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IT governance frameworks: A literature review of Brazilian publications

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Abstract

IT (Information Technology) governance has been a widely studied subject. This has generated different definitions and conceptual models to explain it. We conduct a concept-centric literature review based on a literature reference model. We used three literature frameworks to identify key-variables to evaluate and classify Brazilian IT governance publications. These variables were used to classify 90 Brazilian publications from 2004 to 2012. The authors chose Brazil due to its economic growth and companies' internationalization on the last years. The organizations are fonder to regulatory and compliance marks due to market visibility, driving them towards IT governance practices due to growing dependence on IT. The frameworks used in the country are usually developed abroad - then verification on how they fit with Brazilian organizations is relevant to business management. The study shows that; the most used methodology is the case study; 90% of the papers were written in Portuguese; the IT alignment is cited, but not evaluated; few cases are related to small and medium business; and decision structures are not discussed. The authors conclude presenting a conceptual model summarizing all the models and Brazilian companies' particularities.

Keywords
IT Governance, Framework, Conceptual model, IT Governance Brazil.

1. Introduction
IT governance has been extensively researched over the last twenty years (Brown & Grant 2005). Hence, these studies generated many different definitions and frameworks about IT

governance, making the task of an IT or business manager deciding which way to follow even harder.

Brazil assumed a new role in the global economy in the last few years. Even in a situation where many countries faced a serious crisis including unemployment and corporations failure, Brazilian economy kept growing in a stable pace (Oreiro et al. 2012). The country has been the target for significant external investments on the last five years, and its own companies are reaching a more mature stage of the internationalization process, that is, more intense than the last ten years. This fact coalesces with the need for the Brazilian enterprises, and those which come from abroad, to bring results for their shareholders, besides improving processes.

In Brazil, organizations demanded these practices mainly driven by process quality initiatives started in the beginning of the 1990s and corporate market regulations established by the national stock exchange – BM&F Bovespa (IBGC 2009).

Corporate governance practices in Brazil derived from international financial organizations agreements and other laws that followed corporate scandals, such as Enron and Parmalat (IBGC 2009). The main goal is to ensure that results transparency can be demonstrated from the company to the market, while mitigating risks of processing errors over data and information, unavailability, and lack of integrity and confidentiality (Burnaby & Hass 2009; Alves & Cherobim 2004).

Companies rely strongly on IT to transparently demonstrate their operational status and to enable them to achieve strategic and financial results (Luftman & Bem-Zvi 2010). In Brazil, for large and medium companies, 6% of the liquid revenue of a company is invested in IT (Meirelles 2011). In banks, these figures change for a minimum of 10%.

Even though, these concerns have grown in the last years, available IT governance models to Brazilian companies are typically developed abroad, and then adapted to their reality. A conceptual model would bring these visions together, in a comparative basis, to be a reference for these companies when looking for IT governance implementation and maintenance.

This paper presents a review on publications related to IT governance in Brazil, based on the methodology proposed by Webster & Watson (2002). The literature review was performed over a base of Brazilian papers published nationally and internationally from 2004 and 2012. These samples were classified according to the streams and definitions proposed by Brown & Grant (2005), IT governance arrangements stated by Weill & Ross (2004), and firm classification and IT decision *loci* proposed by Sambamurthy & Zmud (1999). This review is a base for a conceptual model. This model can be used by Brazilian organizations as a reference to verify their position and find different approaches on implementing and maintaining IT governance systems according to their business and operational needs.

1.1. Motivation for localization

Brazil is an emerging market country and currently plays a key-role on Latin America development both politically and economically (Oreiro et al. 2012; The Economist 2009). Companies are very fond to regulations (Guerra et al. 2009) and internationalization movements

are increasing (Fleury & Fleury 2012; Rhinow 2007). The local stock exchange regulations have improved significantly in the last ten years, demanding more transparency on results, and, for corporate governance, planning, implementation, and maintenance (Guerra et al. 2009). Companies rely on IT to keep their operations and to generate results to shareholders and society. Once IT governance models applied into Brazilian companies are typically developed abroad, understand how they cope with the different reality is a need. This context may be used by other markets, such as southeast Asia, the other countries in BRICS (Clarke 2007) or other Latin American Countries, based on their moment of growth, need for greater market standards compliance, and internationalization.

