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IT/IS Governance in Hospital context: Differences between Public and Private sector and their position regarding IT/IS governance Frameworks

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Master in Health Services Management

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November, 2022

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Resumo

As Tecnologias de Informação (TI) são essenciais para o bom funcionamento de um hospital. Agilizam processos de partilha de informação, contribuindo para a melhoria da qualidade dos cuidados de saúde, bem como torna mais eficiente os variados processos dentro destas organizações. Esta crescente importância das TI reforça a necessidade de garantir que o uso destas tecnologias está bem alinhado com a estratégia e objetivos da organização. Surge, assim o conceito de governação das TI. Esta governação permite maximizar o retorno de investimentos feitos em TI, bem como aumentar a flexibilidade de adaptação à mudança, mitigar riscos externos e melhorar a sua performance. Existem diversas *frameworks* que abordam este tema, nomeadamente o COBIT.

A implementação de uma estrutura de governação de TI varia consoante a organização, o setor e o regime estatutário. Por isso, estruturou-se uma entrevista para realizar aos Diretores de TI de hospitais públicos e privados e averiguar que diferenças existem na abordagem ao tema da governação das tecnologias de informação, bem como a perspetiva dos mesmos face à utilização de *frameworks* para este propósito.

Verificou-se que nas organizações privadas existe um maior envolvimento dos gestores intermédios nas tomadas de decisão, bem como maior investimento em inovação e planeamento estratégico de longo prazo. Ao contrário do esperado no início do estudo, as organizações públicas foram as que mais demonstraram interesse em utilizar as *frameworks*, apesar da sua complexidade. Conclui-se que apesar de o regime estatutário influenciar o modelo de governação das TI, o fator determinante é quem está na liderança.

Palavras-chave: Governação de TI; IT/IS Governance Frameworks; COBIT; Hospital público; Hospital privado; CIO; CEO

Classificação JEL: I13 e M15

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Abstract

Information Technology (IT) is increasingly essential for the proper functioning of a hospital. It streamlines data sharing, contributing to the improvement of the quality of healthcare, as well as making the several processes in these organizations more efficient. The growing importance of IT reinforces the need to ensure that these technologies are aligned with the strategy and objectives of the organization. This has led to the rises of the IT/IS governance. Such governance allows the maximization of the return on IT investments, as well as increasing the organization flexibility to adapt to changes, mitigate risks and improve its performance. There are several frameworks that address this topic, namely COBIT.

The implementation of an IT/IS governance structure depends on the organization, on the sector and on the statutory regime. Therefore, it was structured an interview to be carried out to the IT/IS Director s of public and private hospitals and find out what differences exist in the approach to this issue, as well as their thoughts about the use of frameworks for this purpose.

The results show that private organizations there is greater involvement of middle managers in IT-related decision-making, as well as greater investment in innovation and long-term strategic planning. Contrary to what was expected at the beginning of the study, public organizations were the ones that showed that want to follow those frameworks, despite of their complexity. To conclude, although the statutory regime influences the IT/IS governance model, the determining factor is who is in the leadership.

Keywords: IT/IS Governance; IT/IS Governance Frameworks; COBIT; Public hospital; Private hospital; CIO; CEO

JEL Classification: I13 and M15

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1. Introduction

The health sector has becoming more and more demanding. This happens not only due to the pandemic SARS-CoV-2 but also because of the population's increasing need for healthcare. In the past decades average life expectancy has increased steeply. The average of OECD countries recorded an average life expectancy of 80.6 years in 2019 (OECD, 2019). In Portugal the increase in the average life expectancy does not translate into an increase in life's quality. The ageing of the population happens as there is the prevalence of non-communicable and chronic diseases, such as neurodegenerative, oncological, cardiovascular, or respiratory diseases. These factors contribute to an increased demand for health care, thus leading to the overload of Hospitals and other healthcare services (Leite, 2020). Therefore, there is a need for improved quality, efficiency, and effectiveness of health services.

In order to respond to these needs, several healthcare organizations have been developing and implementing systems and services using Information Technologies creating Information Systems and Technologies (IT/IS) (Lapão, 2011). IT/IS services have never been as essential as in today's information society (World Wide Services, 2019). IT/IS represent a critical factor for an effective management and performance of an organization by providing large amounts of quality, reliable and timely information that assists in the management and in decision-making process that minimizes uncertainty (Lara & Jenkins, 2013). Information Technology and Information Systems are used in the healthcare industry to improve the quality of health care, to prevent medical errors, reduce costs, to increase administrative efficiencies, decrease paperwork, and expand access to affordable healthcare (Shahi et al., 2014). Information Technology and Information Systems allows improvements in healthcare processes, such as computer applications for data capture and processing, medication preparation and administrative management (Köbler et al., 2010). In hospitals, IT systems are essential to a series of critical areas, such health information systems, electronic document management systems, invoicing, management of clinical and non-clinical materials, accounting and auditing, human resources management and supply chain management, among others.

Given the growing importance of IT/IS in the Hospital's activity and their weigh in their costs, the more important is to have a good and strong IT/IS Governance structure (Bradley et al., 2012). IT/IS Governance is the set of guidelines for the use of IT/IS in organizations with the goal of aim of aligning IT/IS goals with the company's goals (Weill & Ross, 2004). It is a

structure of processes' relationships, principles and mechanisms used to develop, guide and control IT/IS strategy to achieve the organization's objectives. A good IT/IS governance contributes to the alignment of IT/IS strategy with the organization's strategy, maximizes the investments made in IT/IS and seek to satisfy the interests of stakeholders.

There are several frameworks¹ that provide IT/IS governance guidance, such as Information Technology Infrastructure Library (ITIL), frameworks from International Organization for Standardization (ISO) and from Committee of Sponsoring Organizations of the Treadway Commission (COSO) and Control Objectives for Information and Related Technologies (COBIT) (Sabatini et al., 2017). COBIT is a framework of governance and management of IT/IS (ISACA, 2018). According to many authors, it is one of the most complete and comprehensive IT/IS governance frameworks (Zhang & Le Fevers, 2013; Ridley et al., 2004), being known for implementing a set of best practices for the management, control, and effectiveness of Information Technology (Neto & Carvalho, 2020).

The best combination of IT/IS practices, processes and structures may differ from organization to organization, as they depend on several variables, namely the sector in which they operate. Particularly in the healthcare sector, there are a major divergence between public and private management. This means that might exist relevant differences in IT/IS governance between public and private sector in healthcare organizations.

This research will study the main differences in how IT/IS governance is addressed public and private hospitals, the relevance that IT/IS director give to this issue, how do they approach this issue and their perspective and position on COBIT framework and other frameworks.

