMPLEMENT EHR

In your opinion, specify the extent to which you agree to the following statements. Use the

scale of 5= strongly agree, 4= agree, 3= not sure, 2=disagree, 1=strongly disagree

FINANCIAL COST	1	2	3	4	5
Hardware costs					
Software cost					
Training and consultancy cost					
System maintenance costs					
Staff cost					

TECHNICAL	1	2	3	4	5
Security and integrity					
Privacy and confidentiality					
Data communication and storage					
Suitability of technology available					

SOCIAL	1	2	3	4	5
Fear of loss of jobs					
The need for retraining					
Change resistance					
Health issues					
Fear of the use of technology by some employees					