



Conference on ENTERprise Information Systems / International Conference on Project  
MANagement / Conference on Health and Social Care Information Systems and Technologies,  
CENTERIS / ProjMAN / HCist 2016, October 5-7, 2016

## IT Governance mechanisms in higher education

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### Abstract

Information technology (IT) has become essential in supporting the growth and sustainability of all types of organizations. Higher education institutions are a special type of organization where technological infrastructure consists of a variety of applications, different platforms, academic systems, cloud applications and heterogeneous technologies. All these technologies for supporting the research, teaching and administrative processes require an effective IT governance framework. The framework of IT governance is composed of structures, processes and relational mechanisms. Each one of these mechanisms has a function and when implemented, should affect the organization positively. The process of identifying the right mechanisms to a specific context is a complex endeavor. This paper looks at the IT governance mechanism that higher education institutions have implemented. We did an extensive literature review making use of databases such as Web of Science, IEEE, SCOPUS, or AIS eLibrary for selecting case studies. We discuss these practices in the context of higher education. To continue this research and improve the IT governance body of knowledge for higher education institutions, future works are pointed out.

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Peer-review under responsibility of the organizing committee of CENTERIS 2016

*Keywords:* IT governance; Higher education institutions; IT governance mechanisms; Literature Review.

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### 1. Introduction

Information technology (IT) has become essential in supporting the growth and sustainability of all types of

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organizations (Wu et al. 2015). Higher education institutions are a special type of organization that requires a variety of information technology such as software, academic system, cloud applications, wireless network, e-learning platforms, i.e., for supporting the activities of teaching, learning and research (Coen and Kelly 2007). To control this heterogeneous set of technologies, effective IT governance is necessary making use of structures, processes and relational mechanisms. Each one of these mechanisms has a function and when implemented, should impact the organization positively. As evidenced in studies of Weill and Ross (2004) and Lunardi et al (2014), the organizations have adopted formal mechanisms of IT governance to improve their performance and profit. Furthermore, as stated by Grama (2015), an effective IT governance helps an institution in achieving its goals by applying IT resources in optimal ways. It is quite notorious that every type of organization needs to have formal IT governance to get good results in the organizational performance.

On the other hand, ineffective IT governance might affect the organization performance, quality of services, management of operations and costs (Ali and Green 2012; Pang 2014). In the case of higher education institutions, ineffective IT governance might affect the quality of teaching, research and management of internal processes. To determine the right IT mechanisms remains a complex endeavor. Previous studies were focused on IT governance mechanisms on industry (Almeida et al. 2013; De Haes and Van Grembergen 2009; Pereira et al. 2014a). In addition, as pointed out, it is necessary more research on IT governance mechanisms in different contexts.

Following this suggestion from the literature, we did a literature review for IT governance in the context of higher education institutions, looking at the specific governance mechanisms that higher education institutions have implemented.

## 2. Methodology

The literature review is the base for supporting all types of scientific research (Webster and Watson 2002). Moreover, in the process of a literature review, a knowledge base of theories and concepts about research in any area may be developed. This study presents a literature review of implementation of IT governance mechanisms in higher education. We intend to understand the practices for structures, processes and relational mechanisms that higher education institutions have implemented. We did an extensive search in databases such as Web of Science, IEEE, SCOPUS, AIS eLibrary (Association for Information Systems) and Google Scholar. Furthermore, the most important academic portals regarding IT governance in higher education, two associations of information systems in universities EDUCAUSE in the United States of America and UCISA in United Kingdom, were examined.

We used the following criteria for the review process: search was performed from January 2000 to February 2016; publication written in English and available in full text; keywords “IT governance in higher education” “IT governance in universities” “Information Technology for universities” “Information Technology for higher education”, “IT governance” and “University” with the combination of the topic and title. Other articles regarding this topic were found, but we did not consider them, since we only had access to the abstract.

Pereira et al.,(2014b) have developed a study with a focus on Portuguese financial and healthcare industry (Pereira et al (2014c). These studies build upon research of De Haes et al (2009) in Belgium industry and this study will follow similar recommendations, but with a focus on Higher education institutions.

## 3. Information Technology Governance Mechanisms

Information Technology governance is an instrument to control and manage the IT resources such as infra-structure technology and people in any kind of organizations, including universities (Bajgoric 2014; De Haes and Van Grembergen 2009; Hicks et al. 2012). Besides, IT governance helps the corporate governance of the organization assisting the strategy and achieving objectives, goals and mission. A framework of IT governance may be deployed with a set of the mechanisms such as *structures*, *processes*, and *relational mechanisms* (De Haes and Van Grembergen 2004; De Haes and Van Grembergen 2009; Peterson 2004; Weill and Ross 2004). The aim of IT governance mechanisms is to enhance business/IT alignment with the positive association of IT governance performance (Wu et al. 2015). Each part of this framework has a function as it follows.

