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BASELINE MECHANISMS FOR IT GOVERNANCE AT UNIVERSITIES

Research paper

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Abstract

The pervasive use of technology has created a critical dependency on Information Technology (IT) that requires IT Governance (ITG). ITG calls for the definition and implementation of formal mechanisms at the highest level in the organization taking into account structures, processes and relational mechanisms for the creation of business value from IT investments. However, determining the right ITG mechanisms remains a complex endeavour. Previous studies have identified ITG mechanisms in use in the financial and health care industries. While universities also increasingly depend on IT for their success, ITG implementation in universities has not received much attention. As universities have many unique characteristics, it is highly unlikely that ITG experiences from the financial and health care industries can be directly applied to universities. Therefore, the purpose of this research is to identify an ITG mechanisms' baseline for universities. Six case studies comprising of in-depth interviews three international universities in Brazil, Portugal and the Netherlands, led to the proposal of a minimum ITG baseline for universities that is comparared with the financial and health care industries. This article concludes by presenting key contributions, limitations and future work.

Keywords: IT Governance Mechanisms, Universities, Case Study, Interviews.

1 Introduction

IT has become essential in supporting the growth and sustainability of all types of organizations (De Haes et al. 2013; Williams and Karahanna 2013; Wu et al. 2015). Organizations have been using IT to automate and perform process integration connecting business among customers, suppliers and distributors to obtain sustainable competitive advantage. Moreover, the pervasive use of technology has created a critical dependency on IT that demands considerable attention to IT Governance (ITG) (De Haes and Van Grembergen 2008a).

ITG includes processes, people, and structures to guide decision-making around technological issues (Grama 2015). When properly implemented, ITG can impact the organization positively and enhance business/IT alignment (Wu et al. 2015). To manage the variety of technologies, ITG mechanisms are necessary to support IT-related decisions, actions and assets and to make sure they are tightly aligned with an organization's strategical and tactical intentions (Pereira et al. 2014b).

A study by Weill and Ross (2004) in 250 organizations from twenty-three countries shows that organizations with effective ITG have 20% higher performance than other organizations with similar strategies. Several studies in Brazilian firms also reveal that organizations that have adopted formal ITG mechanisms improved their organizational performance in terms of profitability, efficiency and cost savings (Lunardi et al. 2009; Lunardi et al. 2014). Thus there is evidence that effective ITG mechanisms and frameworks maximize the creation of business value in organizations.

The process of identifying the right ITG mechanisms to apply to a specific context is a complex endeavour which may depend on the organization's size, country, industry, control (public or private) along with other factors (Marrone et al. 2014; Pereira and Silva 2012; Sambamurthy and Zmud 1999). Universities are complex organizations that require adequate IT and information systems (IS) to fulfil their mission. Their IT consists of a variety of applications, different platforms, academic systems, cloud applications, i.e. a heterogeneous set of technologies (Svensson and Hvolby 2012; Wilmore 2014). Different systems, structures, processes and technologies can be found at universities leading to considerable complexity in managing IT.

The speed of change at which new technologies are implemented into this environment including mobile devices, wireless computing, portal software and digital libraries, adds to the challenge of getting value from IT investments. All these are required to offer the right conditions for teaching, learning and research while supporting administrative processes (Coen and Kelly 2007; Wilmore 2014). The effective and efficient use of IT at universities to support research, teaching and management requires appropriate ITG (Bajgoric 2014; Conger et al. 2008; Hicks et al. 2012; Jairak et al. 2015; Wu et al. 2015). Effective ITG in universities is strongly associated with a high level of maturity of IT governance mechanisms (Yanosky and Caruso 2008). Moreover, the adoption of formal practices at the highest level of the organization for governing IT, as claimed by Weill and Ross (2004) and Lunardi et al. (2014), is expected to bring benefits and improve organizational performance.

Grama (2015) states that effective ITG helps an institution in achieving its goals by applying IT resources in optimal ways. On the other hand, ineffective IT governance might affect the organization performance, quality of services, and management of operations and costs (Ali and Green 2012; Pang 2014). In universities, ineffective ITG might affect the quality of teaching, research and management of internal processes (e.g. access to online courses, software, academic databases etc.).

It is essential that organizations with complex IT have ITG in place to operate. Different organizations need different solutions for ITG (Jairak et al. 2015). A mechanism that may be suitable for an organization in the financial industry may not be suitable for an organization in another industry (Brown and Grant 2005; De Haes and Van Grembergen 2008a; Van Grembergen et al. 2004). De Haes and Van Grembergen (2009) have identified a baseline of IT governance mechanisms for Belgium's financial industry. Pereira et al. provided ITG mechanisms for the Portuguese financial industry (2014a) and healthcare industry (2014b). These outcomes show that baseline mechanisms differ across industry

sectors. The need to address the implementation of ITG mechanisms in different contexts encourages further studies.

