Impact of the Information Technology (IT) Governance on Business-IT Alignment.

By

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Dedication

To my wife Angélica Adriana and my children Julian Eduardo and Laura Catalina. For his infinite patience and his affectionate support.

Acknowledgements

I would like to express my utmost thanks initially to Professor Beatrice Avolio for her advice, collaboration and great contribution, I was lucky to have her as my guide. To the professors of CENTRUM PUCP who in one way or another have been able to contribute to the improvement of this work. To the Universidad Militar Nueva Granada for providing me with physical resources and time to advance my doctoral studies. To Professor Francois Bergeron for allowing I to use his measuring instrument. To Professor Francisco Ortega for his friendship and contributions during these years of hard work. To Professor Libia Martínez for her help in the development of this work. To all my colleagues and friends who helped me in the data collection. To my family, my wife, my children, my parents, my sisters, my brothers-in-law and my nephews for all their understanding.

Abstract

Purpose: This basic, quantitative, descriptive, cross-sectional research aims to empirically examine the impact of IT governance on business-IT alignment.

Method: This study adopts the Structural Equation Model (SEM) technique with Confirmatory Factor Analysis (CFA) to evaluate the relationship between IT governance and business-IT alignment, testing three basic hypotheses on the data collected from 672 web-based surveys of companies in Colombia.

Main finding: IT governance significantly and directly affects business-IT alignment, but there are no differences in such influence as per industry type or company size.

Limitations: This study only considered companies located in Colombia with a limited sample size in several industry types, which may become a possibility for further studies. Additionally, the data collected relies on the honesty of respondents and is not completely free of bias.

Keywords

Information Technology, IT governance, IT governance practices, Business-IT alignment, IT strategic alignment, IT management.

Resumen Ejecutivo

Objetivo de la investigación: El propósito de esta investigación básica, cuantitativa, descriptiva y transversal es examinar empíricamente el impacto de la gobernanza de TI en el alineamiento de negocio y TI.

Metodología: Este estudio adopta la técnica Modelo de Ecuaciones Estructurales (SEM) con Análisis Factorial Confirmatorio (CFA) con el fin de evaluar la relación planteada entre gobierno de TI y alineamiento de negocio y TI, poniendo a prueba tres hipótesis básicas, usando los datos recolectados procedentes de 672 encuestas realizadas vía web a empresas en Colombia.

Hallazgos: Este estudio encontró que el gobierno de TI afecta de manera significativa y directa la alineación de negocio y de TI, pero no existen diferencias en dicha influencia entre tipos de industria y tamaños de empresa.

Limitaciones: Este estudio solo tomó en cuenta empresas localizadas en Colombia con limitación en tamaño de muestra en varios sectores de actividad, lo que puede constituirse como una posibilidad para estudios posteriores. Adicionalmente, los datos recolectados están basados en la honestidad de los encuestados y no están completamente libres de sesgo.

Keywords

Tecnologías de información, gobernanza de TI, prácticas de gobernanza de TI, alineamiento de negocios y de TI, alineamiento estratégico de TI, gestión de TI.

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Introduction

This doctoral thesis is made up of six parts: (a) the Abstract and Resumen Ejecutivo; (b) the Table of Contents; (c) the Research Proposal (RP), which was defended earlier; (d) the Results, made up of the accepted or published research paper presenting the doctoral research results; (e) the Conclusions and Recommendations; and (f) the Appendices. The abstract presents the research purpose, the research method, and the main finding in a maximum of 250 words: the new doctoral contribution to management science.

The RP is the final version defended successfully by the student to become a doctoral candidate approximately one to two years earlier. This is why its references seem to be a bit old: they had a cut off in the year when the RP was defended. Besides the front page, Table of Contents, List of Tables, and List of Figures, it contains three chapters: (a) the Introduction, where the research problem is stated, defined, and formulated; (b) the Review of the Literature at the time of its defense. Here the student must show the knowledge gap that he/she found in the academic literature, which he/she addressed during his/her doctoral research; (c) the Methods used to carry out the research, where the student presented details about the population and sample used, the data collection and analyses, the research instrument(s) used, and most importantly, the validity and reliability of the research method, the research design, the research instrument(s), the statistical techniques and procedures used, and of his/her research findings. It also includes the list of References used in the RP and any Appendices attached to the RP at that time.

Then, in Chapter IV the thesis includes a copy of the accepted or published research paper. This paper, as it should be, includes all the details that appear in the journal where it will be published o where it has been published: article title, author(s) name(s), abstract, keywords, paper contents, including the results, where the doctoral contribution to the

management science should be included. It also includes the Conclusions, and the list of References.

The Appendices included in the thesis, among other files, include the following: (a) the letter of acceptance or a copy of the message accepting the research paper, (b) the presentation in PPT used to defend the RP, and (b) the presentation in PPT used in the thesis defense.

In conclusion, this thesis is presented in a *sui generis* manner. The members of the Jury should therefore focus their attention in the Abstract, Chapter IV, where the research paper is presented, and in the Conclusions and Recommendations.

