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# “The Role of Chief Information Officer (CIO) in Implementing IT Governance in Health Care Sector”

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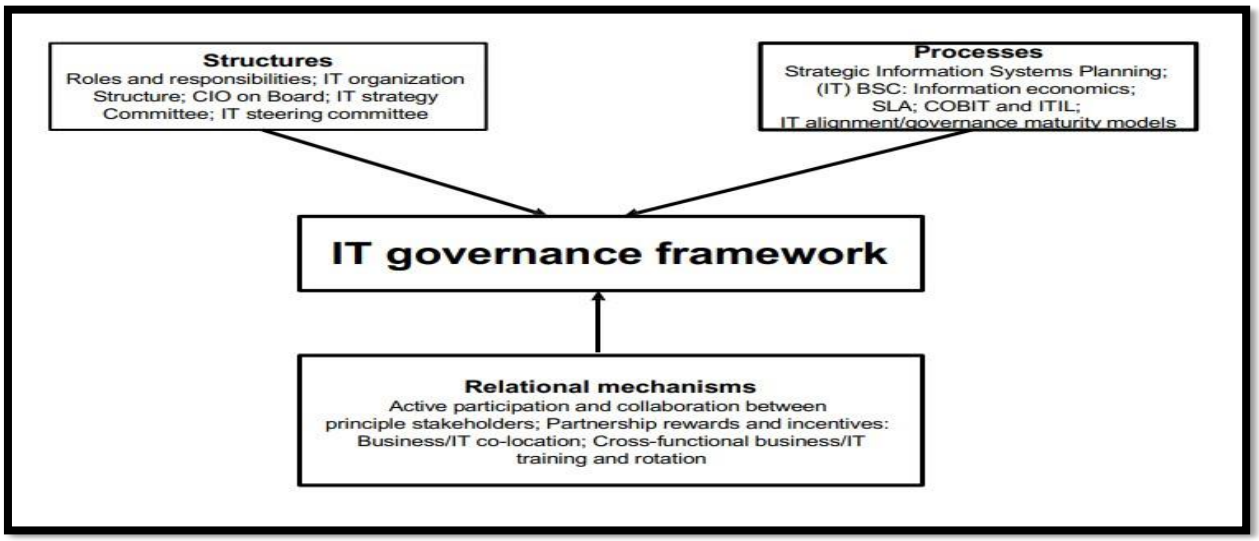
# 1 Elements of Introduction

## *1.1 Introduction*

Healthcare providers face challenges as digital demand increases, and whether a healthcare provider has a properly-integrated health care system or a mismanaged one becomes quickly evident. Mismanaged IT services are part of what seriously hinders efforts to transform the value of information technology into business value in the healthcare sector (Wang et al. 2018). Improving health care IT services is, therefore, essential. Overcoming these challenges is critical to the sustainability of health systems to deliver equitable and efficient services (Ingebrigtsen et al. 2014).

The Chief Information Officer (CIO) plays a vital role in the development of a business' working strategy and contributes as a valuable member of the C–level of the Managerial Team and the manager of Health Information Technology (HIT) (Eck 2016). Technological changes in healthcare have created new opportunities for CIO's, as indicated from the CIO Centre for Health Care. A paradigm shift has occurred, requiring a mental and physical transition from the previous model, wherein a CIO might have had simple technical responsibilities, to a model where the CIO now has a critical (often executive) managerial position, greatly valued for his or her smooth management and contributions to seamlessly-functioning information technology in the healthcare sector (Eck 2016). The challenge here is how the Chief Information Officer (CIO) best performs his or her important role in implementing successful IT governance in the health care sector and what challenges CIOs face in the implementation of IT governance.

As the CIO is an integral part of IT governance framework, the figure below shows the three main parts of the framework which include structures, processes and relational mechanisms. The CIO is a part of the structure of IT governance framework; a solid framework should be built for a successful healthcare organization, otherwise, lack of proper information will lead to failure of framework (Lapão 2011).




*Source 1(Van Grembergen & De Haes 2009)*

Most hospital information systems' departments have an absence of appropriate management, hindering the ability to change conditions for the improvement of hospital information systems (HIS). Additionally, health sector information systems face problems such as mismanagement of projects, imbalance within the distribution of IT finances, and lack of IT operational and security management and data protection (Shahi et al. 2015). IT governance structures can provide an appropriate solution to many of these challenges. Shahi et al. (2015) defines IT governance as the conventions of organizational structures that guarantee the rights and duties of decision-making with regard to the assets of an organisation's information technology. It also serves as the strategic alignment of business and technology, where improvement in value can be best attained. This alignment is based on an iterative procedure for making related

decisions with people, processes, goals, technology and business. Krey (2018) argues that due to an absence of IT governance, a large number of businesses have experienced various types of failure, loss in competitiveness and other unsuccessful projects. However, it was also observed that organizations deploying above average IT governance structures were gaining 27% greater returns as compared to organizations with a more fragile governance structure. Quality IT governance supports businesses' objectives, valuable investments, and mitigates risk management. Current research also observes that adequate ITG can significantly improve the organizational performance of IT (Shahi et al. 2015; Wilkin et al. 2012).