As pointed out in IS top journals such as MISQ and JIT, research on ITG mechanisms is still scarce but has gained greater attention recently (Schlosser et al. 2015; Wu et al. 2015). A first challenge may be to understand how universities are implementing IT governance mechanisms to realize the full potential of IT to leverage research, teaching and knowledge transfer to society (Hicks et al. 2012). Given the relevance that ITG has gained in IS, building upon the work of Ko and Fink (2010), Schlosser et al., (2015), Wu et al. (2015) Pereira et al., (Pereira et al. 2014a), this study intends to contribute to the body of knowledge on ITG, answering the following research question: **What are the minimum baseline mechanisms to effectively govern IT in universities?**

This article is structured as follows: Section 2 introduces the concepts of IT governance and the research on IT governance mechanisms with a description of the research on IT governance in universities. Section 3 presents a methodology adopted in this study, and a multiple case study consisting of interviews. The findings and results of this study are illustrated afterwards in Section 4. Finally, the conclusion and future research proposals are discussed in Section 5.

2 Theoretical background

2.1 IT Governance

ITG first appeared in the 1990s in the IS literature (Henderson and Venkatraman 1993). Many authors define ITG under different meanings. We use the following definition provided by De Haes and Van Grembergen (2009, p. 123): "ITG consists of the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategy and objectives". Corporate Governance of IT is the system in which the current and future use of IT is directed and controlled to support the organization according to ISO/IEC 38500 (2008) and has been recognized by a number of studies (Aasi et al. 2014; Nfuka and Rusu 2011; Qassimi and Rusu 2015). The need for ITG has also been identified by higher education IT leaders as one of the top ten IT issues to achieve success (Allison et al. 2008). A survey conducted by Educause, an international renowned institution in the United States and Canada, presented ITG among the top concerns for directors and CIOs of universities (Ingerma and Yang 2010).

2.2 IT Governance Mechanisms

ITG involves a set of high-level definitions, such as principles, values and goals, operationalized through mechanisms (Wiedenhöft et al. 2016). Thus, ITG mechanisms are a practical manifestation of these high-level definitions and contain day-by-day activities as a way to execute ITG in practice. An ITG framework may be deployed using a set of mechanisms including structure, processes, and relational mechanisms (De Haes and Van Grembergen 2004; De Haes and Van Grembergen 2005; De Haes and Van Grembergen 2009; Peterson 2004; Weill and Ross 2004).

ITG structures are responsible for defining roles and responsibilities. Steering committees are an example of such a structure. A steering committee is composed of directors, managers and executives, in essence, individuals responsible for decision-making in the organization (De Haes and Van Grembergen 2008b; Webb et al. 2006; Weill and Ross 2004). ITG structural mechanisms are related to "the degree to which the organization has established organizational units and roles responsible for making IT decisions such as committees" (Wu et al. 2015).

ITG processes refer to planning and strategic decision making of IT based on practices from ITIL, COBIT or Balanced Scorecard for example, including techniques and appropriate tools to align business and IT (De Haes and Van Grembergen 2008a; De Haes and Van Grembergen 2008b; Webb et al. 2006; Weill and Ross 2004). ITG processes are related to "the degree to which the organization has established formal processes to monitor and ensure that IT policies are consistent with business needs"

(Wu et al. 2015).

ITG relational mechanisms include the participation and interaction between IT and business. Appropriate communication and knowledge sharing combined with learning and coaching is important (De Haes and Van Grembergen 2008b; Webb et al. 2006; Weill and Ross 2004). ITG relational mechanisms are related to "the degree to which the organization has established channels to ensure proper communication and disseminate ITG principles" (Wu et al. 2015).

Table 1 summarizes the findings of empirical studies regarding the relevance of some mechanisms for IT governance.

Source	Findings
(Ali and Green 2006)	The mechanisms of the IT strategy committee and corporate communication systems improves the overall effectiveness of IT governance in public organizations.
(Huang et al. 2010)	ITG structures in SMEs tend to be centralized rather than decentralized or hybrid. IT steering committees and communication policies have an influence on the effective ITG of the organization.
(Prasad et al. 2010)	The firms' effectiveness of the IT steering committee driven ITG initiatives positively relates to the level of their IT-related capabilities.
(Ali and Green 2012)	the involvement of senior management in IT, the existence of compliant ethics or culture in IT, and corporate communication systems have a positive impact on the level of effective ITG.
(Chong and Tan 2012)	Effective collaborative ITG is associated with an active involvement of a governing body; a coordinated communication process; and the presence of relational culture and attitudinal commitment which influences relational mechanisms.
(Herz et al. 2012)	ITG mechanisms in the financial services industry can be categorized as nine mechanisms: three linked with structures, three regarding processes and three relating to relational mechanisms.
(Prasad et al. 2012)	ITG structures such as the IT steering committee and IT strategy committee are necessary in having a better understanding of the use of resources in IT.
(Lunardi et al. 2014) .	Brazilian companies that adopted formal ITG practices improve profitability. Formal mechanisms have a direct effect on financial performance.
(Schlosser et al. 2015)	The social alignment is driven to varying degrees by a broad variety of ITG mechanisms such as IT on an executive board level, top management support, IT planning, IS training, and regular meeting cycles.

Table 1.   Research on ITG mechanisms

Ribbers et al. (2002) as well as Brown and Grant (2005) demonstrate that solutions for ITG may depend on contingency factors such as: size of the organization, type of organization, regional differences, organizational structure, or strategy. As noted by De Haes and Van Grembergen (2009), ITG mechanisms that are suitable for one industry, may not be suitable for another.