2. Literature Review

2.1. IT/IS Governance in healthcare organizations

Information is one of the most valuable tools in management. Information in healthcare assist health professionals in the care delivery (Espanha & Fonseca, 2010). It also contributes to the

¹ Framework is a structure that represents a support for the construction/implementation of something. It is a set of practices, rules, or ideas that allow dealing with recurring problems or to assist in decision making.

proper management of healthcare units through the access to data and the production and use of resources (Lapão, 2011). The variety of interdependent structures and interactions that may exist in hospitals make these organizations adaptive and complex systems (Begun et al., 2003). Information Systems and Technologies in hospitals are essential to a number of critical areas of their operation. Are critical in health information systems, electronic document management systems, invoicing, management of clinical and non-clinical materials, accounting and auditing, human resources management, supply chain management and several other. Information Technology and Information Systems are critical to the success of a hospital. It helps to improve the quality of care, increase efficiency and effectiveness in the examination, treatment, and management of the hospital (Shahi, 2014; Köbler et al., 2010). IT/IS follows patient throughout care delivery, from administrative, clinical and logistic processes (Krey, 2010). The inappropriate use of IT/IS can have a counterproductive effect by increasing the risk and uncertainty for the organization (Ridley et al., 2008). For that reason, it is very important to ensure the proper operation and use of IT/IS tools.

IT/IS Governance is an integral part in the organization governance. It is the ability to create through leadership and a set of organizational structures and processes, the desirable behaviours in the use of IT/IS so that they support and extend organizational goals and strategies (Bradley et al., 2012; Weill & Ross, 2005; Silva et al., 2018; ITGI, 2003 cited by Krey, 2010). It is a framework of relationships of processes, principles and mechanisms used to develop, guide and control the creation and implementation of IT/IS strategies in order to achieve the organization's objectives (Van Grembergen & De Haes, 2008 cited by Rusu & Tenga, 2010). Creating governance structures consists in defining a dynamic of behaviours and interactions among the organization resources in order to develop the participation of the various stakeholders. According to Weill (2004), "IT/IS governance represents the framework for decision rights and accountabilities to encourage desirable behaviour in the use of IT/[IS]".

IT/IS governance is responsibility of the top managers and not only of the IT department but can be delegated to other structures in the organization as well (ITGI, 2003 cited Silva et al., 2018; ISACA, 2018). The Chief Information Officer (CIO) of a hospital has to manage four major priorities (CIO, 2008 cited by Krey et al., 2010):

- Maximise results, by increasing revenues and earnings and decreasing expenses and costs;

- Increase agility, so that the organization and its operation adapt to the changing environment demands;
- Mitigate risks, by ensuring security and continuity of internal operation, while minimising exposure to external risk factors;
- Performance improvement, improving the performance of the hospital's various activities and ensuring patient and employee satisfaction.

To optimize processes, it is crucial to develop a robust business plan, forecast and mitigate risks by properly managing IT-related risks and opportunities. IT/IS governance aims to align IT/IS with the business and organizational strategy and objectives. Seeks to maximize the return on investment with the goal of creating value for the organization and to satisfy the interests of the various stakeholders (ISACA, 2020; Zhang & Le Fevers, 2013; Van Grembergen & De Haes, 2009 cited by Lapão, 2011). To meet stakeholders' expectations, the organization needs a structure with guidelines, procedures and protocols that provide support and promote their growth instead of bureaucratic structures that hinder the operationalization of activities and decision-making (Krey et al., 2010).

It is important to understand that IT/IS Management and IT/IS Governance are distinct concepts. Their difference lies in the focus of activities. While IT/IS Management focuses on the efficiency of internal operations, IT/IS Governance focuses on the IT/IS use to achieve the objectives of the organization and its stakeholders. Therefore, has a focus not only inside the organization but also outside. Governance is the responsibility of the higher hierarchical levels because it addresses the organization (Sethibe et al., 2007 cited by Cepik et al., 2014). Unlike management, governance cannot be outsourced. Specific governance responsibilities can be delegated to other structures in the organization (ISACA, 2018). It is up to IT/IS governance to develop a strategic plan that assesses the impact of IT/IS use and investment on organization (Cepik et al., 2014). IT/IS management questions who should make the decision, who should be accountable for them and how they will be monitored (Campbell et al., 2010; Weill, 2004). In other hand, IT/IS governance emerged as a set of initiatives that aim to create audit and security mechanisms in order to prevent fraud, mitigate risks and optimize processes and ensure the efficiency and transparency of their management.

The identification of the role and insight of IT/IS stakeholders and senior managers of hospitals in major IT/IS decisions is an important issue in health care organizations (Shahi et al., 2014). IT/IS executives need sufficient decision-making power and support from

management to maximize the value creation by the utilization of information technology and information systems (Köbler et al., 2010).

There are three types of IT/IS governance mechanisms: decision-making structures, alignment processes and formal communication. Decision-making structures are, for example, the Executive Committee or other top management boards, where the Chief Executive Officer (CEO) and/or Chief Information Officer (CIO) are part. They are responsible for making the decisions that later will be disseminated throughout the organization via the alignment processes. These processes are management techniques that seek to ensure effective and widespread involvement in decisions made and provide input into governance decisions. Processes such as the IT/IS investment approval, project monitoring, among others are included in this mechanism. Subsequently, decisions taken are communicated. Clear and effective communication of the decisions, of which processes are being implemented and which goals are to be achieved represent effective governance. This includes announcements and messages from senior managers or the CIO (Wiedower, 2016; Weill & Ross, 2005).

Most hospital information systems lack adequate management. At the same time there is an unbalanced allocation of resources and IT/IS budgets, as well as poor operational management of these technologies that compromises the performance and data security. Thus, governance is essential in hospitals as it provides a solution to these challenges (Nugroho, 2017; Shahi et al., 2014). IT/IS governance in the healthcare sector contributes to support and optimise processes, whether in medical or non-medical areas. Which allows, for example, health professional not to waste time on activities that could be avoided, devoting more time to patients. When there is good IT/IS governance in hospitals, improvements in the quality, functionality and accessibility of the health care delivery are expected. At the same time, the structures of healthcare organizations are subject to several legal restrictions and a wide variety of IT systems, which makes the healthcare sector a sensitive field for IT/IS governance implementation.

IT/IS governance structures encompass five major decision domains and provides a framework that establishes governance and decision-making principles regarding IT/IS investments, IT architecture, infrastructure, and its applications (Weill & Ross, 2004):

- IT Principles: Statements about the role of IT in the business;
- IT Architecture: Structure of organization of data, applications and infrastructures in a set of integration and standardization requirements;

- IT Infrastructures: Centrally coordinated and shared IT services that provide the basis for the organization's IT capacity;
- Application Needs: Specifying the need for in-house purchase or development of IT applications;
- IT Investment and Prioritization: Decisions on how much and where to invest in IT.