### 3.1 Structures

Structures are responsible for defining roles and responsibilities. Steering committees are an example of those structures composed of directors, managers and executives, in other words, people responsible for decision-making in the organization (De Haes and Van Grembergen 2008b; Webb et al. 2006; Weill and Ross 2004). Table 1 shows the different structures.

Table 1: Structures

Practices for Structures	Cross Reference Case Studies									
	1	2	3	4	5	6	7	8	9	10
IT strategy committee	x	x	x	x	x		x	x	x	x
IT audit committee at level of board of directors							x	x	x	x
CIO on executive committee	x	x								
CIO reporting to CEO and/or COO		x			x		x	x	x	x
IT steering committee		x		x		x	x	x	x	x
IT governance function / officer					x	x	x	x	x	x
Security / compliance / risk officer							x	x	x	x
IT project steering committee							x	x	x	x
IT security steering committee							x	x	x	x
Architecture steering committee							x	x	x	x
Integration of governance/alignment tasks in roles& responsibilities						x	x	x		x
IT councils							x	x		
IT leadership councils							x	x		
IT organization structure		x	x	x	x					
Centralized						x		x		
Decentralized							x		x	
Federal									x	x
Business/IT relationship managers							x	x		

**Legend**  
 1.(Fraser and Tweedale 2003) 2. (Albrecht and Pirani 2004) 3. (Bhattacharjya and Chang 2006) 4. (Aliyu 2010) 5,6.(Bhattacharjya and Chang 2006) 7. (Zhen and Xin-yu 2007) 8.(Wan and Chan 2008) 9.(Fernández and Llorens 2009) 10. (Ribeiro and Gomes 2009)

### 3.2 Relational Mechanisms

Relational mechanisms include the participation and interaction between IT and the business. An appropriate communication and knowledge sharing with learning and coaching is important (De Haes and Van Grembergen 2008b; Webb et al. 2006; Weill and Ross 2004).

Table 2: Relational Mechanisms

Practices for Relational Mechanisms	Cross Reference Case Studies									
	1	2	3	4	5	6	7	9	9	10
Co-location Business/IT collocation							x	x		
Cross-training					x			x	x	x
Knowledge management (On IT governance)		x			x	x				
Executive / senior management giving the good example								x	x	x
IT leadership		x		x	x	x	x	x	x	x
Corporate internal communication- Addressing IT on a regular basis							x	x		
Active participation by principle stakeholders							x	x	x	x
Collaboration between principle stakeholders							x	x	x	x
Partnership rewards and incentives										
Shared understanding of business/IT objectives		x	x	x	x	x	x	x	x	x
Senior management announcements								x	x	x
Office of CIO or ITG							x	x	x	x

### 3.3 Processes

Processes refer to planning and strategic decision making of IT based on practices from ITIL, COBIT or Balanced Scorecard to name some examples, including techniques and appropriate tools to align business and IT for a good performance (De Haes and Van Grembergen 2008a; De Haes and Van Grembergen 2008b; Webb et al. 2006; Weill and Ross 2004). These mechanisms are the most implemented by the institutions. Table 4 shows the mechanisms for

processes that institutions have implemented. The case study 11 of UCISA, in 13 institutions, The case study 20 is a survey of EDUCAUSE in 458 universities of USA and Canada (Bichsel and Patrick 2014). Table 4 show the mechanism of processes.

Table 4: Processes

Practices for Processes	Cross Reference Case Studies																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Strategic information systems planning	x	x	x	x	x	x														
IT performance measurement (BSC)	x		x	x							x	x	x	x					x	
Portfolio management	x				x	x					x	x	x	x						
Charge back	x																			x
Service level agreements																				
IT governance Frameworks /Standards																				
ITIL					x	x	x	x			x	x	x	x	x	x				x
COBIT					x	x				x		x		x					x	x
ISO/38500																				x
BS7799, ISO17799 and ISO27001					x	x														x
People Capability Maturity Model (P-CMM)					x															
NIS																				x
HEISC:																				x
OCTAVE																				x
MoR: Management of Risk (International)																				x
IT governance assurance and self-assessment												x	x	x	x					
Project governance / management methodologies		x	x		x	x	x					x								
IT budget control and reporting						x	x													x
Benefits management and reporting																				
Business/IT alignment model						x						x	x	x	x					
ITG Maturity Models CMM					x	x	x													
Green IT																				x
Tools and techniques, software						x	x													
Risk Analysis (COBRA)						x														

**Legend**  
 1.(Fraser and Tweedale 2003) 2. (Albrecht and Pirani 2004) 3. (Bhattacharjya and Chang 2006) 4. (Aliyu 2010) 5,6.(Bhattacharjya and Chang 2006) 7. (Zhen and Xin-yu 2007) 8.(Wan and Chan 2008) 9.(Fernández and Llorens 2009)10. (Ribeiro and Gomes 2009) 11. UCISA 12-15. (Ko and Fink 2010) 16. (Saleh and Almsafir 2013) 17. (Jairak and Praneetpolgrang 2013) 18. (Nugroho 2014) 19. (Jairak et al. 2015) 20. (Bichsel and Patrick 2014).