2.3   IT Governance in Universities

IT has an enormous impact on higher education institutions regarding educational performance, learning systems, research productivity, internationalization and integration with universities from other countries. ITG is an essential and important area of study in IS that fortunately has gained more recognition recently (Wu et al. 2015). However, empirical studies in this field are still scarce particularly in universities (Jairak et al. 2015).

Universities from many countries, have increasingly recognized the importance of ITG (Jairak et al. 2015). However, despite the recognition of ITG relevance among university executives, the level of adoption of IT governance mechanisms is low (Yanosky and Caruso 2008). Complex organizations, such as universities, should frequently review their ITG mechanisms to deal with innovation and changes in their environment and adapt to new technologies. It is not only necessary but also essential for these types of organizations to reduce risk and resolve vulnerabilities to provide a high quality and efficient service.

As part of the literature review, we adopted the following criteria (Creswell 2013): search January 2000 to October 2016 in databases such as Web of Science, SCOPUS, AIS eLibrary; publications 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", "Universities", "higher education" combining topic and title.

Table 2 presents a set of relevant studies on ITG at universities.

Source	Purpose
(Bhattacharjya and Chang 2006)	Exploratory study of ITG implementation in two Australian institutions of higher education
(Coen and Kelly 2007)	To present the Information Systems Management and Governance framework developed for UK Higher Education (JISC model)
(Zhen and Xin-yu 2007)	To develop an IT Service Model for Chinese universities
(Wan and Chan 2008)	To improve ITSM for managing campus-wide IT operations in Hong Kong
(Fernández and Llorens 2009)	To present ITG4U, a university-oriented ITG framework to be promoted by the Spanish Association of University Rectors
(Ribeiro and Gomes 2009)	Case study of the implementation and use of COBIT for ITG in a High Public Portuguese Educational Institution
(Ko and Fink 2010)	To understand the ITG using a case study approach in four universities in Australia. They analysed some mechanisms of Structures, Processes and Relational.
(Hicks et al. 2012)	To examine how ITG has evolved in eight public universities in Australia using case study approach.
(Saleh and Almsafir 2013)	Explanatory study of ITIL adoption in a Malaysian university
(Jairak et al. 2015)	To develop a formal set of ITG practices to fit the context of Thai universities.
(Montenegro and Flores 2015)	To develop a model for ICT governance and management to be fully compliant with the regulatory mechanisms that operate within the Central Government of Ecuador.
(Kam et al. 2016)	"To compare the management styles and organizational practices between higher education and the banking industry"

Table 2.   Research on ITG in universities

Studies on ITG at universities have been carried out circumscribing to one specific organization (Ribeiro and Gomes 2009; Saleh and Almsafir 2013; Wan and Chan 2008) or to one specific country, for example, United Kingdom (Coen and Kelly 2007), China (Wan and Chan 2008), Spain (Fernández and Llorens 2009), Indonesia (Jairak et al. 2015), or Ecuador (Montenegro and Flores 2015). A theoretical framework for ITG based on structure, process and people has already been proposed, but based on just four cases and again, circumscribed to a specific country, Australia (Ko and Fink 2010).

3   Research Methodology

Previous studies have examined ITG in different industries, but few attempted to identify suitable ITG mechanisms for universities. This is an exploratory study in its nature looking for a minimum set of essential IT governance mechanisms to be implemented at universities, something that was explored very little so far and calls for a better understanding. The case study method is particularly appropriate for these type of studies and well-suited to capture knowledge and develop theories (Benbasat et al. 1987).

We used a multiple case approach (Yin 2009) in which IT Governance mechanisms are examined across six universities, each one a case under study. These six cases, played an important role in their selection, were selected bearing in mind diversity in size, culture, strategy, structure and processes to

reduce contextual bias (Dubé and Paré 2003). All universities studied are large and public. While attempting to answer which is the minimum set of suitable ITG mechanisms for universities, unlike other studies focusing on a specific country, we selected three countries, and two universities from each country.

3.1 Data Collection

In order to identify suitable ITG mechanisms for universities, we performed semi-structured interviews in six universities, two universities in three different countries; Brazil, Portugal and the Netherlands. We carried out the interviews with CIOs, IT Coordinators and IT Directors) since these are the IT decision-makers at top management and medium levels that are responsible for IT issues (ITGI 2003). Table 3 shows the profile of each interviewee.

	Country	Position	Education	Experience in IT (years)	Experience in the position (years)	Duration of Interview (hours)
1	Netherlands	CIO	Master	30	1.5	1.5
2	Netherlands	CIO	Master	30	10.0	1.5
3	Brazil	IT Coordinator	Master	16	5.0	3.0
4	Brazil	IT Coordinator	Master	15	3.0	2.5
5	Portugal	IT Director	Master	25	0.1	2.0
6	Portugal	IT Director	Master	20	3.0	1.5

Table 3.   Information about interviewees

We contacted the universities by phone and e-mail explaining the purpose of the study. Then the university indicated the most appropriate person to be interviewed. An invitation was sent to that person to schedule the interview. Adding to that invitation, a document with the ITG mechanisms' definition was sent to ensure that all interviewees had the same understanding of each mechanism as well as the questionnaire to be utilized during the interview. The questionnaire was developed in three parts: the first part, with general questions about the institution; the second part, comprising of personal questions about the interviewee; the third part, including questions regarding the level of implementation, the perceived effectiveness, and the perceived ease of implementation of ITG mechanisms. The following question was posed, "What is the level of implementation of the <IT Governance mechanism> in your institution?" on a scale of 0 to 5, where 0 means "not implemented", 3 means "partially implemented" and 5 means "totally implemented".