According to Guillemette et al. (2017), the role of ITG is highly critical for the uptake and deployment of e-health practices. It is expected that a well-developed IT strategy will provide assurance for the effective utilization of IT in the healthcare sector. ITG aims to provide the core of health organizational strategy—with its applications and other implications—for the long run. The ITG can be used to bridge up the functional connection of clinical expertise and IT by the CIO. The CIO in the healthcare environment generally oversees all vital operations of the IT department, handling consultations with other personnel at the similar level in other departments with matters related to technology. The officer ensures that the IT department plays a critical role in spearheading the efficient delivery of healthcare services as well as aiding in the realization of the corporate goals and objectives (Haddad et al. 2018).

According to Nguyen et al. (2016), CIOs are facing daunting challenges for routine information management technology in academic medical care centres and other health organizational systems as a part of conventional administrative and clinical application platforms and work flow. The CIO is confronted with intense challenges for restraint resource and stretches the organization. In a nutshell, the chief information officer facilitates the implementation of IT policies, ensuring that the department is relevant to the daily operations of the healthcare organization. The purpose of this paper is to investigate the role of CIOs in the implementation of IT governance in the health care sector.

### *1.1 Relevant Background*

Chatfield and Coleman (2011) define corporate governance as the effective system for directing and controlling business activities. The generation of business values derived from IT isbased on overarching goals for the deployment of ITG, including the chief driver of top executivesin significant projects. An adequate ITG is aligned with the investment in IT given the preferencesof the business, finding out who will make the decisions concerning IT, and assigning the appropriate personnel with particular responsibilities for results. Pang (2014) expressed that IT strategy is highly operational across the board of directors, with the main objective being to ensurethat ITG is or is not an integral element on the agenda of the board and can be regularly reported.The IT committee strategy is considered the most effective tool to guarantee that IT governance has become a vital element of corporate governance.

The healthcare sector is recognized as the topmost investors of IT, given the related benefits through effective use of IT for improved service quality as well as reduction cost. Wade et al. (2014) mentions that greater IT investment can lead to improved performance of healthcarebusinesses. ITG can be perceived as the effective framework for bringing stakeholders to recognize the benefits of adequate utilization of advantageous technology applications. Weill andRoss (2005) also argue that regarding the complicated decisions made by IT and its required resources in an organization, an adequate structure is vital to make sure that IT performance is fulfilling the objectives of the company with delivery of the estimated values. An effectual ITG has become the most vital element to predict the value of organization obtained from informationtechnology.

Several decades ago, CIO health care emerged as the supreme information technology 'A'person at the 'C level' or senior executive level. IT managers come from a range of professions with different educational backgrounds (Eck 2016). Presently, the role of the CIO (in a highly conventional manner) is subjected to intense challenges. The team, resources and the other applications of varied IT systems aim to fulfil the requirements of regulatory bodies (Nair & Dreyfus 2018). The long term challenges for IT systems are based on implications of diversified programs and other streams of revenue for innovation, growth and interaction with employers, customers as well as insurers of health (Szydlowski & Smith 2009). All such instances lead to novel challenges for CIOs, specifically requiring vision and leadership skills in a caring, structured manner. The role of the CIO is highly realistic, and they are greatly concerned with the readiness of an organization for making the transition towards a well-informed, information-oriented system of e-health (Guillemette et al. 2017).

CIOs are facing the challenges of diverging implications, and maximum pressure is placed on hospitals, not on vendors, to integrate the novel technologies in present strategies. CIO's are facing the challenge of the precise management of innovation: they require financial incentives to make IT investments. They also have to

constantly look for the most advanced and latest electronic health information and technology to enhance productivity and boost the safety of patients and quality healthcare (Wu et al. 2016). Presently, CIOs are progressively more data centric and expansion array of novel application and platform are required to be accessible easily that can be easily shared with overall making of decision. Some of the skills that CIOs require include clinical and administrative management of data in real time—helpful for making informed decisions across the entire business. Therefore, it is good to monitor the landscape of the vendor, their best- practice sharing and team-management challenges to bring information and technology solutions that will be useful and deliver demonstrative value.

### *1.2 Objectives*

The general aim of this research project is to investigate the roles and challenges faced by CIO's in implementing IT governance in the health care sector.

### *1.3 Significance of research*

Nowadays, the network of current health organization systems is composed of an intricate ecosystem along with the multifaceted moving of information and connected devices. The health care sector is facing a rapidly shifting environment where information is flowing at a much faster pace. In this sense, the roles and responsibility of CIOs have to become extensively adaptable. This research will highlight the present role of CI's that are highly vital for improved and better roles in the future.