The first step in designing IT/IS governance is to determine who should make decisions and be responsible for these decision areas. There are six types of archetypal approaches to IT/IS decision making. Which mostly differ in the level of centralization of the decision-making process (Weill & Ross, 2005; Weill, 2004; Brown & Grant, 2005):

- Business Monarchy: IT/IS decisions are made at the executive level, also called C-Level, i.e., CEO, CIO, etc;
- IT Monarchy: IT/IS decisions are made by IT/IS professionals, namely the IT/IS Director;
- Feudal: IT/IS decisions are made by each unit, region, or function of the organization;
- Federal: They seek to balance the responsibilities and accountabilities of the various organs of the organization, covering at least two distinct hierarchical levels;
- IT Duopoly: IT/IS decisions are made based on a two-party arrangement, involving IT/IS Executives and IT/IS representatives or representatives of the various units;
- Anarchy: Each individual, or group, decides for themselves what their IT/IS agenda should be.

Table 2.1.1 - IT/IS Governance Archetypes (Weill, 2004)

Decision rights or inputs rights for a particular IT/IS decision are held by:		Executive Level/C-level (CEO, CIO, COO, etc.)	IT/IS professionals (IT/IS Director)	Business Unit Leaders or Process Owners
Business Monarchy	A group of, or individual, business executives	X		

IT Monarchy	Individuals or groups of IT/IS executives		X	
Feudal	Business unit leaders, key process owners or their delegates			X
Federal	Executive level and at least one other business group – IT/IS executive may be an additional participant	X	X	X
		X		X
IT Duopoly	IT/IS executives and one other group	X	X	
			X	X
Anarchy	Each individual user			

Business Monarchy and IT Monarchy represent the structures with the most centralised decision-making power, while the Feudal structure is a structure where decision-making is more decentralised since it is made by the person in charge of a specific unit of the organization.

Although it is not a consensual decision, most researchers agree that an organization with a very centralized decision-making structure entails a centralized IT/IS governance structure, while a structured organization will have a less centralized IT/IS governance (Brown & Grant, 2005). In a centralized structure the decisions related to IT/IS is concentrated in the same body of the organization, such as the CIO. In a decentralized structure it is up to the various units to make the decisions. A centralized organization contributes to greater control and standardization of IT/IS and allows for economies of scale. On the other hand, a decentralized structure allows customizing solutions according to the unit, contributing to respond more effectively to the specific needs of an organization unit (Weill & Ross, 2004; Brown & Grant, 2005).

Tavokalian (1989), quoted in Brown & Grant (2005) found that IT/IS governance structures are directly related to organizations' strategic orientation towards competitiveness. Organizations with more innovative and progressive strategies, who are oriented to be highly competitive, have a more decentralised IT/IS governance structured. Whereas in more conservative organizations that adopt "defensive" strategies, they also adopt a centralized structure.

IT/IS governance has an informal structure, varying from hospitals to hospitals (Shahi et al., 2014). Determining the most appropriate governance model for the organization implies understanding its state, being aware of its need and the intended goals. It is necessary to identify the relevant stakeholders and continuously analyse the current and future requirements to keep them involved and informed (Wiedower, 2016; ISACA, 2018).

2.2. IT/IS Governance in the public and private sector

Portugal has a wide national healthcare providers network. It is mostly made up of public and private organizations. National Health Service (NHS) is the tax funded Portuguese public health system, and it is characterised by universal coverage of citizens. The Ministry of Health centralises strategy planning and regulation at national level. It has five administrative regions which are responsible for health management strategies and care provision to local populations, for supervise NHS hospitals in their administrative territory and for implement measures enacted by the Ministry (OECD, 2021; Fernandes & Nunes, 2016; Leite, 2020).

IT/IS governance has to be adapted to the organization concerned. IT/IS practices, processes and structures need to be adapted to the organization's strategies. Each one has its own specificities. IT/IS governance measures should follow the organization's context, need and goals (ISACA, 2018). It may change depending on the sector of activities or its nature. IT/IS governance in the public sector differs from the private due to the characteristic differences of these sectors (Liu & Ridley, 2005).

Public health organizations differ from private organizations in several characteristics. Such as their main objective, their role, their context of operation and their way of operating. Firstly, public hospitals are owned by the State, i.e government owned and tax funded. While private hospitals are owned by their shareholders, whether individuals, companies or groups of

companies. The purpose of the organisation itself and the respective strategies adopted differ. Public hospitals are at the service of NHS and aim to create public value. They seek to achieve the objectives established by governmental programmes. Such as promote the health of population by providing quality care through a citizen-centred health service with a universal and accessible service, tending to be free of charge. Private hospitals can be subdivided into for-profit and non-profit organizations. In this work when private hospital is mentioned it refers to for-profit hospitals. While public hospitals are financed mainly by taxpayers, private hospitals collect its revenues through the fees charged to its clients. This means that the ultimate purpose of these organizations is to maximize profit. Aiming to maximize revenues and minimize costs (Fernandes & Nunes, 2016; Campbell *et al*, 2010; Cepik et al., 2014; Leite, 2020; Boyne, 2002).

Public hospitals are exposed to coexist with numerous stakeholders with distinct needs and interests that often conflict, more than private ones. Public sector is influenced by government plans, thus there is pressure to achieve short-term goals in order to follow political cycles and obtain votes for the next mandate. Private sector is guided by market signals, competing with dynamic and turbulent environment. This exposure to the market results in an incentive to invest in mechanisms that result in productivity and efficiency increase. Allowing them to increase their competitiveness in the market and justifying the risk taken. The fact that public sector organizations are not exposed to the market and have more limited budgets make these organizations less likely to consider and incur risks, even if these prove to be good investments. Public sector organizations have high level of bureaucracy with fairly formalized and inflexible processes with fairly stringent legal imposition, again resulting in a lack of incentive for efficiency and productivity (Boyne, 2002; Liu & Ridley, 2005; Campbell et al., 2010).

Decision-making differs in the two sectors. In the public sector it is hampered by the bureaucratic process and usually by the existence of several levels of authority, hindering the implementation of IT/IS investments or innovations. Generally, this sector is more methodical and regulated. In contrast, the decision-making in private organizations is faster due to the greater flexibility and proximity between those who decide and those who execute (Boyne, 2002; Liu & Ridley, 2005; Campbell et al., 2010).