Similar questions were asked for effectiveness and ease of implementation: "What is the perceived effectiveness of the <IT Governance mechanism> in your institution?" and "What is the perceived ease of implementation of the <IT Governance mechanism> in your institution?" The list of ITG mechanisms used in the questionnaire was essentially based on De Haes and Van Grembergen (2008a), used in similar studies (Ko and Fink 2010; Qassimi and Rusu 2015; Tonelli et al. 2015) but complemented with some other mechanisms from the literature review.

The interviews were conducted between August and November of 2016. Face-to-face interviews were conducted in the Netherlands and Portugal, while skype interviews were conducted with the Brazilian based interviewees. The interviews in Brazil and Portugal were conducted in Portuguese, and in English for the Dutch based interviewees. The face-to-face interviews were recorded using Quick Time player while the skype interviews were recorded using ECAM call recorder software.

While conducting the interviews, we attempted to follow Myers and Newman´s recommendations (Myers and Newman 2007, pp. 16-17): situating the researcher, minimizing social dissonance, representing a variety of voices, everyone is an interpreter, using mirroring in questions and answers, and flexibility, and confidentiality of disclosures. In this way, the interviewer presented himself as someone in the context of universities, while respecting culture differences, giving voice to differences, and ensuring the confidentiality of the information. In addition, observations, documents, the IT website and IT strategic plans' analysis were also used to confront the interviewees and ensure an awareness and certainty of their answers.

We also asked the interviewees to choose the ten most important mechanisms from a list of 46 mechanisms regardless of having or not having been implemented in their institutions. The next section provides analysis of the collected data.

3.2 Data Analysis

Table 4 shows the collected data from the interviews (columns 1 to 6). Each main column has 3 sub-columns, which correspond to a set of questions already used in similar studies that will allow for a comparison of ITG mechanisms in higher education with other industries.

	1			2			3			4			5			6			SUM		
Structures	IM	EF	EI	IM	EF	EI	IM	EF	EI	IM	EF	EI	IM	EF	EI	IM	EF	EI	IM	EF	EI
IT organization structure	4	3	2	5	4	3	3	4	1	5	3	0	5	5	2	5	3	2	27	22	10
ITG function / officer	0	0	2	5	4	2	5	4	0	5	4	0	5	5	1	5	5	1	25	22	6
CIO reporting to CEO and/or COO	5	3	0	5	3	2	2	3	2	5	4	0	5	5	0	5	0	1	27	18	5
Security / compliance / risk officer	5	4	1	5	4	0	0	0	5	0	0	3	4	4	1	5	5	0	19	17	10
Business/IT relationship managers	3	1	4	5	5	2	3	3	3	0	0	2	5	5	0	0	0	5	16	14	16
Governance tasks in roles& responsibilities	0	0	4	4	4	2	4	2	3	0	0	2	5	4	5	5	3	5	18	13	21
IT steering committee	2	0	1	5	3	2	2	4	3	0	0	0	5	5	5	5	0	5	19	12	16
IT expertise at board level	2	2	3	4	3	3	3	2	2	0	0	2	5	5	5	0	0	5	14	12	20
IT security steering committee	0	0	5	5	5	1	0	0	5	5	1	0	5	5	5	0	0	5	15	11	21
IT project steering committee	5	3	2	5	5	1	1	2	3	0	0	2	0	0	5	0	0	5	11	10	18
IT strategy committee	2	0	2	5	4	2	0	0	5	0	0	0	3	4	2	0	0	5	10	8	16
IT audit committee at board of directors level	4	3	1	5	5	0	0	0	5	0	0	5	0	0	5	0	0	5	9	8	21
Architecture steering committee	4	3	2	3	3	3	0	0	5	5	1	0	0	0	0	0	0	5	12	7	15
IT councils	3	1	2	4	4	2	4	2	3	0	0	5	0	0	5	0	0	5	11	7	22
CIO on board	1	0	3	2	4	2	0	0	5	0	0	4	0	0	5	0	0	5	3	4	24
IT investment committee	2	0	2	3	3	2	0	0	5	0	0	0	0	0	0	0	0	5	5	3	14
IT leadership councils	0	0	2	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	27
Processes																	Average		**14.2**	**11.1**	**16.6**
Demand management	3	3	2	4	2	3	4	4	2	2	2	2	5	5	0	5	5	5	23	21	14
Strategic information systems planning	5	3	2	4	5	3	4	2	2	5	3	3	5	5	0	3	3	4	26	21	14
Portfolio management	5	4	0	4	4	3	4	4	3	0	0	3	3	5	0	3	3	2	19	20	11
ITG assurance and self-assessment	4	3	1	3	4	2	1	1	4	3	4	1	4	5	0	4	3	3	19	20	11
Charge back	0	0	5	3	4	2	2	4	4	0	0	2	5	5	5	3	4	2	13	17	20
Project governance / management methodologies	4	4	1	4	4	3	2	1	3	1	2	1	5	5	5	0	0	3	16	16	16
IT performance measurement (BSC)	3	3	1	2	3	4	0	0	5	1	1	2	5	5	0	3	3	2	14	15	14
Frameworks ITG	3	3	2	4	4	2	2	2	3	1	2	2	5	3	2	0	0	5	15	14	16
IT budget control and reporting	3	4	0	4	4	2	0	0	5	1	1	3	5	5	2	0	0	5	13	14	17
Service level agreements	2	2	3	3	3	4	1	2	4	3	1	2	3	5	0	0	0	5	12	13	18
Project Tracking	4	4	1	4	4	2	2	3	2	1	1	1	0	0	5	0	0	5	11	12	16
Benefits management and reporting	2	2	3	0	0	5	0	0	5	0	0	2	5	5	2	3	3	3	10	10	20
Business/IT alignment model	3	3	2	3	4	3	0	0	5	0	0	3	0	0	2	3	3	2	9	10	17
Architectural Exception Process	2	2	3	0	0	5	0	0	5	0	0	3	5	5	0	3	3	5	10	10	21
ITG Maturity Models CMM	3	2	2	1	2	3	0	0	5	0	0	3	0	0	2	3	3	3	7	7	18
Relational Mechanisms																	Average		**14.3**	**14.7**	**16.2**
Office of CIO or ITG	3	3	1	4	3	3	5	4	2	5	4	0	5	5	0	5	5	0	27	24	6
Knowledge management (ITG)	4	4	1	3	3	2	4	4	2	3	3	1	5	4	0	5	5	0	24	23	6
Informal meetings	5	2	0	5	4	1	5	2	0	4	4	1	5	5	0	5	4	0	29	21	2
Corporate internal communication	3	2	0	2	2	3	4	4	2	4	5	2	5	4	0	5	3	0	23	20	7
Shared understanding of business/IT objectives	2	2	2	3	2	4	2	4	3	1	1	4	4	5	2	3	3	2	15	17	17
IT leadership	3	3	1	4	3	3	1	1	3	2	2	3	5	4	1	5	3	0	20	16	11
Co-location Business/IT collocation	3	3	2	3	4	3	3	4	2	4	4	1	0	0	5	0	0	5	13	15	18
Cross-training	2	2	2	4	4	1	2	2	3	3	4	1	5	3	5	0	0	5	16	15	17
Senior management announcements	2	2	1	3	2	4	2	1	2	3	3	2	5	5	0	2	2	5	17	15	14
Executive giving the good example	4	4	0	3	1	4	0	0	5	2	2	3	4	4	0	5	3	0	18	14	12
ITG awareness campaigns	2	2	1	0	0	5	2	3	2	1	2	3	5	4	0	5	3	0	15	14	11
Business/IT account management	3	2	1	5	4	2	0	0	5	0	0	3	5	5	0	0	0	5	13	11	16
Job-rotation	0	0	5	1	0	4	2	3	3	4	3	1	0	3	5	0	0	5	7	9	23
Partnership rewards and incentives	0	0	5	2	2	3	0	0	5	1	1	3	0	0	0	0	0	5	3	3	21
																	Average		**17.1**	**15.5**	**12.9**