## 1 Elements of the Literature Review

### *1.1 Specific Roles of the CIO in implementing the IT governance.*

CIOs and their teams need to emphasize several guidance areas that are strategic for transforming their institutions into efficient IT organizations (Singh & Hess, 2020). The first part is to ensure a technicalinfrastructure, which delivers the basis and outlines the current technology used. The head of theinformation department needs to understand current technologies. Mintzberg describes the managerial role of CIOs as senior executives in an organization. CIO's have interpersonal roles in a firm which identifies them as the head of the IT department, a leader of other IT staff, and theliaison between the department and the top management team in the firm (Smaltz et al. 2006). Asfigureheads in the department, CIOs initiate ideas and mobilize other people to offer suggestionson how best they can implement the IT governance to meet and exceed the expectations of the topmanagement. As leaders, CIOs give directions to other staff within the IT department and counselon matters related to technology to the management team (Haddad et al. 2018). CIOs act as a liaison between their department and the rest of the organization. They represent the IT department in the organization and integrate it with the overall purpose of the healthcare firm. In a nutshell, CIOs work closely with people across all departments to ensure they provide the necessary link between the department and other functions.

Furthermore, CIOs play the primary role in implementing IT governance in the healthcare entity. The officers handle issues related to the information systems as they arise. For instance, they deal with issues of information security, such as protecting the system from external and internal intrusion, promoting patient privacy and institutional integrity. In this way, CIOs handle disturbances related to the smooth functioning of information systems within the organization (Smaltz et al. 2006). Secondly, CIOs make entrepreneurial decisions on matters related to the IT department. When the management wants to acquire a new technology, CIOs offer entrepreneurial consultation. For instance, officers are able to weigh the benefits of new technology versus its cost and other available options. At this point, they make a decision that helps the organization to invest its resources appropriately. Finally, CIOs negotiate with external parties in matters related to purchasing technology-related items on behalf of the organization. In the process, the CIO makes vital decisions that enhance resource allocation and investment in the IT department. Such a role contributes immensely to the implementation of IT governance in health institution.

### 2.2 Role of CIOs in Centralized Integrated Information Delivery System.

One component of IT governance comprises the central and well-integrated system of delivery as well having a committee responsible for the information and technology used for developmental IT plans, the budget, and preferences of the business, operating in a well-integrated manner (Winter et al., 2023). The centralized

existence of this department has chief authority on the domestic groups of IT. The domestic budgets of IT are confronted with the centralized approval where IT plans provide the specification of well-integrated applications and infrastructure development. A different unit of operation is required to select applications for supporting the domestic ancillary department from a verified list. The advantages of centralized frameworks consist of well-integrated practices for varied methods of IT, followed by clinical utilization. The efficiency scale, with it a well-standardized workflow and process, aims for new implementation, software training and standard and dictionary maintenance. It can lead to the reduction of staffing costs as a centralized model is helpful to avoid anarchy in information delivery systems (Tassabehji et al. 2016).

According to Krey (2018), ITG has proved to become a main driver of process enhancement—for instance, maximizing the efficiency of the collection of patient records; increasingly easy communication with nursing, physician or medical staff; all this is due to IT taking over the once-essential (and time-consuming) tasks of documentation. The efficient utilization of ITG reveals a direct impact on the safety of patients and quality. The endeavor also requires the extensive realization of associated nursing, medical or administrative process with adequate utilization of respective resources of IT to effectively deal with foresighted aspects of IT issues. Hence, the comprehensive and well-integrated aspect of good IT governance is based on alignment and execution where resources have become essential for effective alignment, integration, measurement, investment and sustainable tactical and strategic direction along with, of course, a value-based proposition, supporting IT in clinics within the entire health organization system.

### 2.3 Application of Concepts of IT Governance for the CIO Role

The approaches of communication are based on announcements from CIOs or any IT governance officers. IT governance requires an owner advocate or home organization, and the majority of CIO officers are required to communicate the arrangement of the governance. The CIO responsible for governance of IT is required to assure the adjustment of other asset management (human, financial, IP and physical) and governance of IT. The different types of mechanisms of IT governance, process, communication and structure are required to explain specific group responsibilities, along with individual engagement, to make the department the bestplace for making effective decisions (Degoulet et al. 2017; Hoyt & Yoshihashi 2014).

The tools of IT governance are based on different mechanisms where the structure of decision making is based on restricted limitation, to make the widespread decision across the enterprise by varied alignment tools, not based on adequate structure of decision making. The membership is required to overlap the structure of decision of making by making linkages amongbusiness and IT decisions: these connections are required on multiple levels among the business governance unit and the enterprise. The governance structure can support the organisational strategic goals and objectives with clear objectives and clear metrics of management (Van Grembergen & De Haes 2009). The figure below shows the three layers of IT Governance responsibility.