Because of the factors above, Ridley et al. (2005) refer that IT/IS governance is more complex in the public sector than in the private. Nevertheless, whether in the public or private sector IT/IS plays a crucial role in organization's activities, whether clinical or non-clinical. IT/IS governance may be carried out in different ways, can be more complex to implement in

one sector than in other but can also determine the success of an organization if well applied to its context.

2.3. IT/IS governance Frameworks

There are problems that IT/IS in health sector face, such as poor management, imbalanced use of IT/IS budgets, poor operational management, data security and protection. For those problems IT/IS governance frameworks can provide a proper solution. The growing importance of IT/IS governance resulted in the creation of several IT control frameworks over the years. A control framework is a recognized system of control categories that cover all the internal controls expected in an organization (IIARF 2002 cited by Liu & Ridley, 2005). There are several frameworks that provide IT/IS governance guidance. They were developed over the years and seek to encompass the best practices to support the process of understanding, structuring and implementing IT/IS governance processes in organizations. For example, there is ITIL, COSO, ISO/IEC 20000/38500 and COBIT (De Haes et al, 2020; Sabatini et al., 2017; Carolino & Nunes, 2019; ISACA, 2018).

ITIL, Information Technology Infrastructure Library, is an IT management framework that emerged at the end of the 1980's with the need of having organized and clarified processes. It provides guidelines for better IT management, how to plan, design and implement effective management and make the best use of service capabilities. ITIL contributes to the development of Service Level Agreements (SLAs) that allow the definition of Key Performance Indicators (KPIs) with great focus on how the IT/IS services and processes should be (Zhang & Le Fever, 2013; Shivashankarappa et al., 2012; Silva et al., 2018).

COSO emerged in 1975 with the goal of improving financial reporting processes and preventing fraud. The COSO structure is based on generic recommendations which include guideline for good governance practices in any area of organizations, not only IT/IS (Janssen, 2008).

ISO/IEC 20000 is the first ISO (International Organization for Standardization) standard for IT/IS service management. It identifies the requirements for management and assists in the preparation and implementation of Information Technology services in the organization. It allows the certification of IT Service Management Systems independently according to the

standard (ISO/IEC, 2005). ISO/IEC 38500 is aimed at IT/IS governance, defining it as a subgroup of organizational governance. Its main tasks are based on the assessment of IT/IS usage, preparation and implementation of strategies and policies, monitoring via IT/IS performance metrics. It seeks to promote the effective and efficient use of information technology (ISO/IEC, 2015).

COBIT (Control Objectives for Information and Related Technology) was created in 1996 by Information Systems Audit and Control Association (ISACA). Initially it was developed to support audit professionals who were increasingly confronted with automated environments. Nowadays COBIT is a globally accepted model. Considered the most comprehensive and complete IT/IS governance and management framework. It relies on a set of best practices, processes and metrics that enables manager, auditors, or users to better adopt IT/IS governance and control in the organization (ISACA, 2018; Zhang & Le Fever, 2013; Silva et al., 2018; Krey et al., 2010; De Haes et al., 2020). COBIT assists organization to align IT/IS processes with their business. The development of an IT/IS governance model helps managers and users to understand their IT systems and decide the level of control and security needed to protect and ensure a good allocation of their IT resources (Lapão, 2010).

COBIT relates itself with other frameworks above mentioned. It covers the generality of ITIL processes. But while ITIL is a collection of management processes for delivering IT/IS services in a complete and specialized manner, COBIT deals with strategic and generic management and governance issues. It focusses less on processes and more on how they are implemented. It is aligned with COSO and its internal control practices and includes several ISO/IEC standards in its formulation (Saeedinezha et al., 2021; Carolino & Nunes, 2019; Knahl, 2009, citado por Krey et al., 2010; De Haes et al., 2020).

The updated version of COBIT is the result of several practical experiences and results from the continuous improvement of the previous six versions. Its evolution follows the various IT/IS-related changes occurring in organizations (Steuperaert, 2019, cited by De Haes et al., 2020). Compared to the previous versions, COBIT 2019 has improved in several areas. In flexibility, in that it allows COBIT to be adapted to the context of the organization in the best way. Has also improved in the relevance, i.e being aligned, supported, and grounded with today's standards and benchmarks. It has a prescriptive application, it can be seen as a recipe or a guide to the implementation of an IT/IS governance system tailored to the organization in question. Includes IT performance management, since the structure of COBIT performance management model is integrated into a conceptual model (ISACA, 2018).

One of COBIT main goals is the creation of value for stakeholders. To do so, COBIT follows the “goals cascade” in which to meet the stakeholders needs and to preserve the value created by the information technology it is necessary to achieve the organizational goals. In turn, to achieve the organizational goals it is necessary to achieve the alignment goals, i.e ensure that IT/IS strategies are aligned with the goals and mission of the organization. And finally, to ensure this alignment it requires that the management and governance objectives are achieved (ISACA, 2019; De Haes et al., 2020). It works like a cascade. For IT to contribute to achieving the organization’s goals, IT/IS governance and management objectives need to be achieved as well.

In COBIT 2019 the management and governance objectives are divided into five domains (ISACA, 2018; De Haes et al., 2020)):

- Governance objectives are grouped in the Evaluate, Direct and Monitor (EDM) domain, which aims to evaluate strategies, to guide managers on the strategic options chosen and to monitor the achievement of strategies;
- Management objectives are grouped into four domains:
 - Align, Plan and Organize (APO), addresses the organization as a whole, its strategies and IT/IS support activities;
 - Build, Acquire and Implement (BAI), deals with the definition, acquisition and implementation of IT/IS solutions and their integration in the organization's processes;
 - Deliver, Service and Support (DSS), addresses the operational delivery and support of IT services;
 - Monitor, Evaluate and Assess (MEA), addresses performance monitoring and IT/IS alignment with internal control objectives and external requirements.

Each management or governance has a respective process. A management process is related to a management goal and a governance process is related to a governance goal. To achieve the governance and management objectives, each company must define, adapt, and sustain its governance system in components. Components are factors that by interacting with each other contribute to a good IT/IS governance system in the organisation. COBIT 2019 identifies a set of crucial components: the Process, set of practices and activities that allow achieving the desired IT/IS objectives; Organizational structures; Principles, policies and frameworks that define the desired behaviour in the organization day-to-day; Information; Culture, ethics and

behaviours are success factors of governance and management activities; People, capabilities and skills; and, Services, infrastructures and applications that provide the organization with the governance system for IT/IS processing (ISACA, 2018; De Haes et al., 2020).