Table 4.   Interviews from Universities

 "**IM**" represents the level of **ITG mechanisms implemented** in the institution (from 0, not implemented to 5, totally implemented). "**EF**" represents how **effective** the mechanism is from the inter-

viewees' perspective (from 0, not effective at all, to 5, very effective). **"EI"** represents the **ease of implementation** of the mechanism from the interviewees' perspective (from 0, very easy to implement, to 5, not easy to implement). A score of 3 indicates the mechanism is partially implemented. In this section, the collected data is discussed. Table 4 lists information collected from the interviews. The mechanisms implemented by all the institutions are marked in green. These mechanisms had a score of at least zero or higher. The aim of these questions is to know the most effective and ease of implementation mechanism in the context of universities. The researcher noted observations in loco in ITG at institutions and read all the documents provided before the interview. When the interviewee scored a high level or low level in a mechanism (See Table 4), he/she was asked to confront the documentation provided again and the observations were noted by the researcher. The aim was to ensure the feasible score level in each question regarding to the ITG mechanism in table 4.

The data were analysed using Microsoft Excel, creating a frequency sum of each mechanism and the average. Additionally, the software NVIVO was used to transcript and analyse the qualitative data. Three main pre-defined categories were created namely, Structure, Processes and Relational Mechanisms to code the data. The quote was inserted on the Structure category at the selective code "IT strategy committee" for example: "*All the strategy that is defined is at IT department level… We should have the strategy vison at institutional level...and it is important to be defined to IT success in our university...*". After analysing this code, we conclude even though the university has not a formal IT strategy committee, to have a committee to discuss strategy and alignment within the organization is vital.

We also asked each interviewee to choose the ten most important mechanisms according to their perception and experience in ITG. Table 5 depicts these choices in yellow cells over the columns. The additional column provides information on the frequency of the top ten selected mechanisms decided by each interviewee.

