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## IT Governance Structures in Brazilian, Dutch and Portuguese Universities

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### Abstract

Effective IT governance is determined by how the IT function is organized and where the IT decision-making authority is located within the organization. Three different IT governance structures may be considered: centralized, decentralized and federal. The appropriacy of these structures is based on the organization's context. This article aims at analyzing how appropriate the IT governance structure adopted by universities is. Using a qualitative approach, we carried out six interviews in three countries, namely Portugal, the Netherlands and Brazil. The findings show that the centralized structure allows economizing on skills and applications, leading to cost reduction and standardization. While the decentralized mode calls for a duplication of resources, higher risks and a difficulty in communication in faculties, a centralized IT system emerges in the university. We can conclude that the federal structure is more suitable for universities where the infrastructure and strategy is centralized and the execution and operation are decentralized. Our findings are in consonance with the literature. This article will end presenting the limitations and future work.

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*Keywords:* IT Governance Structures; Universities; Qualitative Interviews.

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## 1. Introduction

Human activities are becoming increasingly dependent on Information Technology (IT), which is at the core of complex systems to support individual and group work in a diversity of organizational settings [1]. Organizations have been using IT to perform business processes, integrating customers, distributors and suppliers in order to achieve competitive advantage. In fact, IT is essential to support the growth and sustainability of all types of organizations [2, 3] and its pervasive use has created a critical dependency on IT which highlights IT Governance (ITG) in particular [4].

Three types of mechanisms (structures, processes, relational) can be considered for decision-making regarding the implementation of IT governance [5] which can impact organizations positively and enhance business/IT alignment [3, 6]. In other words, an adequate combination of these mechanisms are necessary in managing a variety of technologies as well as supporting IT-related decisions, actions and assets [7, 8]. In addition, the adoption of formal mechanisms at the highest level of the organization for governing IT, as claimed by several authors [9] and [10], brings benefits and improves organizational performance.

Universities are complex organizations that require adequate information systems to fulfill their mission by running a variety of premise and cloud applications, on different platforms, to what emerges as a rather heterogeneous technological environment [11]. This environment should provide the right conditions for teaching and learning, research, and service activities as well as management activities [11-13]. Provided it is an heterogeneous technological environment, it requires appropriate IT governance [14, 15] with mechanisms at a high level of maturity [16] for the effective and efficient use of IT by professionals, which are very demanding.

The question now is not how important IT governance is for organizational success, but what types and appropriate sets of mechanisms make it effective. One of these types is the structures for governance. The universities should be focused on implementing the best IT governance structures to improve decision making while pursuing their strategy. However, the literature is scarce on the advantages and disadvantages of structures for IT governance [14]. Motivated by these recommendations, this research aims at analyzing how appropriate IT governance structure adopted by universities is.

## 2. Research Background

Effective IT governance is determined by how the IT function is organized and where the IT decision-making authority is located within the organization. In the literature, we found two different approaches. The first approach is provided by Sambamurthy and Zmud [17] and another approach is provided by Weill and Ross [9]. In this article, we used the first approach, since it is more pragmatic and the different archetypes of the second approach are included. Therefore, the organizations are classified into the following structures: Centralized Structure, Decentralized Structure and Federal Structure [17, 18].

The centralized type is made by the business or IT management which can generate standardization and efficiency. According to Weill & Ross [19] the most organizations with a profitability tend to be centralized in their approach of IT governance, with emphasis in strategies to efficient operations. Winkler [20] argues that centralized structure is more suitable to public organizations yielding better outcomes. The IT governance structure in small and medium organizations tend to be centralized than decentralized or federal [21].

In the decentralized structure, the decision making is made for business units and the IT decisions reflect a bottom-up, local work unit perspective [21]. This type of structure has more flexibility to the business units.

The last structure is federal. The federal structure, known to be the best one, mixes the centralized infrastructure control with decentralized application control. The managers and IT professionals share the decision making [17, 18]. According to Chong and Tan [22] the adoption of a federal structure is more appropriate for a collaborative network.

The IT governance structure in small and medium organizations tends to be centralized rather than decentralized or federal [21]. However, few studies attempted to analyze the ITG governance structure at universities. Universities are organizations with characteristics different from industry [14] due to the politics, administrative and financial autonomy. Therefore, the majority of the time, the universities prefer to develop and customize their own

ITG frameworks rather than follow the industry standards [14]. Industry needs to be in compliance due to the market requirements.

We performed a literature review following the Creswell [23] criteria to identify studies on IT governance at universities, researching from January 2000 to February 2017 on databases such as Web of Science, SCOPUS, AIS eLibrary; publications written in English and available in full text; keywords “IT governance” and “University”, “Universities”, “Higher education” combining topic and title. Each one of these articles, examined the IT governance structure. Most of the articles found do not provide detailed information about the structure. Table 1 shows some of these studies.