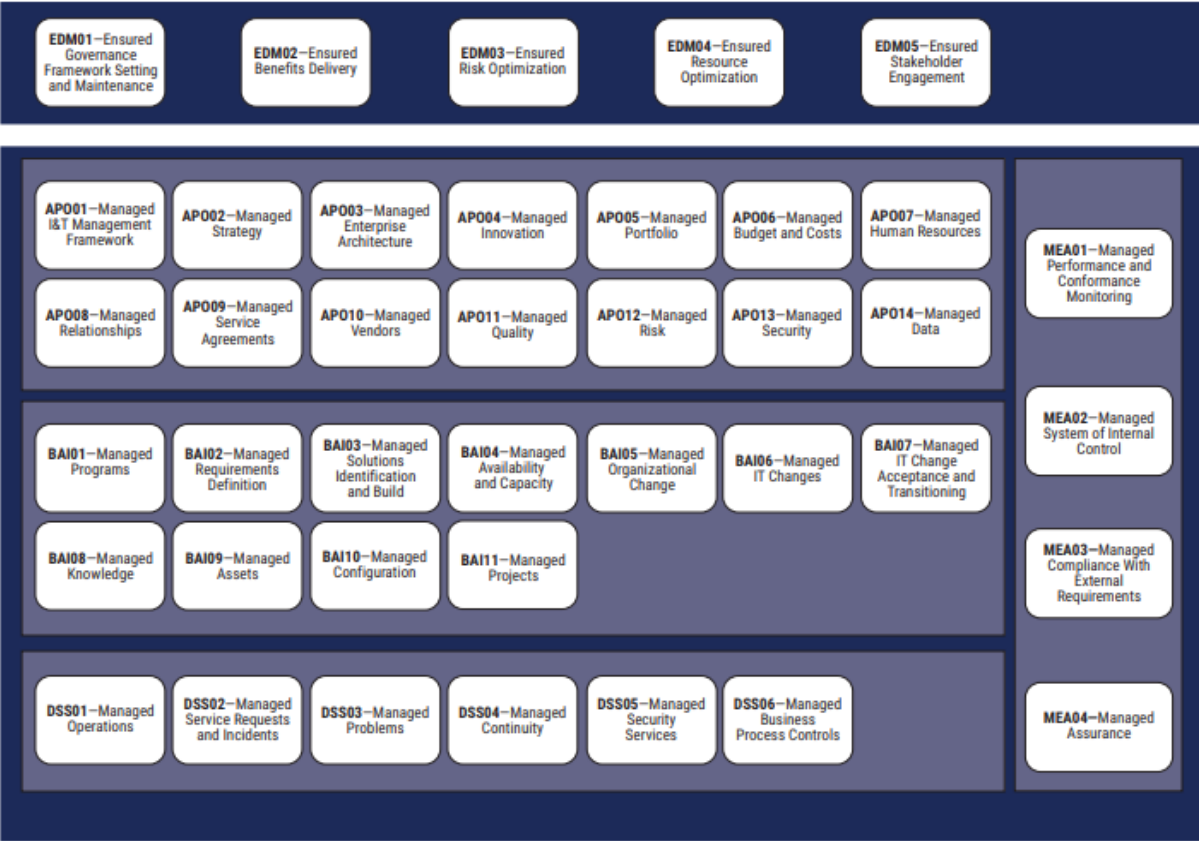


Figure 2.3.1 - COBIT Core Model (ISACA, 2018)

A successful health care organization is built on a solid data and information framework (Lapão, 2010). COBIT should be tailored to the organization's needs, as well as to its operating context, so its implementation may vary from a public hospital to a private hospital. When well implemented, this framework gives the organization the ability to better control its IT/IS processes, by improving its IT/IS governance model, aligning IT/IS goals and practices with the organization's objectives, and monitoring its performance. (ISACA, 2018; De Haes et al., 2020; Saeedinezhad et al., 2021).

3. Methodology

To carry out this study on IT/IS governance in hospitals and ascertain whether there are significant differences between public and private hospitals in this subject, it was conducted a literature review with the following index keywords: IT/IS governance; IT/IS governance in hospitals; IT/IS governance frameworks; COBIT and differences between public and private sector in Portugal.

It will be used a qualitative method. This model of methodology allows investigating a certain topic. The chosen methodology aims to understand certain situations, analysing the perceptions and behaviours of those involved, as well as the context in which they act (Kaplan & Maxwell, 2005). Thus, based on a qualitative methodology, it will be possible to understand the differences in IT/IS governance between a public and a private health organization.

Qualitative approaches are complex to analyse data and thematic analysis can represent a flexible and useful method to organize and describe rich and detailed data. Thematic analysis is a method for identifying, analysing, and reporting themes. It benefits from its flexibility and interpretative phenomenological analysis. It can be seen not as a specific methodology but as a tool (Braun & Clarke, 2006). The processes of data collection, data analysis, interpretation, and research design are connected and depend on each other (Kaplan & Maxwell, 2005).

Data collection can be performed either through interviews, surveys, or document analysis. The data collection method will be a semi-structured interview with IT/IS Director of hospitals since structured approached contribute to ensure data comparability (Maxwell, 1996). The IT/IS Director is responsible for managing, planning, and executing the information service activities for the various departments of the organization. He/she works under the command of the CIO to whom he/she should report. The IT/IS Director is also responsible for supervising and ensuring that the projects carried out by IT department are aligned with the organization's strategies and objectives (ISACA, 2018; De Haes et al., 2020).

Table 3.1 - Interview structure

Topic	Specific Topic	Author (year)	Question
IT/IS Governance	IT core activities	Paré et al., 2020; Köbler et al., 2010	1. What are the main tasks of IT/IS professionals in the organization?
	Decision making and implementation	Shahi et al., 2015; Köbler et al., 2010; ISACA, 2018	2. How are IT/IS-related decisions made? Who participate in the decision making?
	Monitor and evaluation of IT performance	Shahi et al., 2015; ISACA, 2018	3. How do you monitor IT/IS performance?
	IT/IS Governance Structures	Weill & Ross, 2005; Shahi et al., 2015	4. There are any formal IT/IS governance structure? How it is structured?
IT/IS Governance Frameworks	COBIT Framework	ISACA, 2018	5. Do you know COBIT framework?
	Framework	Shahi et al., 2015; ISACA, 2018	6. Do you follow any IT/IS Governance framework?
		ISACA, 2018	7. What are your thoughts about this framework?

The interview was made to five IT/IS Director s from hospitals from different various cities in Portugal. Three of them are public hospitals and two are private hospitals. One of the public hospitals ended a public-private partnership (PPP) contract in the recent past. While PrH2 are a group of several hospitals and clinics across the country, the others are single organizations.