Structures	1	2	3	4	5	6	Frequency
IT organization structure			■	■		■	3
ITG function / officer				■	■	■	3
Security / compliance / risk officer	■						1
Business/IT relationship managers		■	■	■		■	4
Integration of governance tasks in roles & Responsibilities						■	1
IT steering committee	■		■	■			3
IT strategy committee	■	■	■	■		■	5
Processes							
Demand management	■					■	2
Strategic information systems planning		■	■	■	■	■	5
Portfolio management				■	■		2
ITG assurance and self-assessment	■						1
Project governance / management methodologies	■		■	■		■	4
Frameworks ITG	■	■	■	■	■	■	6
IT budget control and reporting		■					1
Service level agreements					■		1
Project Tracking			■				1
Benefits management and reporting	■						1
Relational Mechanisms							
Office of CIO or ITG	■	■			■		3
Knowledge management (ITG)	■	■	■	■	■	■	6
Informal meetings		■			■		2
Corporate internal communication					■		1
IT leadership			■				1
Co-location Business/IT collocation		■					1
Business/IT account management		■			■		2

Table 5.   Ten most important mechanisms chosen by each interviewee

The researcher had an essential function in leading the selection process for the chosen mechanisms in accordance with the interview, documents provided and notations made in field. For instance, during the interview the interviewee mentioned the word "strategy" on several occasions featuring the importance of having a well-defined strategy at the institution. Nonetheless, the "IT strategy committee"

mechanisms were not pointed out as essential on the list. Hence, the researcher asked the interviewee if the mechanism "IT strategy committee" should not be on the list because it was marked as important in the interview process as well as in other previously analysed sources. The "Frequency" column accounts for the number of respondents that have selected that particular mechanism as one of the most important ones. For the baseline, we considered only the mechanisms that were selected at least by half of the interviewees.

4   Discussion and Conclusion

The Table 6 illustrates the mechanisms in higher education (highlighted in grey) that are common with other industries. Grey cells represent a match of a mechanism between at least two industries. All the mechanisms listed in the first column can be seen as the minimum baseline proposed by the authors for universities. Each interviewee had to choose the 10 most important mechanisms. The aim of choosing ten mechanisms is because is a fairly number and a good starting point to implement ITG at universities. In doing so, the baseline is illustrated only mechanisms with the frequency equal three. However, six mechanisms with the frequency two stayed out of the baseline and could be used to complement the initial list.

Baseline for Higher Education (HE)	Belgium Financial Industry (De Haes and Van Grembergen 2009)	Portuguese Financial Services Industry (FI) (Pereira et al. 2014a)	Portuguese Health Care Industry (HC) (Pereira et al. 2014b)
S - IT strategy committee	IT strategy committee	IT strategy committee	IT strategy committee
S- IT organization structure	IT organization structure	IT organization structure	IT organization structure
S - Business/IT relation-ship managers		Business/IT relationship managers	Business/IT relationship managers
S - IT steering committee	IT steering committee		
S - ITG function / officer			
P - Strategic Information Systems Planning	Strategic Information Systems Planning		Strategic Information System Planning
P - Project governance / management methodolo-gies	Project governance / management methodologies		
P - Frameworks ITG		Frameworks ITG	
R - Office of CIO or ITG			
R - Knowledge manage-ment (ITG)			

Table 6.   Baselines of ITG mechanisms across industries

Regarding the most important mechanisms for the baseline proposed for higher education, five are structures, three are processes and two are relational mechanisms. It was not a surprise that two mechanisms, "IT strategy committee" and "IT organization structure" are common to all industries that have been studied.

The first mechanism, "IT strategy committee", is perceived as essential to define the strategy and business alignment. Indeed, since IT tends to be a commodity among enterprises and industries and plays a crucial role to achieve the business goals, a committee ensuring that IT is always on the agenda is clearly important nowadays.

The second mechanism, "IT governance structure", important for higher education as it is in the other industries, reveals that universities also desire to have an ITG structure stabilized for decision making.

The third mechanism, "Business/IT relationship managers", is also indicated as other structural mechanisms to compose the baseline. The main role of this mechanism is to make the bridge between the business and IT for a better understanding among stakeholders.

The fourth mechanism, the "IT steering committee", is not so common with the other industries. While the IT strategy committee is at board level, the steering committee is at executive level responsible for determining business priorities in IT investment focusing in IT service delivery and projects daily. Both committees are crucial for an effective ITG to have a better understanding of use of IT resources (Ali and Green 2006; Huang et al. 2010; Prasad et al. 2012). At the IT level has more flexibility and autonomy to implement committees than institutional level where are necessary to integrate areas with people from different positions.

The last structural mechanism chosen is the "ITG function / officer". Due to the importance of ITG, a specific function to govern IT is an excellent starting point for universities to promote the importance of IT for the business at institutional level and be rewarded accordingly by the board. Since the size and particular characteristics of universities make them unique and different from other industries, an ITG function to align IT and corporate governances deserves attention.

At the process level, three mechanisms were selected: "Strategic Information Systems Planning (SISP)", "Project governance / management methodologies" and "Frameworks ITG". The ITG frameworks were selected by all the interviews. It was not surprising, since the studies found in the literature show frameworks such as ITIL, COBIT or ISO/IEC 38500 as a starting point to implement IT governance. From the interviews, we understood that ITIL is more practical and it is the most ITG framework implemented. Service desk and incident management are the most common ITIL processes implemented in all the universities. It is remarkable that the IT at universities have a focus on operational services taking in account the number of IT users and quality service to deliver to students, professors and administrative staff.

SISP is pointed out by five universities. Universities as complex organizations need to develop long-range strategic planning to justify funding requests for research and teaching activities as well as projects.