2. Methodology

This study was based on Webster and Watson (2002) concept-centric methodology for literature review, depicted in Figure 1. The objective is to understand how IT governance is defined and how it is applied on the published studies.
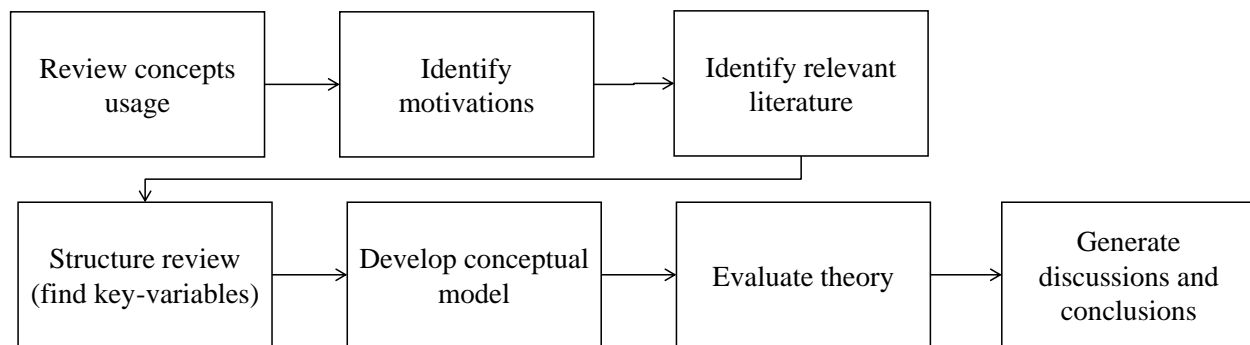

Figure 1: Methodology for literature review studies.

Source: adapted from Webster & Watson (2002).

Specifically to IT governance, we used three models as a basis: Sambamurthy & Zmud (1999), Brown & Grant (2005), and Weill & Ross (2004). These authors were chosen because their methodologies, and conceptual models are widely referenced on literature, for instance looking through search results for the subject on Google Scholar. This paper concentrates on describing:
- IT governance concepts;
- Conceptual model review: streams;
  - Forms;
  - Contingency analysis.
- Current models;
- Selected literature classification by:
  - Conceptual models;
  - Streams;
  - Referenced authors;
- Discussions and conclusions.

This paper localizes its work on selected literature related to Brazil to verify how the same structures and models are applied in this geography.

For this, data collection is based on a bibliometric study for papers search. Beuren & Souza (2008) defended that bibliometrics is made of empiric laws and principles set that contribute to establishing theoretical foundations of Information Science. Espejo et al. (2009) explained that bibliometric performance metrics are useful to evaluate academic research, as well as orienting future research strategies. Also about bibliometric research, Cooper & Schindler (2003) defined it as a descriptive study, once: "the researcher tries to describe or define a subject, usually creating a profile for problem, people or event groups. Such studies may include data collection and creating the distribution on how many times the researcher observes a unique event or characteristic".

For data collection, literature sources were selected from publications through searches on SciElo, CAPES, SIBI,/USP, AISel, Spell, Web of Science, and Scopus databases, including library review for Brazilian congresses, such as Contecsi. This phase was conducted from September till December, 2012, including papers published between 2004 and 2012. The keywords used for the searches were: "governança de TI" ("IT governance" in Portuguese), "Tecnologia da Informação" ("Information Technology"), "COBIT", "ITIL", "Governança" ("Governance"), "alinhamento estratégico" ("strategic alignment"), and "IT governance". Keywords were used alone and combined to improve the results.

Results were filtered to be only Brazilian or Brazilian-related studies about IT governance implementation, usage, and definitions. All papers were read once to verify their adherence to literature models cited. Results from the searches on the research databases resulted on 99 papers.

Each paper scored points for the reference models as it used or referenced their concepts, or even when some findings or description matched some of the models. It was possible that a paper scored zero, one or more points. To be sure papers were adequately grouped, they were read again to check their classification. After reading and scoring, scores were used to verify which part of the models were more frequently referenced, bringing up how IT governance was being studied in the country.

Some limitations of this study are:
- IT governance models were considered based on their historical evolution and relative importance on literature. Studying more localized frameworks or simpler models could contribute to concept models;
- Other variables, such as cultural characteristics, behavior, organizational and individual competences, and power relations could be used to make a complete analysis.

3. IT governance concepts
To understand the meaning of IT governance, we first analyzed the definition of corporate governance. Corporate governance is the system to direct and control corporations, which means the adequate roles and responsibilities allocation throughout the organization. It also defines

rules, politics and procedures to be considered during decision making processes (Guerra et al. 2009).