Table 1.2 - Characterization of the interviewees (2021)

	PuH1	PuH2	PrH1	PuH3²	PrH2
Sector	Public	Public	Private	Public	Private
Number of people in the direct area of influence (SNS)	184 600	500 000	-	247 115	-
General Hospitalization Capacity	400	1 689	-	313	-
Number of Medical Consultations	135 730	880 877	100 000	149 944	2 234 000
Number of Emergency Treatments	99 406	235 002	5 600	-	459 000
Number of Surgeries and Deliveries	10 261	42 987	4 000	73 823	75 000
Number of Complementary Diagnostic Tests and Therapy	2 298 702	9 394 529	300 000	34 593	-
Number of Imaging Exams	-	-	50 000	-	1 213 000

² This organization is currently under public management, but in the recent past it operated under a public-private partnership, i.e. under private management but providing a public service. Several elements of the organization remained after the transition to the public sector, such as the current IT/IS Director .

Regarding data analysis, after each interview, its transcription was made to allow a later analysis of its content. The most relevant information to answer the question asked was highlighted and a category of response was created to group the hospitals, as shown in Table 4.

4. Results

The following table resume the results obtained from the interviews made to the IT/IS directors.

Table 2.1 - Results from the interview

	Pu H1	Pu H2	Pr H1	Pu H3	Pr H2
1. What are the main tasks of IT/IS professionals in the organization?					
Service Management, User Support Network and Infrastructure Coordination, Project Management. Little strategic planning for the medium/long term and poor modernization.	X		X		
Service Management, User Support Network and Infrastructure Coordination, Project Management. There is some strategic planning for the medium/long term and little modernization.		X		X	
Service Management, User Support Network and Infrastructure Coordination, Management and maintenance of existing projects and solutions. Long-term strategic planning and focus on constant innovation and modernization.					X

2. How are IT/IS-related decisions made? Who participate in the decision making?					
Decisions are made by the Board of Directors, in agreement with the member responsible for IT and the IT/IS Director, with little involvement of middle managers. After approval by the Board of Directors, it needs to be authorized by the responsible Agencies or Administrations (AMA, ARS, SPMS) to be implemented.	X	X			
Decisions are made by the Board of Directors, in agreement with the member responsible for IT and the IT/IS Director, with the involvement of middle managers, such as the Planning Director. After approval by the Board of Directors, it needs authorization from the responsible Agencies or Administrations (AMA, ARS, SPMS) to be implemented				X	
Decision-making power is centralized in the Board of Directors, taken based on the needs and solutions exposed by the IT/IS Director, the directors of the various services or the multidisciplinary working group for clinical informatization			X		
Decision-making power is centralized in the Board of Directors, taken based on the needs and solutions exposed by the IT/IS Director, the directors of the various services or the multidisciplinary working group for clinical informatization. Yet,					X

middle level managers have a lot of autonomy and freedom of action					
4. Is there any formal IT/IS governance structure? How is it structured?					
No, there is a plan of action associated with the governance issue		X			
No, it is limited to the IT/IS Director and the Board member responsible for IT, who have daily meetings				X	
No, there are working groups that define strategic priorities as defined by the Board of Directors in the areas of Clinical Informatization (multidisciplinary group) and Risk Management and Security (namely cybersecurity)	X		X		
No, there are several middle managers (Deputy Directors) responsible for core areas such as software development, infrastructure and communications, digital innovation, data and analytics, each of whom is responsible for developing these vertical areas. There are also deputy directors who play the role of liaison between the various units throughout the country and these central teams.					X
5. Do you know COBIT framework?					
No				X	
Yes	X	X	X		X
6. Do you follow any IT/IS Governance framework?					
No			X	X	X

Yes	X	X			
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1. What are the main tasks of IT/IS professionals in the organization?

PuH1: “I divided the service into three teams. One of User Support which is the first line helpdesk. One team of Networks and Systems and another of Information Systems”.

PuH2: “Information Systems Acquisition and Development; Management of systems operation and support services; Management of Telecommunications, Data Centres and Computer Networks; Management of user support and consolidation of Support Centres”

PrH1: “90% is desk service. There are 6 of us, four are only allocated to outdesk, changing printers, fixing computers, configuring users, etc.”

PuH3: “At this moment I can already start planning. I already have projects being planned and which will be implemented in order to improve hospital circuits. But 90% is [solving] urgent and emerging problems, when I say urgent are situations that have to be solved in the next 5 minutes”.

PrH2: All teams end up having project tasks where they are building new things, we are constantly developing new things, we are constantly developing new platforms and building and implementing new systems and so all teams have that part of building new things. All teams also have tasks of constantly maintaining and updating what they already have. [...] Other task is solving urgent problems, doing trouble shooting, analysing the problem and fixing it.”.

2. How are IT/IS-related decisions made? Who participate in the decision making?

PuH1: “Weekly meetings with the member of the Board responsible for IT/IS area. I bring my issues and she brings hers. At these meetings we evaluate and assess the status of the projects. I am involved in the IT/IS projects, in terms of requirements, in terms of financing, I have the budgets to manage”

PuH2: “From the point of view of what you can work within the IT/IS you have total freedom, everything that depends on a transformation you no longer have any freedom of action.”; “In the public sector hospitals do not have the autonomy to spend money on IT/IS, they always have to request an opinion from the Agency for Administrative Modernisation.”; “In public sector, middle management it is an invisible management”.

PrH1: “Proactivity on my part. I have an idea and present to the board.”;” We have a multidisciplinary working group that addresses Clinical Computerization. We meet, discuss initiatives, and present them to the board.”.

PuH3: “We have two ways. IT/IS decisions are always made in agreement with the board member and the director of IT/IS, always. In between, we have the planning director or the service director. Everything that does not require external suppliers is approved directly by the IT/IS director to optimise circuits. Everything that requires the provision of services, acquisition of equipment, in other words, that requires third parties and not the hospital, requires the approval of the Board of Directors.”

PrH2: “If they are previously thought out, validated, budgeted and timetabled decisions, it is a process that occurs only within the IT/IS department. What is discussed more at board level is projects that conflict with each other in terms of priorities. And to things that have not been budgeted to be approved off-budget in order to being implemented. It is a process that moves forward within a week, without great formalities.”

3. How do you monitor IT/IS performance?

PuH1: “When there are complaints, we meet and define a plan and record in excel or similar platforms, what the defined action plan is, and I monitor whether or not it is being complied with. There is no specific platform dedicated to this management. Monitored as it happens. The SLA that was defined is monitored to see if it is being met.”

PuH2: “At the moment we are using a project management tool, which we have execution indicators, when we have execution indicators it is an incentive for the financial part.”; “Indicators are presented in ENESIS [Information Systems and Technologies Strategy document] and the proposal to the indicators that the percentage of conclusion can be known.”.

PrH1: “We have not had that assessment. But I make an annual activity report, in this report that I issue for the executive committee, I put all the objectives and activities that were proposed to develop and the state of implementation”.