Table 1. ITG structure at Universities

ITG Structure	Lessons Learned from Previous Studies	Reference
Decentralized	A decentralized IT organizational structure is seen as high risk because is preferable for institutions enables control over IT.	[24]
	The study of eight Australian universities showed that the structure of being highly decentralized. All of the universities examined shared a common history of highly decentralized, faculty based IT functions, which appeared to be a natural evolution. These include a duplication of resources, a difficulty in achieving institution wide alignment with strategic business objectives, and IT risks that were not being managed.	[25]
	The positive effect of educational IT capabilities only has an effect when it is also coupled with a decentralized provision of IT supporting services. When these services are primarily provided by central IT, the effect of educational IT capabilities decrease.	[26]
Centralized	Centralized IT governance is preferable for the institutions since this enabled them to maintain control over the decentralized IT functions in faculties and business units.	[24]

To summarize, it is adequate to control IT in a central way through an IT governance office. Indeed, with a federal mode, universities have standardization and decentralization in their business units. This solution has been pointed out and may be the best scenario. The research methodology is presented in the next section.

### 3. Research Method

Few studies attempted to analyze the effectiveness of IT governance structures in the context of universities. This is an exploratory study that adopts an inductive strategy using qualitative data from semi-structured interviews to collect data from different points of view [27] building upon the practical experiences from key stakeholders in the university context [28].

#### 3.1 Data collection and data analysis

In order to understand the effectiveness of IT governance structures at universities, we performed semi-structured interviews in six universities across three different countries, which are Brazil, the Netherlands and Portugal. We adopted a convenience sampling to select a variety of universities from different contexts with a variation in institutional size, culture, strategy, structure and processes to reduce contextual bias [29].

Interviews were conducted with the universities' IT decision-makers at the top and medium management levels (CIO, IT Coordinator and IT Director) usually responsible for all decisions concerning IT [30]. Table 2 provides some information regarding their institutions.

The questionnaire to frame the interview was developed in three parts. In this article, due to lengthy restrictions, we focused only on the first part of the questionnaire analyzing the ITG Structure. <What type of IT governance structure is used in the institution?> it is an example of a question. More details concerning this structure were also asked such as the benefits and advantages perceived in practice as well as the most suitable structure.

Face-to-face interviews were performed between August and November 2016 in Portugal and the Netherlands. Skype interviews were performed in Brazil. Interviews were conducted in English in Netherlands and in Portuguese in Brazil and Portugal, and were later translated to English. “ECAM call recorder” was used to record the interviews on Skype and “Quick Time player” for the face-to-face interviews. We attempted to follow some recommendations to make the interview process more effective [31]. The NVIVO software was used to do a verbatim transcription of all the interviews, and after we used this to analyze the evidence from the transcripts. The

QS World University Rankings [32] were used based on Carnegie Classification of Institutions of Higher Education to classify the universities' size: extra-large for more than 30.000 students; large for more than 12.000 students; medium for more than 5.000 students; and small for less than 5.000 students.

Table 2. Information about interviewees

	Country	ITG Structure	Position	Type of Control	Experience in IT (years)	Experience in the position (years)	Duration of Interview (hours)	Size
1	Brazil	Federal	IT Coordinator	Public	14-20	4-6	3.0	Extra Large
2	Brazil	Federal	IT Coordinator	Public	14-19	3 or less	2.5	Extra Large
3	Portugal	Centralized	IT Director	Public	20-24	3 or less	2.0	Medium
4	Portugal	Centralized	IT Director	Public	14-19	3 or less	1.5	Medium
5	Netherlands	Federal	CIO	Public	25 or more	3 or less	1.5	Extra Large
6	Netherlands	Centralized	CIO	Public	25 or more	10 or more	1.5	Medium

The Table 3 shows the data collected from the interviews where we asked the current ITG governance structured adopted and the best model.