Going even further in history, Machiavelli (2002) discussed different power models in states. Especially in chapter IX, a parallel can be established with organizational structures, once the leader assumes his responsibilities and then needs to propose and create other power layers to be sure that it can operate and survive. The way responsibilities and power are distributed will determine how the organization shall work.

Having understanding governance as a system for responsibilities allocation and control, corporate governance drives the need for IT governance, once the organization depends on IT and has to be compliant with regulatory and business requirements. In other words, IT governance fits in this context once companies rely on IT to deliver their results.

Studies also explore the need for business and IT alignment (Henderson & Venkatraman 1993). However, if IT is to be considered part of the business, the main task goes beyond trying to align them, but, in fact, to plan, develop, implement, operate, and maintain them together since the beginning. The other stream of studies observed here connect the strategic planning and development phases for IT in conjunction with organizational strategic planning cycle (Mendonça & Souza Neto 2011; Carvalho 2009). In literature, several different points of view related to IT governance are presented. Table 1 summarizes some of them.

Source	Country of origin	IT governance definition
Weill & Ross (2004)	USA	The decision rights and responsibilities framework to stimulate desirable behaviors on IT utilization.
Simonsson & Johnson (2005)	Sweden	Preparation, development and implementation of decisions on goals, processes, people and technology at tactical and strategic levels (based on 60 different works).
ITGI (2006)	USA	Leadership, organizational structures and processes that ensure IT to sustain and improve organizational strategy. IT governance is under executives' responsibility.
Van Grembergen & de Haes (2008)	Belgium	Consists of leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategy and objectives.
Fernandes & Abreu (2008)	Brazil	Drives IT decisions sharing with other managers within the organization. Establishes rules, organization structure and processes that will determine IT usage by end-users, departments, divisions, business units, suppliers and clients, determining how IT services should be provided to the organization. • Ensure business and IT alignment (strategies and objectives);

		• Ensure business continuity against interruptions and failures, while maintaining and managing services applications and infrastructure; • Ensure IT and regulations alignment.
Carvalho (2009)	Brazil	Mechanism to follow up and evaluate the execution of the IT strategic plan, being essential to its success, making possible the necessary adjustments that respond to market and organization dynamics.
Albertin & Albertin (2010)	Brazil	Management model that is part of corporate governance and IT management, being aligned with corporate strategies, objectives and goals. IT governance has to define directions and turn the IT decision process effective, looking for a valuable delivery, operational excellence and results optimization related to business goals.

Table 1: Different literature IT governance definitions.

Based on these definitions, common and different topics on the definitions statements were identified:

- Common: IT governance is related to decision making; IT and business alignment as a goal; generates value to the organization;
- Divergent: involves leadership; deal with processes; discusses the structure; provides direction.

IT management models are the mechanisms that put IT governance into practice inside organizations. IT governance is different from IT management: governance is about allocation of adequate responsibilities based on the decisions that must be made, who performs the activities and who is accountable for its results and effects since it is aligned internally to business current and future demands and externally to clients. Management is about delivering IT services and products, with an internal focus to cover current and future demand (Peterson 2004).

4. Define key-variables using reference models

For this study, three literature models were detailed to find key-variables related to IT governance that could be found on this review. These models were chosen based on their influence and recurrence on specialized publications. Specifically for IT governance frameworks, three papers were used as primary references, due to their relevant citation levels in the studied area. Sambamurthy & Zmud (1999) propose scenarios that represent the contingency forces that would impact IT governance mode. The authors' work brings up contingency factors that must be observed during IT governance implementation and maintenance phases. These factors are governance mode, firm size, diversification mode and breadth, exploitation strategy for scope economies, and line IT knowledge. They help to characterize the organizations relating then to the locus of decision rights. The authors also depict three modes of IT governance: (i) Centralized: corporate IT has authority for all IT activities; (ii) Decentralized: divisional IT and line management assume authority for all IT activities; (iii) Federal: both corporate IT and the

business units assume authority for all IT activities. This model evolves later with Weill & Ross (2004) work as it merges the two streams depicted by Brown & Grant (2005).

Weill & Ross (2004) archetypes are based on the IT organizational structure: (i) Business monarchy: IT decisions are made by CxO's; (ii) IT monarchy: corporate IT professionals make the IT decision; (iii) Feudal: decision by autonomous business units; (iv) Federal: hybrid decision making; (v) IT duopoly: IT executives and one business group; (vi) Anarchy: each small group makes decisions.