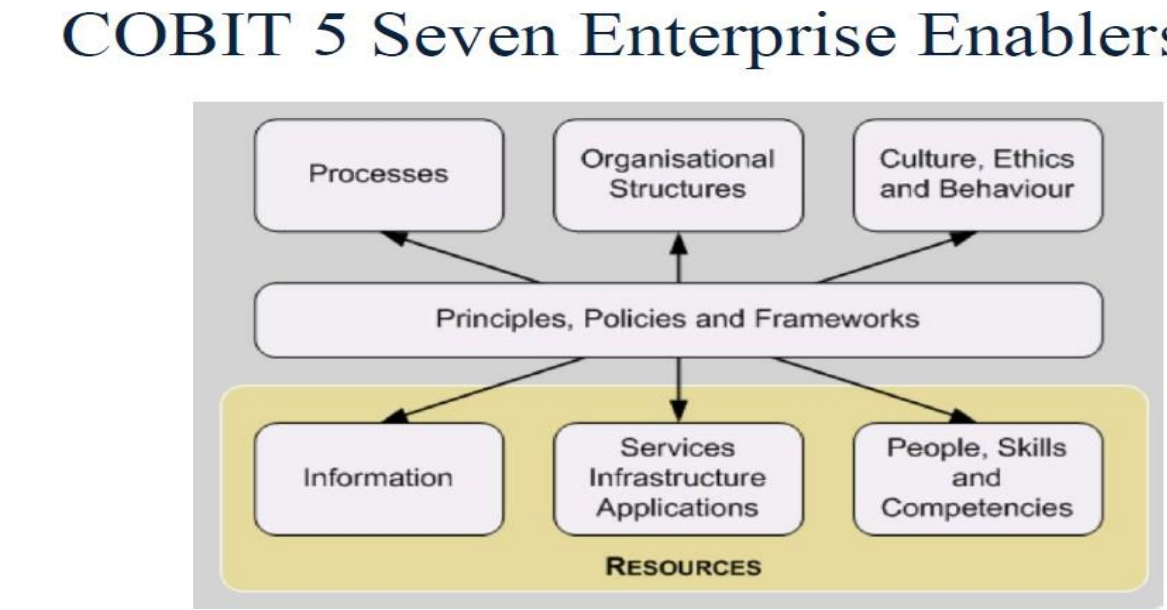

*Source 2 (Van Grembergen & De Haes*

The main objective of the domain of strategic alignment is movement in the right duration and effectively aligned as compared to domain of strategic alignment, which ensures the maintenance and validation of the value proposition of information technology. For the assuranceof the entire component of IT atmosphere across the IT strategy, it is supportive for the entirety of the strategic goals and objectives. The future and current costs, risks and technologies are effectively managed by adequate systems of IT governance. The factors affecting adequate IT governance are based on effective value delivery and concerned with implementation of adequate value propositions across the cycle of delivery, making sure that IT can be delivered in a timely manner within the limitations of the budget and with a consistency of quality appropriate for the attainment of promised advantages, optimization of costs and offering the intrinsic worth of information and technology (Wu et al. 2016).

The strategic element for valued, dependable delivery involves higher-level difficulties for measurement: business elements such as elapsed service time, satisfaction of customers, profitability, productivity of human resources and order fulfilment are obviously key. In order to attain the effectual delivery of a system leading to good investment returns and management of yearly costs, the ITG must have high flexibility for the adoption of future requirements in areas such as response time, through input, ease of use, security, resiliency, accuracy and high integrity (Alam et al. 2016).

2.4 The IT Governance Framework: COBIT

The IT governance framework to be implemented at the hospital began with COBIT assessment (Lapão 2011). The COBIT framework is based on adequate governance of IT, also having intentions for balancing IT risk with controlled investments. The COBIT framework is comprised of higher-level strategic goals and objectives and belongs to significant domains; organizations and planning; implementation and acquisition; support and delivery, as well as adequate monitoring. The planning and organization of IT is comprised of controlled objectives within the information architectures, IT investment, management's communication aims, and the external fulfilment of risk evaluation, compliance and project quality requirements. The implementation and acquisition domains are related, with automation of key resolutions, software application, and development of procedure, installation of system, change and accreditation management (Guillemette et al. 2017).




Source 3 (De Haes & Van Grembergen 2015)

The support and delivery domain will provide controllable objectives on an extensive level of service, where third party management service is based on identification of cost, education of user, incident management, configuration, as well as operational management (Hoyt & Yoshihashi 2014). The monitoring domain is emphasized on the evaluation of internal records to obtain process monitoring with independent audit services.