PuH3: “I can monitor suppliers' SLAs, I get a monthly report from suppliers, internally I do not. “; “I had to do a comparison of number of calls answered and not answered, and number of tickets solved and not solved.”.

PrH2: “We don't use any specific framework. We look at three indicators. The first is the number of incidents in the technical assistance centre [...]. The second indicator has to do with utilization [...]. The third metric is user feedback [...].”

4. Is there any formal IT/IS governance structure? How is it structured?

PuH1: “There are working groups in which I am part of, such as CLIC, which is the clinical informatics commission, I am part of the cybersecurity team, the information risk and security committee and so what we do is, we meet in these groups as a rule every two months and what we do is we take the topics that concern us and discuss them and from there we come up with implementation actions and other improvement actions. Internal groups within the organisation, aligned with the strategies issued by the Board of Directors. The Board defines the strategic priorities and then, as a function of this, I direct the projects according to these themes”

PuH2: “We have an action plan linked to the issue of IT/IS Governance”

PrH1: “It does not exist. There is the working group concerned with clinical computerisation, the clinicians' complaints and, on the other hand, the need to optimise processes. Then there's the member of the executive committee responsible for IT, to whom I report. I meet weekly and we discuss the things from the previous week, the things for next week, the to do's, the priorities, what's new to do, and it's like this weekly basis”.

PuH3: “No, it is restricted to the IT director and the member of the Board of Directors, with whom I have daily meetings. But there is nothing in the organisation chart.

PrH2: “No, I would say that it is done a little bit by each of the directorates.”; “We have a group of deputy directors who play the role of communication between the units throughout the country and these central teams/structures”.

5. Do you follow any IT/IS Governance framework?

PuH1: “Yes, at the IT service management level we use ITIL. I also have knowledge of COBIT”.

PuH2: “[...] COBIT 5. In the service management area, we have ITIL, ISO 20000, in the security area ISO 2722 for good practices, in the risk area we can have 27005.”.

PrH1: “No. I am inspired by ITIL, I am tired of proposing to the board the project life cycle model, with the change management [of COBIT], with the seven phases to explain that to have a project it is critical to have a need for change.”

PuH3: “No. I am not inspired by any governance tool. I am inspired by teamwork. I have always felt that we would get to the end much more effectively if we all worked towards the same purpose.”.

PrH2: “When I make these plans and guidelines, I base them essentially on 5 pillars: risk management, namely cybersecurity; performance; strategic alignment, which are the major areas and alignments towards which we want to orient our function and our forces, because we often have to be one step ahead of what the organisation will ask of us, we have the obligation to anticipate trends; the whole component of team and resource management. And the delivery of this to the units, the organisational structure we have allows us to deliver it to the units.”

7. What are your thoughts about this framework?

PuH1: "COBIT as being a project management framework teaches us how to assess risk, we have the whole component of knowing how to manage the project in its life cycle, as a whole. We are able to do a requirement gathering, it also teaches us how to do that requirements gathering as a whole, we go through all the phases."

PuH2: “COBIT is the high level of governance. [...] We know it's the best view but it's not that easy to execute"; "It serves as guidelines. In public hospitals you'll find a purely Delivery, Service and Support layer and a little bit of Alignment, Planning and Organisation".

PrH1: “The project life cycle model, with change management, allows you to understand what the starting point is and what the goal is.”; "The cascading benefits, optimising costs and resources and maximising benefits and then the business objectives down to the IT Related Goals, which is what I then have to do to align with the business objectives".

PuH3: "If we are blind to look at a framework tool, we forget to manage people. When we talk about public institutions, which is complicated because there is no meritocracy, I will not be able to offer my employees a better salary, a better raise, a productivity bonus, as there is in the private sector, I have to find another way, and that is it, managing people. We have to make sure that the employees wear the jersey and there is no safe framework, it has to do with the skills we have to motivate the team".

PrH2: "Frameworks should serve as guidelines and points of inspiration for the structures that you want to implement and what you want to do, they can never serve as prescriptive guides to exactly what is to be done because otherwise you drown. You have to look at what you can

implement in the first phase, and as you start to gain traction and maturity, you go up in the maturity level of the framework itself".

5. Discussion

The main activities performed by IT/IS professionals in all organizations under analysis are Service Management, User Support Network and Infrastructure Coordination, and Project Management. User Support is the activity where professionals spend the most time. There are urgent issues, generally in the hospital circuit, that must be mitigated in a matter of minutes as they directly affect the organization's core business.

At public hospital PuH1 and private hospital PrH1, IT/IS professionals spend much of their time triaging and resolving incidents, tickets opened at a Help Desk service, as well as system errors, whether clinical or non-clinical. Urgent problems require so much time that strategic planning for medium/long term is scarce. At the same time, there is difficulty in short-term planning, "it is enough to have a problem in an information system or something unexpected to destabilise the daily task plan" (PuH1 IT/IS Director). In the case of PuH2 and PuH3, IT/IS professionals are already able to perform a more in-depth medium/long-term strategic planning. In these four organizations, the investment in modernisation and innovation is low. In PrH2 there are no IT/IS teams exclusively dedicated to a task, all must deal with urgent issues, all have to innovate and develop new platforms and new systems, and at the same time all have to maintain and update what already exists. Firstly, because people who are developing new things need to know about the existing ones, since it is also the best way to grow professionally and having knowledge of everything that is around. Secondly, because if there are one team only innovating and other only solving problems, this last team will get enough of the job first. In PrH2 there is a strong focus on innovation and modernisation. In private hospitals there tends to be more long-term planning and greater investment in modernization as this will allow the organization to differentiate itself and become more competitive in the market (Campbell et al., 2010).

Linking COBIT domains to the tasks IT/IS professional perform we can say and as stated IT/IS director from PuH2, in public hospitals we find mainly the layer of Deliver, Service and Support (DSS) that include Managed Operations, Managed Service Requests and Incidents,

Managed Problems, Managed Continuity, Managed Security Services and Managed Business Process Controls. In these organizations there is low management in areas like strategy, architecture, innovation, or portfolio, this means that they also have a poor layer of Align, Plan and Organize (APO) and even a poorer layer of Evaluate, Direct and Monitor (EDM). In PrH2 we find that they give a lot of relevance to tasks that are included in these last two domains (ISACA, 2018).