Table 3. Quotes from interviewees

University	Quotes from interviews
1	<i>Currently, most of the structure is centralized. However, some IT technicians work at the faculties reporting directly to the faculty directors not to IT directors. Therefore, we can consider that the IT governance structure is federal. The ideal model is to have a decentralized structure where the central point defines <b>roles and procedures</b>, and <b>the execution</b> to be <b>decentralized</b>. The core structure is centralized to <b>avoid wasting resources</b> and the execution decentralized with the <b>distribution of tasks</b> to a better execution. The best of the worlds is the <b>strategy and definitions</b> to be <b>centralized</b> and the <b>operations decentralized</b>. However, we are so far of this model in our institution. I think that is not good an IT all decentralized.</i>
2	<i>Our structure is federal. We have some <b>departments decentralized</b> ...which is a serious <b>problem</b>. An ideal model in my point of view is the <b>centralized decision-making</b> and the <b>decentralized operation</b> ... The operation decentralized with a relationship and with the central IT structure. IT with a <b>centralized infrastructure</b> and the operation decentralized. The decentralized IT at faculties have several <b>problems</b>, the <b>cost</b> being one. The others are in the <b>communication</b> with the central IT, the autonomy where they develop their own software and do not share with us. Most of the time they are <b>doing the same things</b>, it generates a <b>duplication use of resources</b>. Moreover, the decentralized IT is only to attend the local demand and not at an institution level as the centralized IT.</i>
3	<i>... The Structure is centralized. It is a big advantage in issues such as <b>cost reducing</b>. Moreover, it is harder to manage a team when the people have to work in different places even to create new team procedures or methods is tough to implement</i>
4	<i>... it is centralized at services level ... The ideal is to have all centralized. The <b>centralization</b> is good for management and to <b>save resources</b>. Each faculty have the own data center and it is more expensive for the university. For instance: Each faculty has an e-mail server, an authentication server, among others... all have the same servers <b>duplicated</b> to do the same thing and each unity do it individually. Moreover, it is necessary to have a team in each unit. It is a <b>resource wasting</b> and as the human resources, technical resources are scarce... Then, this model is not efficient in the practice.</i>
5	<i>... it is centralized and federal. We are still moving to more centralized, especially in the research area. The main benefits in the <b>centralized mode</b> are <b>economise on skills, economise on applications, cost reduction</b></i>
6	<i>... it is centralized. The benefits of this type are <b>cost reduction and standardization</b>.</i>

After analyzing the interviews, we performed open, axial, and selective coding for qualitative analysis following recommendations by Strauss and Corbin [33]. Such data enabled us to identify the open code. We created a pre-defined category of ITG structure and the ITG structure with the selective codes of Centralized, Decentralized and Federal. Table 4 provides information of this analysis.

Table 4. Analysis from the Interviews

Category	Sub-Category/ Selective Codes	Open Code
IT Governance Structure	Centralized	Strategy Definition; Infrastructure; economize on skills; economise on applications; cost reduction; Standardization; Institutional level; management; Economize on resources
	Decentralized	High cost; Duplication of Resources; Waste Resource; Operations: Execution; Faculty level; No relationship with main IT at university; Control difficulty; Lack of efficiency
	Federal	Centralized Strategy Definition and Infrastructure with a Decentralized Operations and Execution

The next section presents the discussion, conclusion, the limitations and future work

#### **4. Discussion and Final Remarks**

The interviews were useful to get qualitative information. The evidence of this research has lead us to draw the following conclusion, even though some universities have the federal model, we found a consensus among the interviewees that the centralized model is the most suitable one. Moreover, a totally decentralized model is not seen as appropriate for this type of organization. Table 4 provided information regarding the qualitative analysis.

The federal structure is the most adopted by large and extra-large universities given their size, they have more than one campus. Medium size universities with only one campus, where the ITG infrastructure is central, they usually adopt the centralized structure. The adoption of a centralized structure has some benefits such as economizing on skills, economizing on applications, cost reduction and standardization.

Another interesting point is that none of the universities adopted a totally decentralized structure. The results of this study show that the universities with a decentralized structure share the same problem in issues including high cost, duplication of resources, waste of resources, the difficulty of control and a relationship with the central IT. The findings are in consonance with what has been found in eight Australian universities [25]. Furthermore, a decentralized model is not effective in practice due to the difficulty in standardization and a relationship with other faculty areas. We confirmed that the IT structure tends to be centralized rather than decentralized or federal.

The federal structure tends to be more appropriate in large universities (i.e., one or more campuses) due to higher IT demands at each campus, and location issues. Therefore, in these campuses, it is suggested that the decentralized IT units have a strong interaction with central IT, reporting and working as a partner for it to be for efficient.

We can conclude that the best arrangement has a federal structure where the infrastructure, strategy, roles and procedures are centralized to avoid resource wasting and the execution and operations are decentralized. The findings confirm the literature provided by IT units [24] where IT function has control of the decentralized functions in the faculties.

The aim of this article was to analyze the type of IT governance structure adopted by the universities as well as to propose a better type of structure arrangement according to the data from interviews and the literature review. The article presented a snapshot of each structure adopted by universities from different countries. In addition, qualitative information upon the advantages and disadvantages of IT organization structure were also provided.

This research has some limitations. The data collection was limited to six universities and only one person was interviewed from each one. However, the interviewee was a significant voice in the context under study. We intend to keep collecting data from more universities to increase the comprehension of the IT governance structure adopted in order to improve and strengthen the outcomes of this line of research.

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