2.5 Roles of CIOs in Data Management

The technical structure captures a vast amount of data. Health care executive heads can monitor the incessant data growth and its distribution among several systems, both in organized and unstructured designs. EHR is not the only source of information available to the health care system: however, data may come from a single patient from different hospitals, wearable laboratories, and primary care (Cerchione et al., 2023). Societal media and text messaging are also part of the patient's comprehensive health record. All this data is the responsibility of the health care officer. To accommodate data from several sources, health care supervisors oversee all their institutional work as well as integrating data among their existing projects (Eck 2016). This technological ability to collect, store, and manage huge amounts of population data, patient data and hospital operational data helps organizations reduce costs, improve patient outcomes, and predict capacity. According to Alam et al. (2016), Health Information Management (HIM) is considered the dedicated profession for effectual patient management where healthcare data is required for patient care. The basics of HIM are helpful for on-going evolution as, with the passage of time, institutions will be paperless due to improved electronic developments. The role of HIM is helpful for effective deployment of EHR (Electronic Health Records). Thus, the CIO plays a leading role in promoting interoperability.

Sharing of Electronic Health Records (EHRs) is essential in improving care delivery and patient outcomes in hospitals across the globe (Collins et al. 2015). Sharing information helps to advance medical research, which improves care and increases knowledge among care providers. The CIO, therefore, is instrumental in facilitating the policy of sharing patient information. In this regard, the officer ensures that such initiatives do not conflict with policies of IT governance and patient privacy in the process. With the help of CIOs, healthcare organizations share information without violating the interests of patients; hence, exercising good governance in healthcare information technology.

2.6 Roles of CIOs in Risk Management:

As mentioned earlier, risk management is a critical aspect of IT governance objectives in corporate governance when aligning IT and business strategies. Through the implementation of best practices to reduce information technology risks, CIOs aim to balance the risks of information technology through investments in IT controls. Thus, it is reasonable to recall that IT governance aims to reduce the risk of speculation by ensuring that the information technology complements the business' organizational strategies. CIOs only should manage IT governance; it is not possible to establish consistency among organizations with varying views on who should or should not manage IT (Wessels & Loggerenberg 2006). CIOs must implement and maintain an IT governance framework and will normally convene the IT governance committee to help design, implement and maintain it. It is the responsibility of the IT director to inform the executive director of the status of their IT governance framework on a regular basis and ensure that IT strategies and objectives are well defined and aligned with the rest of the Members (Wessels & Loggerenberg 2006).

2.7 Challenges affecting the CIO role:

Many critical challenges affect the role of CIOs for progressive health care. The first challenge is to ensure that the current technological infrastructure effectively meets the IT objectives and organizational needs. The second issue involves sound data management and big data analysis. As the amount of information collected increases, data security poses another challenge (Eck 2016).The next challenge involves cooperation. Advanced executives should collaborate with a wide range of partners to build internal and external relationships to be effective. According to Lapão (2011) IT Management Initiative at São Sebastiao Hospital, the Hospital Information System (HIS) Department is coordinated by one person, a non-executive member of the board of directors, and is formally appointed as a "Director". He holds the position of Head of Information, as he is a non-executive member of the board of directors and has a very close relationship with the chairman. After the window, the HIS partition environment analysis was performed, which identified potential issues that could adversely affect the performance of HIS governance (Lapão, 2007). The Director, for example, was not an executive member of the hospital board, his participation at least as a non-executive member in the board is nevertheless a good practice of IT governance. The strategic communication between the Chief Financial Officer and the Chief Information Technology Officer must be effective, or it may affect the strategic alignment of the servers. One way to communicate is to have the ability to transfer their technological

knowledge to business terms at all levels of the organization. Therefore, effective communication skills, another challenge, become critical.

To address these issues, a comprehensive analysis of the challenges and opportunities faced by executive heads of health care and the best tools / suppliers of health-care training tools must be undertaken. This guide will support health care CEOs in their role in building the technology infrastructure by making the right technical decisions with the right access and support that provides individuals with the tools to achieve their business results.

2.8 Priority Areas for CIOs in Healthcare Organizations:

Besides the interpersonal role that CIOs play in implementing the IT governance in the healthcare environment, the officers also play an informational role. In this role, the CIO monitors the flow of information from one quarter to another to ensure it serves its purpose in the organization (Smaltz et al. 2006). He or she provides the technical support to ensure the information flows smoothly from the source to other parts of the system. The CIO also disseminates vital information from one point to the intended recipient. To ensure that the IT governance is fully implemented, the chief information officer acts as a spokesman of the IT department to the top management of the firm, communicating the interests of the department to the top leadership as well as defending its relevance to the realization of corporate goals. In this regard, the CIO holds the information concerning the IT department and passes it across other units when a need arises.