#### 4. Discussion and Conclusion

Regarding of IT governance mechanisms implemented by the higher education institutions, we can draw some conclusions. Higher education institutions had implemented many committees. Each one of these committees has an objective and a goal in the IT governance of institution. For example, the strategy committee has the mission of ensuring that IT includes on the agenda to assist the alignment with IT strategy. Others such as IT steering or IT project committee, have the goal of managing IT investments and IT projects. The adoption of formal committees composed of executives (rector, directors, researchers) of higher education institution and IT people can affect the alignment business/IT positively. From our point of view, it is not necessary to have too many committees. In practice, it is more relevant to focus, creating a committee to oversee business-IT alignment.

The IT mode structure decentralized, centralized and federal is also discussed. According to most organizations with the goal of profit tend to be centralized in their approach of IT governance, with emphasis in strategies to efficient operations. The study of Hicks (2012) in eight Australian universities shows that the structure is highly decentralized (Hicks et al. 2012). According to (Chong and Tan 2012) the adoption of a federal structure is more appropriate for a collaborative network. In the case of universities, the federal mode might be the most appropriated with the centralized control and decentralized IT functions in faculties and business units (Ko and Fink 2010). To summarize, it is adequate to control the IT in a central way through an IT governance office. Indeed, with a federal mode, universities have standardization and decentralization in business units. This solution has been pointed out and may be the best scenario.

Concerning the processes, the most implemented practices are ITIL, COBIT, and ISO. We perceived that institutions choose a standard and customize it to a specific reality. The Information Technology Library, ITIL, is seen as the driver to IT governance in a significant number of case studies.

Due to space limitations, we did not show all ITIL process that higher education has implemented. In the case of UCISA, there are thirteen case studies for implementation of ITIL in universities of UK. These case studies can be further explored identifying the level of maturity of each ITIL process. The outcomes of processes are the standard and are essential to start creating an IT governance implementation. Some institutions, for any reason, choose one and customize to reality. The implementation of Balanced Score Card, strategic information systems planning, methodologies for project management, control of costs, implementation of tools and software compliances, are some examples of practices that impact positively the activities of teaching, learning and research.

Last, we have the relational mechanisms. The adoption of portals for sharing knowledge on IT governance and formal way of communication, are the main mechanisms that universities have implemented. A practice such as “partnership rewards and incentives” was not cited. Regarding this practice, it would be interesting to understand the program of rewards and incentives for employees. In public higher education institutions, due to legislation, is more difficult to make use of financial rewards. However, public higher education institutions have incentives for promotion if IT employees get a master or a doctorate. Public and private higher education institutions can make use of incentives through training for employees to get official certifications such as PMI, ITSM, ISCA among others.

This paper reveals IT governance mechanisms implemented in the context of higher education institutions. In fact, the literature on IT governance in higher education institutions is scarce. Few studies can be found. In addition, an in-depth discussion of each practice is required.

#### 4.1 Future Work

We suggest for future work to analyze the effectiveness and ease of implementation of each one of the IT governance mechanisms identified in the literature review. De Haes (2009) have done a similar research to this one in Belgium industry. We would use the same proposal and customize it to the context of higher education. The outcomes of these mechanisms are possible to compare across different types of industry, taking as examples the works of Pereira (2013) in Portuguese Healthcare and Financial industry and Lunardi (2014) in Brazilian industry. In conclusion, some questions are open to future research. What are the recommended IT governance structures, processes and relational mechanisms to higher education institutions? Which is the minimum baseline to IT governance in Higher Education? What is the level of maturity in the adoption of ITIL, COBIT, ISO: IEC:38500 in higher education? Following these questions, we encourage authors to identify the software that universities have adopted to assist IT governance. Is open source or commercial or software developed internally? From these answers, many conclusions may be drawn upon suitable tools to a specific context taking in account other types of industry. What is the level of maturity when considering the rankings for higher education institutions? Do universities, with a better position in a ranking, tend to adopt more formal practices than others? We finish this article encouraging other researchers to investigate IT governance in the context of higher education taking in account contingency factors such as region, culture, private vs. public, among others.

#### Acknowledgements

This work was supported by CAPES Foundation, Ministry of Education of Brazil Process n.º10415/13-0 and by FCT – Foundation for Science and Technology, project UID/CEC/00319/2013.

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