Brown & Grant (2005) propose a conceptual framework for IT governance research, grouping assessed publications into two historical streams: (i) IT governance forms (stream I): related to the decision locus within organizations; (ii) IT governance contingency analysis (stream II): why and how governance fits the organization. The authors conclude saying that their proposed model could be used once it separates IT governance structure from the IT organizational structure. This concept may also be used relating Section 2 considerations of governance early in history with micro-power structures proposed by Foucault (1979).

The factors presented by Sambamurthy & Zmud (1999) drive the way an organization conducts its IT governance systems, This was concluded based on the validation of the authors' three hypothesis: (i) Reinforcing contingencies induce a centralized or decentralized mode of IT governance; (ii) Conflicting contingencies induce a federal mode of IT governance; (iii) Dominating contingencies induce a centralized or decentralized mode of IT governance.

The sample used by the authors is significantly related to USA and European markets, filtered by the same time frame collected by the authors at that time. However, the conceptual model proposed by Brown & Grant (2005) can be replicated to the Brazilian scenario as proposed in this study. Once IT governance is newer in this market then it was on those captured by the authors, the study gain importance because it analyzes a growing market with a consolidated conceptual model that can be used to check current development and contributes to practitioners on ways to implement and maintain with IT governance systems.

4.1 Brazilian examples

For Brazilian organizations, Tarouco & Graeml (2011), Lunardi (2008), and Zwicker et al. (2007) presented studies about applying IT governance practices and their results are used to complement this analysis. Even though, reference models used in these works are defined abroad.

Tarouco & Graeml (2011) performed a survey on 51 Brazilian firms to understand which best practice reference models they were using, such as ITIL, COBIT, and Six Sigma, as referred as keywords on section 2. These works are related to the previous studies since the conceptual models match.

Keyes-Pearce *apud* Lunardi (2008) states five different points of view for IT governance in literature:
- As a structure: structure and architecture for IT management within the organization;
- Emphasizing on control: a well-defined tool for IT internal audits;

- Emphasizing on coordination: mechanisms established in the organization to ensure IT coordination and integration, such as the IT steering committee;
- As a process, centered in sustainable capabilities: IT governance success does not come from managing IT activities, but on identifying and developing main IT capabilities;
- As a continual process: IT governance is a standard for decision making process, and must always to be monitored and improved.

Lunardi (2008) depicts that IT governance has three fundamental mechanisms:
- Structures: roles and responsibilities formally defined within the organization for IT decision making;
- Processes: defined and implemented following best practices benchmarking, such as ITIL and COBIT;
- Relationships: the way information flows among IT and all other corporate areas, including stakeholders, to ensure its alignment to the business needs and requirements.

Zwicker et al. (2007) evaluate IT governance as an input for IT usage degree on Brazilian companies based on three criteria:
- Planning and control: activities related to IT;
- User participation: on IT decisions and activities;
- Executive participation: on IT decisions, activities and decision making, related to business-IT alignment.

These models present a different dimension that is relationships or participation: the way not only IT area interrelates with others, but also on how information flows within the organization regarding IT decisions and business influences. However, it is still not detailing individual competences level.

5. Review results
From the 101 papers found originally, 9 were rejected after a first filter since they did not relate directly to IT governance (N=92). The entire list may be accessed on the author's web page (Alves, 2012). For detailed filtering, grouping and scoring, reading through the abstracts demonstrated to be inefficient, since most papers did not summarize their methods or results. This complete reading brought a broader perspective over the contents of the papers and more precision to reference the concepts of the models. Papers were compared according to conceptual models (Sambamurthy & Zmud 1999), the streams (Brown & Grant 2005), and Weill & Ross (2004). Results were based on the conceptual model criteria scores. These scores represent paper adherence to the conceptual models.

5.1 Sample results
The collected papers were identified based on the presented keywords as explained on Section 2. The most referenced were "Governança de TI" (8%); "Tecnologia da Informação" (6%); "COBIT" (5%); "ITIL" (4%); "Governança", "alinhamento estratégico", and "IT governance" (2% each).

From 2004 to 2011, papers about IT governance increased seven times (29 in 2011, 4 in 2004). This demonstrates the growing interest on the subject in Brazilian academic literature (the papers published in 2012 were not considered in this accounting because the year had not finished by the time this paper were developed). Regarding the language used in the studied papers, more than 90% were written in Portuguese. Although it is expected that articles on the Brazilian reality are written in Portuguese, it does not contribute to knowledge sharing with the academic community worldwide.