CIOs have to integrate the IT department to the culture of the organization. They must give priority to the culture of the organization when going about their normal duties in the firm. The ICT functions within the organization must align to values and aspirations of the entire healthcare entity. The CIO should therefore seek to be guided by the mission statement of the organization. It is in the mission statement that the organization spells out its cultural values, which the CIO can use to formulate IT policies that would help the firm to accomplish the mission. For instance, if the organization strives to safeguard patient information from intrusion, the CIO formulates policies and implements security measures to the information system of the hospital. CIOs also provide assurance to the health care sector where patients must have accessibility to the correct health information where it is required for maintenance of excellent data standards with higher level security, confidentiality and integrity levels. Such action aligns the functions of the IT department to the culture of the organization which promotes patients' privacy

The professionals of HIM actively respond towards changes, becoming adaptable to fulfilthe constantly-evolving healthcare information in real time. The role of HIMs include acting in response towards changes and becoming adaptable to globally standard fluctuations in terms of electronic records of health and related quality patient records, to utilize individual healthinformation and experts for collection, interpretation and evaluation of health-related information. The evolution of HIMs have transformed from extensive role range and other responsibilities andprofessional of HIM are not prolonged to centralized to single department only, however the decentralization is based on employment of expertise in all over enterprise. As an effect of role expansion, there is a high demand for well-trained and skilled professionals across the entire sectorof healthcare. The ongoing education and ongoing educational programs are continuously adaptable and expanded to fulfil the demands of industry for the dynamic and robust workforce of HIM (Skurka & Skurka 2017).

Shea and Belden (2015) recommended that the role of HIMs are highly critical for the success and growth of the profession, where response towards rising demand leads towards three main strategic directions for advancement in the profession and ensuring the enhancement of theirrole in the entire healthcare sector. Professional development is focused on specific technical expertise, involving general improvement and advanced certification, ensuring the enhancement and promotion of growth of highly qualified professional of HIMs. CIOs role as the HIM leaders is dominant and can be perceived as valuable to the healthcare sector for diverse stakeholder groups.

2.9 CIO Duties in Healthcare:

The CIO in a healthcare organization acts as a consultant in matters of adopting technically-advanced care modalities that would enhance efficiency. Note that the integration of information and communication technology (ICT) in health organizations serves the purpose of advancing efficiency in delivery of care and increasing the reliability of modalities applied in treatment of patients (Collins et al. 2015). Again, the management of the health organization seeks to increase efficiency, realizing overall objective of the healthcare facility. The IT professionals help the management make vital decisions by outlining factors that influence final decisions, such as the level of training required to incorporate new systems and the available alternatives that would meet the expectations of the organization.

The roles of CIOs aim for the creation of solutions for the fulfilment of the real needs of the business of

health organisation. In health organisations, CIOs are responsible for vision and leadership. CIOs have the competitive knowledge and technological skills to serve the health organisation as the strategic player of a team (Chawla et al., 2023). The other CIO duties are based on alignment of the objectives of IT and other programs regarding strategic preferences such as offering IT department leadership, assessment of existing and future needs for IT, peer partnership, communication of strategic recommendation, management of routine operation and direction of financial, legal and technical activities.

The information is accessible and localised is restricted for well-authorised users. The CIOs tasks are comprised of the security of the network, devices of configuration, and resolution of accessible challenges. The health organisational information can be viewed as the vital element of enhancement in quality of healthcare, providing the assurance of the related cost of healthcare. The legislation is aimed for protection of privacy by development of incentives for re-

identification of information about health services and to bring provision of equity to healthcare; also, to enhance the participation of private enterprise with respect to privacy of patients. The health care system is flowing at an unfortunately slow pace, and when there are simple issues of services that require attention, such as issues of improved interconnection as well as demand for accelerated accessibly of medical data and patients, the current duties of CIOs show that due to sensitive nature of medical data, the health care sector is much slower to join the technological revolution experienced by other sectors This hesitancy, however, risks having healthcare fall behind if not adequately adjusted by CIOs (Banker et al. 2011).

The role of security is highly paramount to improving the possibility of transition. The healthcare professional as well as the patient can sustain mutual advantages by improving the foundation of trust. The IT and CIO departments are required to establish clear work parameters by development of blueprints for the protection of trust of patients and also to enhances the fluidity of goals and responsibilities. Braithwaite et al. (2017) projected that to make the electronic health system seamless requires an adaptive infrastructure in place for r effective defending and handling. When data and network are not secured properly, then re is lack of improvement in healthcare quality; or cost, however, healthcare systems will continuously become a preferred cybercriminal targets. As the effect, the networks of healthcare are urgently required to maintain the network of health care and support also online devices. The CIO is required to manage the sensitive information flow in constant manner among suppliers, offices of doctors, hospitals and other departments. The information protection maintains a critical role for maintenance of healthcare institute integrity (Wu et al. 2016).

Guillemette et al. (2017) highlighted that the future duties of CIOs are based on breadth of collected stored and shared markets and have become lucrative cybercriminal targets. The worth of medical records0is tenfold higher as compared to credit cards for recognition of theft. At the present time, various health care institutes are required to deal with the complex nature of such

threats in near future. The CIO has the power to make key decisions for altering the future of the institution. CIOs are projected to amalgamate the advanced services and technologies by team development of hi-tech professionals in a well-integrated manner and adapt security infrastructure to mitigate complex and sophisticated threats.