Finally, for relational mechanisms, "Office of CIO or ITG" and "Knowledge management (ITG)" were chosen. While in other industries, the "Office of CIO or ITG" is not pointed out as essential to compose the baseline, at universities, it is seen as crucial and also with good effectiveness and ease of implementation. Indeed, a defined function for the CIO or the ITG at institutional level is a good starting point to implement ITG at institution and to sustain the organization's strategy and objectives.

The "Knowledge management (ITG)" was identified as essential by all universities. During the interviews, it was evident that such common ground had a reason. There are specific entities/initiatives responsible for sharing knowledge not only internally but also with other universities. In Netherlands, there is the "Surf association" while in Brazil and Portugal there are some forums to discuss IT solutions among IT decision makers at universities. According to the interviewees, this type of associations provides a portal as a way to share experiences, courses and solutions for IT among the universities. Thus, those associations are seen as fundamental for IT success in universities. Other examples of similar associations to share IT knowledge among universities are the UCISA in the United Kingdom and EDUCAUSE in the United States of America. This mechanism constitutes the main novelty in the context of universities.

Three mechanisms, "Office of CIO or ITG" Knowledge management (ITG)" and "ITG function / officer" that were selected for the minimum baseline of IT governance in universities, are not present in the studies for the Belgium financial industry and Portuguese Financial and Healthcare industries. However, these three mechanisms were pointed out as having a good effectiveness and ease of implementation.

Table 7 allows for a comparison across industries regarding the relevance of the mechanisms to be in a set of the most important ones, the effectiveness and the ease of implementation of the IT governance mechanisms.

It must be stated that the effectiveness of the mechanisms that were not implemented in the universities at the time of the interviews was not taken into consideration to determine the average. For this

reason, the average of effectiveness can be considered lower when compared with similar studies in the field.

	Most Relevant Mechanisms			Effectiveness			Difficulty		
	Structure	Processes	Relational	Structure	Processes	Relational	Structure	Processes	Relational
F I	46.7%	40.0%	13.3%	23.6	24.6	22.0	17.7	23.1	20.4
HC	41.7%	28.3%	30%	22.9	26.1	26.4	20.5	20.6	17.8
HE	31.7%	40.0%	28,3%	11.0	14.7	15.5	16.6	16.2	12.9

Table 7.   ITG mechanisms across industries

The results in Table 7 show that the processes mechanisms are the most recommended for all industries, but are also the less implemented in the universities as shown in Table 4. On the other hand, the relational mechanisms are the most implemented (Table 4) in practice but less suggested as the most relevant (Table 7). These are interesting conclusions that should be explored in further research.

From Table 7, we can conclude that some differences exist among these industries, for example: relational mechanisms are the less relevant for higher education industry and financial industry while for healthcare industry are processes mechanisms. Structure mechanisms are the less effective for higher education industry and healthcare industry, while for financial industry are relational mechanisms. Relational mechanisms are the most effective and easy to implement in healthcare industry and higher education institutions, while for financial industry are processes and structures.

From a universe of 46 possible mechanisms (the 10 most important selected in each interview), 31.7% were structural mechanisms while 40.0 % were process and 28,3 % were relational mechanisms (Table 7). Some information regarding the comparison between Portuguese financial industry (Pereira et al. 2014a) and healthcare industry (Pereira et al. 2014b) is presented in Table 7. We did not present the Belgium Financial industry by De Haes and Van Grembergen (2009) because the study does not provide enough information to compare.

At Figure 1 the authors present a pick chart with the relationship between effectiveness and easy to implement. Plus, regarding ease of implementation, the number zero means not effective and not easy to implement and the number five very effective and very easy to implement. The Figure 1 shows the average of effectiveness Vs ease of implementation. The average is calculated with the sum of each dimension divided by the number of interviews.

From the pick chart, the authors conclude that regarding the effectiveness/ ease of implementation, the "Office of CIO or ITG" is the mechanism with the highest ratio and "project governance/management methodologies" with the lowest. There are some mechanisms with the same ratio: "strategic information system planning" with "demand management" and "IT governance assurance and self-assessment" with "Portfolio management".

Some mechanisms appear to be more effective among universities such as "Office of CIO or ITG", "Strategic information systems planning", "Knowledge management (ITG)"., "ITG function / officer". Hence, these mechanisms appear at the minimum baseline for universities. In contrast, these mechanisms do not appear in any other industry at the minimum baseline. Such evidences demonstrate that different industries have different ITG requirements.

The mechanism "Partnership rewards and incentives" is not present in any university interviewed. The authors believe that such evidence is related to the fact that only public universities have been interviewed so far. Public universities have some legal contingencies. Despite the interviewees have pointed that sometimes there was some flexibility in attending conferences, courses and other similar events, these conclusions must be further explored in our next research where we intend to include also private universities.