Considering the authors' institutions, the most representative in the studied papers were USP (Universidade de São Paulo), PUC (Pontifícia Universidade Católica), FGV (Fundação Getúlio Vargas), UFGRS (Universidade Federal do Rio Grande do Sul) and Universidade Católica de Brasília, accounting for, respectively, 12%, 7%, 7%, 5%, and 5% of the total institutions listed. Regarding research methods, case studies prevail as represented in Figure 2. The case study method is the most used in the area. Some researchers point out that it is crucial to use more the surveys and quantitative approaches to find more consistent results and be aligned to international publications trends (Pozzebon & Diniz 2012; Zwicker et al. 2007).
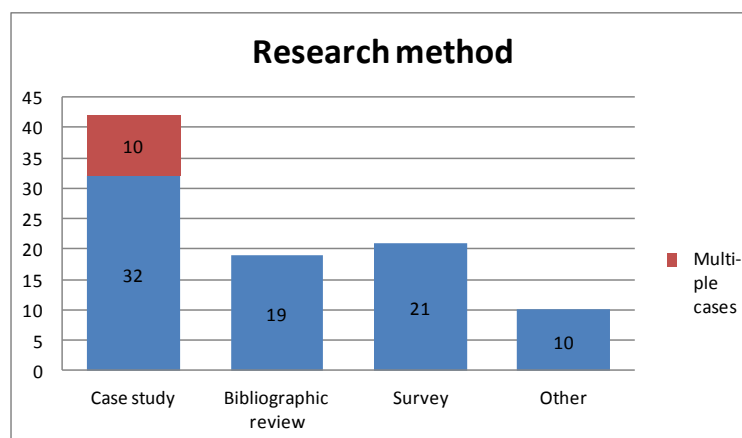

Figure 2: Research methods used on the analyzed papers.

5.2 Adherence to the reference models
Table 2 presents the adherence of the studied papers regarding the Sambamurthy and Zmud (1999) work. Each line represents one category identified by the authors as IT Governance contingencies.

CATEGORY	CONTINGENCY		TOTAL
	FACT	LEVELS	
Corporate governance	Overall governance mode	Centralized	35
		Decentralized	3
	Firm size	Small	14
		Large	27
Economies of scope	Diversification mode	Internal growth	10
		Acquisition growth	1
	Diversification breadth	Related markets	5

		Unrelated markets	2
	Exploitation strategy for scope economy	Enterprise-wide consolidation of assets	20
		Enterprise-wide line/IS partnership	4
Absorptive capacities	Line/IT knowledge	Low	6
		High	9
IT Governance Forms (stream I)	Basic locus of IT decision making		33
	Expanded locus of IT decision making		5
IT Governance Contingency Forms (stream II)	Individual and multiple contingencies for uniform governance frameworks		18
	Complex analysis for non-uniform governance frameworks		7

Table 2: Publications adherence to Sambamurthy & Zmud (1999) model.

Complementing with the contingency forms, we found that the largest part of papers reference to competitive/business strategy (50 citations, 54%) and organizational and decision structures (37 citations, 40%). Although these concepts are referenced, they are not used in practical terms on the studied organizations to achieve results. Industry and firm size are cited on 16% of the analyzed studies for categorizing the studied organizations. The majority of the studies (25 papers, 25%) refer to Weill & Ross (2004) conceptual model for IT governance.

6. Evaluation and discussions
The bibliographical review findings were evaluated by the authors, generating some discussions:
- IT governance publications are increasing annually: demonstrating the importance of the subject in the country;
- Extensive use of case studies for IT governance evaluation: presenting corporate usage of IT governance concepts but mainly in large companies. Increasing the number of surveys could bring more data that could be evaluated using multivariate statistical analysis;
- Most part of papers are written in Portuguese: creating a barrier to communicate regional findings for international publications;
- References to Weill & Ross (2004) work: they are largely present in the analyzed papers; however this conceptual model is not used to suggest improvement recommendations or to highlight differences, only referred to adherence purposes;
- References to business and IT alignment: they are largely present; however real results on applying this in a practical base as an IT governance benefit are not evaluated;
- Few cases related to small and medium business: although they are responsible for almost 70% of formal workforce in Brazil (World Bank Database 2007);
- Firms' decision structures are not discussed: although this is a foundation concept for IT governance, sampled studies do not consider this subject.