## 2.10 CIO reporting structure:

(Al-Taie et al. 2014) shows a significant positive correlation between the strategic IT vision of the organization and the structural strength of the Information and Communication Directorate (CIO) in relation to the reporting structure and CIO functionality. In short, the Executive Director of Information reports to the Executive Director and the Company with the CFO to address the revenue side of healthcare using technology and business knowledge (Eck 2016). IT managers with high levels of reporting had greater influence and control over the implementation of an IT strategy. Level of CIO reports and the organizational location of IT managers. Other studies have confirmed the vital relationship between the rank of IT pioneers and the strategic direction of information technology in the organization. It is found that business innovation that supports information technology is more likely when the head of information is brought up to the CEO. The structure of the reports of the executive board is said to be consistent with the main organizational purpose of information technology (Al-Taie et al., 2014).

## 2.11 Aligning IT to Business in the Healthcare Sector.

Information technology plays a crucial role in the delivery of quality care to patients in the current healthcare setting. Hospitals adopt IT as a tool for promoting efficiency for medical and nursing personnel (Krey 2018). IT governance

in hospitals enables administrators to adopt concepts that would improve efficiency and enhance control over medical and administrative processes. This happens when the hospital has executive personnel in the IT department, who are able to understand the expectations of the management and the role of IT in meeting these expectations. Through the efforts of chief information officer, the health organization integrates

its IT framework to all vital operations to achieve efficiency (Collins et al. 2015). For example, CIOs integrate IT in the treatment process, improving the process quality of management of patients' health records, relieving medical and nursing staff from tiresome documentation tasks.

The IT governance in the US public sector plays a vital role in maintaining proper delivery of services such as Medicaid to the low-income population. CIOs ensure that the IT infrastructure functions smoothly in delivering responsive and interactive processes, including aligning health systems to the expectations of the people across the United States (Pang 2014). It is through the efforts of CIOs that institutions may realize the full implementation of IT governance, facilitating improved healthcare in the country overall. For instance, the government, through the intervention of CIOs, is able to manage healthcare delivery in the US through proper functioning of the Medicaid program. In this case, CIOs in different states play vital roles in implementing IT governance, improving care delivery and reforming the healthcare sector in United States.

Current trends in the health sector call for collaboration among hospitals in delivering coordinated care to patients. In the process of collaboration, hospitals, especially in Belgium and other developed economies, share vital information on specialized services such as cancer treatment to improve care delivery (De Pourcq et al. 2018). To support hospitals' collaboration, each organization requires the efforts of CIOs in formulating policies and implementing IT governance. CIOs coordinate the process of sharing information and monitoring the infrastructure in use to ensure it does not compromise legal provisions that facilitates information security (Krey 2018). Through the efforts of CIOs in different hospitals, collaboration becomes efficient and continuous, which is an integral part of implementing IT governance in health sector.

## 3 Elements of methodology

In this research, a systemic literature review was conducted focused on the following question: What is the role of a CIO in implementing IT governance in the healthcare sector? In order to answer this question, we began with a general search of academic databases such as

Emerald, Scopus and Google scholar by using specific keywords. The articles were selected based on their titles, abstract and conclusion, and if relevant enough to the central question, the selected articles were confirmed to be used for the research. The inclusion criteria included using only research done between 2005 and 2018, and using only research written in English. The keywords used included:

- IT governance
- Role of CIO
- Health information
- CIO Duties in Healthcare
- E-Health
- Healthcare sector

Also, the combination of two keywords was used to retrieve the most useful and meaningful articles regarding the role of CIOs in the healthcare sector. Nevertheless, this second search did not find many relevant sources and the case studies we did find tended to be short advertisements or acknowledgments for the companies involved in successful projects, which lacked in detail.

### 3.1 Limitations (not constraints).

The main limitation of the study was difficulties accessing the relevant information as well as limited case studies.

## 4 Results & Discussion:

The literature gathered in this research pointed out several roles of the CIO. According to Smaltz et al. (2006), Mintzberg acknowledges that the CIOs are both managers and senior executives in healthcare organizations. Smaltz et al. (2006) expound on this by stating that the CIO is the head of the IT department, leading other IT staff, and acting as the link between the department and other managers in the hospital. Leading the IT department demands that the CIO

come up with ideas on how the hospital facilities can best make use of IT. The CIO gives direction and counsel on matters related to technology as Haddad, et al. (2018) envisions. This also means that the CIO is the spokesperson for the IT department since they are the leaders and ought to know everything that goes on in there. As Haddad, et al. (2018) put it, the CIO communicates the interests of the department to other managers to ensure that they align with corporate goals.