Therefore, our purpose for setting up the minimum baseline mechanisms is to assist both researchers and practitioners in understanding the essential requirements to implement effective IT governance at

universities. This recommendation for these ten minimum ITG mechanisms to universities is a good starting point to implement IT governance.
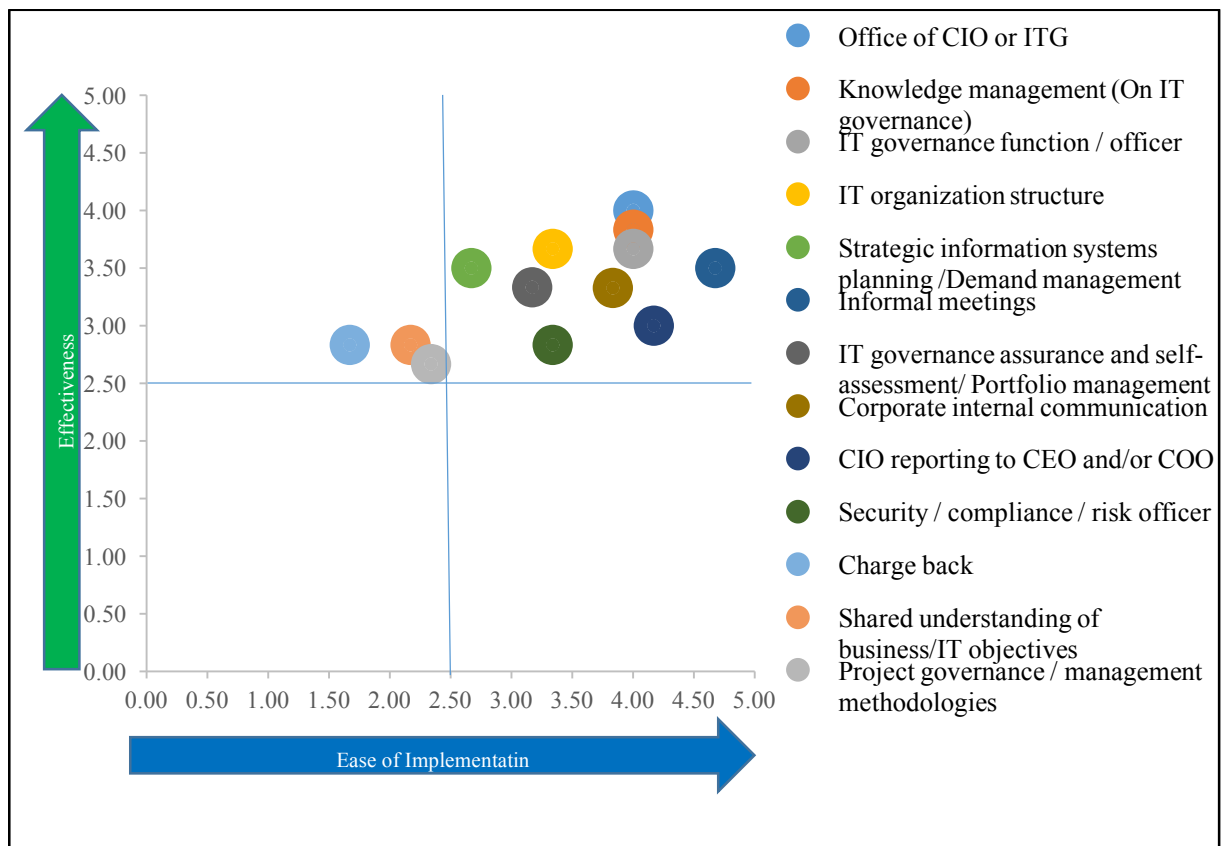

Figure 1.   Pick Chart (effectiveness Vs Easy to implement)

From Figure 1 which presents a pick-chart with the fifteen mechanism with the highest effectiveness/ ease of implementation ratio. This pick-chart is useful to understand which mechanisms would be the quick-wins. The three mechanisms with the best ratio are: "Office of CIO or ITG", "Knowledge management (On ITG)", "ITG function / officer". All these mechanisms were also pointed out as essential at the minimum base line for universities. Therefore, the authors state that these three mechanisms should be seen as the quick-win mechanisms for universities.

The aim of this study was to identify a minimum baseline for universities regarding ITG mechanisms.. This study compares the results with other similar studies in different industries which will enrich the conclusions.

To summarize, a minimum baseline for universities was presented. Yet, a comparison among several industries which results are present in similar studies was also performed and several conclusions taken. For example, "IT strategy committee" is the only mechanism included in all so far. Plus, the processes mechanisms are the most relevant for universities while relational mechanisms are the most effective and easy to implement. Finally, the most important type of mechanisms chosen by the interviewees does not match the most implemented type of mechanisms and such fact must be studied in the future.

4.1   Limitations and Future Research

This study has some limitations. First of all, the collected data was limited to public universities from three countries. Second, only one executive was interviewed in each university. In this article, we took in account only how many times the mechanism was selected and we did not consider a ranking among them. In addition, the questionnaire applied collected other data that are not discussed and presented in this article. The qualitative data collected from interviews and transcribed to NVIVO was not totally presented in this article. However, the authors intend to use these data to discuss and present further research.

Nevertheless, the authors are still performing more interviews and collecting more data in universities from different countries (including private universities) as well as pursuing a validation of the list of ITG mechanisms with a huge sample in order to improve the baseline and strengthen the outcomes. Finally, we intend to advance this study with further researches. Further results may compare the maturity level of IT governance of the universities, draw conclusions regarding the type of organizations (private vs public), and answering questions like: What is the level of IT governance maturity when considering the rankings for higher education institutions? How universities, with a better positon in a ranking, tend to adopt more formal mechanisms than others?

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