6.1 Conceptual model

Based on the observations and the related models found in literature, the authors propose a conceptual model for IT governance that may be applied on Brazilian organizations.

This model is a summary relating to the most referenced concepts on this literature review. The key-variables for IT governance are described below and depicted in Figure 3:

- Structure:
    - Organizational structure: where IT is located on the company's chart;
    - Participation of IT and other areas on IT decision-making process: how IT decision making power is distributed within the organization;
- Business/IT alignment: how it leads to results related to IT governance;
- Firm size/type: characterize the organization regarding its size (small, medium or large, based on the number of employees, or even private or public).
- People: relations among areas and people. Even though, it is not related directly in the studied conceptual models, people and competence dimensions are obligatory for better understanding power relations within the organization and how information flows.
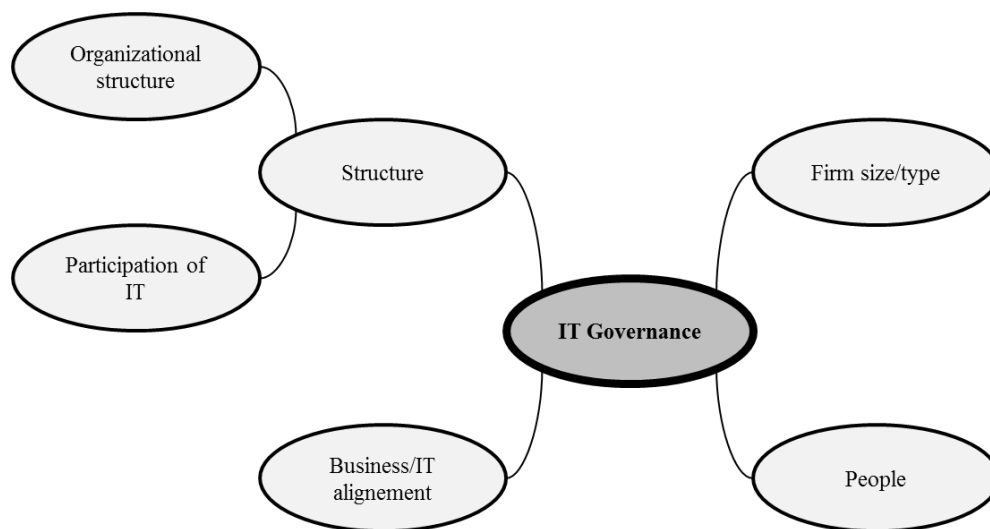

Figure 3: Conceptual model developed by the authors based on the sample adherence to the analyzed models.

6.2 Future work

Based on these results, further research may be conducted:

- The authors suggest Brazilian studies to be published in English to favor global reach, including Latin American publications;
- To introduce factors related to success of IT governance implementation and its use by organizations;
- Studies related to small-medium business;
- Determine quantitative variables for the proposed conceptual model, allowing a survey and multivariate evaluations;

- To analyze decision structures, and not only processes, of studied organizations;
- Studies related to organizational and individual competences, as well as power relations.

7. Conclusions

This literature review considered 90 papers related to IT Governance in the Brazilian market. It was possible to understand, based on the sample analyzed in this paper, the following IT governance characteristics in Brazil:

- IT governance decisions are centralized and localized on IT areas or business units within companies. Much is referred to "business and IT alignment" requirements, however the works fail to demonstrate how it is done in practical terms or which kinds of results are obtained;
- Complex analysis models or even other areas participation on IT decisions is not part of the discussions about IT governance; however it should be considered improving IT and business relationship within the organization;
- Relating firm size and industry verticals is a valuable way to determine the context. Context which organizations are part is closely related to how they are applying IT governance models;
- IT is almost strictly related to internal organization affairs, which means IT directions are still determined by cost-reduction orientations, rather than contributing to innovative ways to do business;
- Understanding how IT knowledge is fundamental to find out how IT is operated and governed. Knowing how it is distributed throughout the organization is a relevant factor to promote collaboration among business and support areas and IT;
- Despite papers present the need for understanding and mapping organizational and decision structures for IT, in practical terms they do not determine how it is been used;
- The authors of the papers recognize the importance of using competitive and business strategy to determine or be used while establishing IT goals and directions. However, in general, their works do not present how this joint and collaborative work could be done, or even what results are being obtained.

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