Therefore, the CIO also doubles up as a consultant when it comes to the adoption of IT in healthcare facilities. The CIO is not just an employee who is confined to the IT department, they are now part of the management team as a consultant. All other managers will have to refer to the CIO with regards to how they can use technology to improve care and profitability while cutting down cost. According to Collins, Alexander, & Moss (2015) CIOs as consultants advise the management on factors that influence decision making on things such as the level of training required to incorporate IT, or alternatives to meet organizational expectations. According to Smaltz, et al (2006), this means that CIOs are tasked with making decisions that will affect the entire healthcare organization. They have to make decisions on IT security matters, for instance, which affect patent privacy and institutional integrity. They make decisions that help the organization invest in the right and most appropriate IT systems. Another role that comes out clearly in the literature is the CIO as an information officer. According to Smaltz, et al (2006), the CIO monitors the flow of information throughout the healthcare organization to ensure that everything runs smoothly.

Another role of the CIOs is to ensure the safety of the IT network and data collected by the IT systems. Without a doubt, technology used in the hospitals stores very personal, vital data about patients, which should remain private and confidential. It is the duty of the CIOs to ensure the safety of these network systems and data. Therefore, they need to source out the best security systems data available. According to Wu, Kao, & Sambamurthy (2016), when patient data and networks are not secured properly, the risk of IT systems being cybercriminal targets becomes

high. Therefore, the CIO is required to secure sensitive information flow among suppliers, doctor's offices, hospitals and other departments (Wu, Kao, & Sambamurthy, 2016).

Another important new role of CIOs in today's organizational environment is to work as an integrator. To achieve this, the CIOs have to work with other managers in the hospital facilities so as to ensure that the IT department integrates into the culture of the organization. The culture of the organization refer to the values and aspirations of the facilities, which can be established in the mission statement of the organization (Wessels & Loggerenberg 2006). From this research, the following themes emerged: First, CIOs are increasingly becoming important in the healthcare sector if progress is to be made in terms of integrating technology; secondly, the role and tasks of CIOs keeps on evolving as new technologies emerge, and finally, there is a need to clearly define the roles and tasks of CIOs for training and education in the future.

### 4.1 The Significance of CIOs in the Healthcare Sector

From the literature, it becomes clear that the role of CIOs in the current context of healthcare delivery cannot be ignored. IT is very important in the delivery of quality care to patients. For modern hospitals, the adoption of IT is important so as to promote efficiency of medical and nursing personnel. However, this process needs someone with authority to give directions as to where healthcare organizations should be headed to and which technologies to adopt. This is where the CIOs come in, because they have the necessary skills as far as governing IT in hospitals is concerned. They know what to adopt so as to improve efficiency and enhance control over medical and administrative processes. CIOs are IT experts who are able to understand expectations of the management and the role of IT in meeting

healthcare expectations. With the expertise of the CIOs, for example, management of patients' health records, hence relieving medical and nursing staff from time-consuming documentation tasks.

4.2 The constant evolution of CIO roles and tasks.

For a long time, CIOs have not been part of the management in many organizations. More recently, they have become part of management due to the ubiquity of technology. For CIOs to become experts in identifying healthcare needs and technological solutions, they ought to comprehend both the organization and technology. They should also be trusted to manage this process. Nowadays, CIOs have taken the role of integrator: an advisor on how the hospitals can be profitable, global, and sustainable, using technology. The new technology and delivery platforms means that CIOs have to understand the objectives and language of the organization and integrate them within the information systems; this is why CIOs are becoming increasingly important members of the management team.

4.3 The need to clearly define the roles and tasks of CIOs for training and education in the future.

The literature also points out that there is a need to clearly define the roles and tasks of CIOs in the current context of ever-changing technologies so as to ensure efficacy and increased productivity. It appears that CIOs are adopting new roles, integrating information technologies in healthcare organizations; but, for them to be skilled and trained in the same, their roles ought to be clearly defined. Some of these new roles include designing the correct information architecture, as well as internal and external services, in the correct manner. This stresses the need for CIOs to be leaders who know how to integrate different services. This shift in roles is what is being stressed in the literature. Academic programs should also change to ensure that CIOs meet the wider organizational needs and not just server maintenance and coding tasks.

## 5 Conclusion:

The main aim of this research project was to investigate the role of CIOs in implementing IT governance in the health care sector. To achieve this, a systemic literature review was

conducted with a general search of academic databases such as Emerald, Scopus and Google scholar search engine by using specific keywords. The inclusion criteria were that papers before 2005 were excluded, and that the research must be in English. CIOs are increasingly important in the healthcare sector as integrating technology becomes increasingly important, it became clear that CIOs are also a very important part of the delivery of quality care to patients (especially with regards to patient input regarding IT). CIOs have the necessary skills for IT hospital governance; they know what to adopt so as to improve efficiency and enhance control over medical and administrative processes. Additionally, the roles and tasks of CIOs keep on evolving as new technologies emerge. The roles and tasks of CIOs have been changing because they now play the role of integrator and not just coders or IT workers. They have become part of the management team in healthcare delivery. Finally, there is a need to clearly define the roles and tasks of CIOs for training and education purposes.

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