The various IT/IS departments have decision-making autonomy in cases where external suppliers and expenses are not required. Decisions involving increased costs, or not previously budgeted, are taken by the Board of Directors. In all five organization, the Board of Directors involves the IT/IS director, either directly or through regular meetings between him/her and the member of the Board of Directors responsible for IT/IS. In the case of public hospitals, decisions involving increased costs ultimately need to be approved by the Agency for Administrative Modernisation (AMA) or other responsible organizations/institutions. So, it is up to these agencies to decide whether some investments can be made or not. PuH1 and PuH2 differ from PuH3 in the involvement that middle managers have in the IT/IS-related decisions. In PuH3 there is a greater involvement of these managers, elements such as the planning director or the service director also participate in IT/IS decisions.

According to the IT/IS directors of the private organizations interviewed IT/IS decisions do not need any authorisation or approval from another institution. The IT/IS decision-making power is therefore concentrated in the Board of Directors. The Board of Directors makes decisions based on the needs and solutions presented by the IT/IS Director, the directors of the various services and multidisciplinary working groups, such as a group dedicated to clinical computerisation (PrH1). In the case of PrH2, middle managers (deputy directors) are also involved in the decision-making process and accountable for certain tasks.

In PrH2, if they are decisions that have already been thought out, validated, budgeted, scheduled, and approved by the Board, then the subsequent decisions occur within the IT/IS Department. Here the IT/IS Director meets with the various departments of the organization and collects the projects that they want to implement each year, a budget is prepared and, if the Board approves the budget, then it in turn approves the financial execution of such projects. That said, there are then two major reasons for discussing IT/IS decisions in the Board. First, IT/IS projects that conflict with each other from a priority point of view, it is then up to the Board to define which IT/IS department should prioritize. Secondly, the approval of IT/IS projects that have not been previously budgeted is discussed.

To monitor IT/IS performance these hospitals, adopt different approaches. PuH2 uses project management tools, with execution indicators set out in the Information Systems and Technologies Strategy document. In PrH1, despite the IT/IS Director stating that it is not monitored much, an activity report is produced annually, containing all the objectives and activities that were proposed to be developed as well as their state of implementation. In PuH1 and PuH3, this monitoring is done ad hoc, i.e., as the need arises, generally occurring when there are complaints. There, a meeting is held, an action plan is defined and recorded in Excel and subsequently monitored. In the case of PuH3, the IT/IS Director is able to monitor the SLAs of suppliers (whether of infrastructure or applications), since he/she receives monthly reports. In PrH2, they look at three indicators: Number of incidents at the technical assistance centre, where users report problems/incidents associated with an asset, whether it is an application, system or equipment; Usage, which allows the perception of how a certain system is used; User Feedback, people flagged as representative of users who allow obtaining guides on how the performance of IT/IS is being performed in the various services and aspects to be improved. Then they proceed to the analysis and crossing of all information obtained by these three indicators.

None of the organization interviewed has a department/team exclusively dedicated to the topic of IT/IS governance however this does not mean that IT/IS governance is a forgotten issue. In PuH2, instead of a formal structure, there is an action plan associated with this topic, which often cannot be executed due to lack of personnel. IT/IS Director from this organization states that the public sector suffers from lack of middle management and of other positions that would contribute to Governance, such as the CIO, Chief/Manager of Digital Transformation, Chief Technology Officer and an Information Security Officer. At PuH3, it is limited to the IT/IS Director and the member of the Board responsible for IT/IS, who meet daily. PuH1 and PrH1 have internal groups aligned with the strategies defined by the Board, where priorities and action and implementation plans are defined with a view to continuous improvement, namely in areas such as clinical computerisation, information risk and security and cybersecurity. In PrH2 IT/IS governance “is made a little bit by each department” (PrH2 IT/IS Director), in which each department defends the IT/IS projects to be implemented for what is their strategy to achieve the organizational objectives. In addition, in the IT department there is also a set of deputy directors, responsible for core areas, such as software development, infrastructures and communications, digital innovation, data and analytics. Each deputy director is responsible for developing these vertical areas. There are also deputy directors who play the

role of communication between the units throughout the country and the central team; they are the ones who align the directors and managers of each hospital with the centrally defined strategy.

Contrary to what was expected before the interviews were conducted, public hospitals are the ones that most demonstrated intentions to use or follow IT/IS governance and management frameworks, namely COBIT and ITIL. IT/IS Director s of PuH1, PuH2 both draw inspiration from COBIT and use ITIL at the IT/IS service management level. While the IT/IS Director of PrH1 does not use any framework but is inspired by ITIL and COBIT. He does not use them because he mentions that the board did not authorize it implementation. IT/IS Director s of PrH2 and PuH3 do not use any IT/IS governance framework, although PrH2 is based on 5 pillars of governance similar to those present in COBIT. The IT/IS Director of PuH3 considers that governance is achieved through teamwork. If you get commitment and everyone works towards the same purpose, using a framework or not, the results will be better.

All interviewees have knowledge about COBIT apart from the IT/IS director of PuH3 who did not knew about the existence of this framework.

IT directors who support the use of COBIT highlight its advantages. According to them, this framework helps them interacting with other professionals in terms of the guidance it provides for the implementation of IT/IS projects in the organization, risk assessment, as well as the requirements and steps to align IT/IS with the organization's goals and to satisfy the interests of stakeholders through the Cascade Goals principle. The ones that prefer not to use those frameworks prefer to manage people, namely IT/IS people. They involve middle managers in the decision making and have indicators and processes assembled in order to reach IT/IS governance without those frameworks.

6. Conclusion

This study it is not a generalization or representation of IT/IS governance in the whole health sector. It is a recognized fact that governance and IT/IS governance is a critical success factor for a hospital and a description of how IT/IS governance is structured and approached in this specific organizations. IT/IS governance helps to maximize results, increase agility of the

organization to adapt to the change, mitigate risks and improve the performance in terms of quality and efficiency.

We conclude that from COBIT point-of-view public hospitals act mainly in the Deliver, Service and Support layer, when private act not only in that layer but also in Align, Plan and Organize and Evaluate, Direct and Monitor layer. Private hospitals use more long-term planning to long term strategies and invest in modernization, and monitor what they already have.

In the public sector, there is an attempt and willingness to follow IT/IS governance frameworks, such as COBIT, but there is no capability to do so, usually due to the inefficiency of the processes and the lack of staff.

The organizations with private management influence show to be sceptic about the efficiency of the use of an IT/IS governance framework. IT/IS Director of those organizations believe that a framework does not answer the needs and can drown the organization if these organizations are taken in depth. Instead, they believe in the teamwork and the involvement of several levels in IT/IS-related decision making.

The main conclusion is that even though different statutory models of organizations translate into different governance models, it comes down mainly to who is in charge. We can argue that the process efficiency or bureaucracy hampers good IT/IS governance but, in the end, leadership makes a big difference in the governance of an organization.

As a limitation, I recognize the low representativeness of the sample interviewed and ideally the interviews would also have been carried out with the CIO

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