Chapters I to III: Research Proposal

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A Research Proposal Presented in Partial Fulfillment of the Requirements for the Degree of Master of Philosophy

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Chapter 1: Introduction

Among the many key factors in finding high levels of organizational competitiveness, are the Information Technology (IT) (Weill, Subramani, & Broadbent, 2002). IT includes processes, investments, expenses, computing assets (hardware, software and communications networks) and knowledge that firms possess to providing technological services (Aduloju, 2014; Broadbent & Weill, 1997; Majchrzak, Malhotra, & John, 2005). Other studies suggest that there is high motivation to research use of IT and its relation to organizational performance (Melville, Kraemer, & Gurbaxani, 2004).

The way like organizations manage IT takes precedence (Luftman & Brier, 1999), some studies describe as the IT governance structure is considered a key to improving organizational performance factor (Sambamurthy & Zmud, 1999). Under pressure from the environment and the changes made in uncertainty, companies are wondering how their IT management may be more efficient to detect and respond to these changes and seize and capitalizing on opportunities (Mithas, Ramasubbu, & Sambamurthy, 2011). Whether, how companies perceive the importance of IT, and how the organization contributes to improved IT management and thereby establish the strategic alignment of business and IT is still unclear (Huang, 2012).

Background of the Problem

In recent decades, researchers have tried to understand and explain how investing in IT affects organizational performance (Schwarz, Kalika, Kefi, & Schwarz, 2010). However, there has not been an easy target of achieving. It takes time, a more coherent understanding of how to measure impacts at the level of enterprise productivity and the use and ownership of IT (Jacks, Palvia, Schilhavy, & Wang, 2011). Modern organization depends IT for its operation and consolidation, so make economic efforts to invest in IT seeking thereby be

more effective and efficient, and thus fulfil its mission and achieve consistency with its strategic planning (Muñoz Periñán & Ulloa Villegas, 2011).

In previous research it has been observed that the relationship between IT investment and organizational performance is variable, depending on how you measure both financial performance and IT investment (Lim, Dehning, Richardson, & Smith, 2011). While some researches argued that increased investments in IT rarely translate into superior financial results (Carr, 2003), other researchers have argued that IT can effectively support the performance of the organization (Brynjolfsson & Hitt, 1996; Kohli & Devaraj, 2003). The difference in the way researchers assume how to measure the impact of IT is accentuated, the relationship is greater when IT investment is measure from the strategy or expenses incurred in IT, rather than IT capacity (Lim et al., 2011).

It is necessary to govern IT to improve its performance in terms of achievement organizational goals, IT governance mechanisms have been used by companies primarily to improve efficiency (Lunardi, Becker, Maçada, & Dolci, 2014; Rigoni, Dwivedi, & Hoppen, 2010). IT governance should involve the monitoring of the use of IT to support the organization thereby achieving business value (Juiz & Toomey, 2015).

IT Governance Institute (ITGI, 2003) defined IT governance as the set of actions performed by the IT area in coordination with senior management to use technological resources in the most appropriate available way and thus find the operational needs of business, responding with regulatory quality and customer requirements. For the ITGI the IT governance is concerned with two things: The delivery of value from IT to business and mitigation of IT risk (IT Governance Institute, 2003).

In recent years, there have been developed several frameworks to guide the implementation of IT governance in an organization, such as, ISO/IEC 38500:2015 which aims to suggest the organization a system by means of which direct and control the current

and future use of IT. This framework is based on six guiding principles, responsibility, strategy, acquisition, performance, conformance and human behaviour (International Organization for Standardization / International Electrotechnical Commission [ISO/IEC], 2015).

Control Objectives for Information and Related Technology (COBIT) is a framework created by Information Systems Audit and Control Association (ISACA). In its fifth version, is collected the best practices framework for managing and monitoring IT governance, providing a set of objectives which are authorized, updated and internationally accepted by, organizational managers, IT professionals and auditors in these topics (Information Systems Audit and Control Association [ISACA], 2012). Finally, The Calder-Moir model posed as a combination of the models mentioned above to coordinate and organize the IT governance models, seeking to obtain the maximum benefit from all frameworks and standards (Garbarino, 2010).

Additionally, there are other frameworks that support the IT management in specific areas, such as, ISO/IEC 27001:2012 in the establishment and improvement of a system of information security management in the organization (International Organization for Standardization / International Electrotechnical Commission [ISO/IEC], 2012). In addition, ISO/IEC 20000:2011 in the establishment of a system for IT service management (International Organization for Standardization / International Electrotechnical Commission [ISO/IEC], 2011).

Also, it may be mentioned the Information Technology Infrastructure Library (ITIL), which is a recognized compendium of books that find the best practices in IT service management, which addresses the strategy, design, transition, operation and continuous improvement of IT service (Office of Government Commerce [OCG], 2007). The BS 25999 standard, which deals with business continuity management with emphasis on the availability

of information as a valuable asset of the organization (British Standards Institution [BSI], 2007). The Project Management Body of Knowledge (PMBOK), that is a widely used guide by the companies to project management (Project Management Institute [PMI], 2013). And, the Capability Maturity Model Integration (CMMI), which is a compendium of good practices for improving and evaluation processes to develop, maintenance and operation of information systems (Software Engineering Institute [SEI], 2012).

Weill and Ross (2004a) described the IT governance as a framework of interaction between three key components: First, the structures, derived from the business units, functions, roles and responsibilities for appropriate IT decision making. Second, the processes, which refer to the design of procedures for the implementation of the management in accordance with the strategies and IT policies. Finally, the relations, considered as the mechanisms that seek opportunities to ensure the effectiveness of the IT governance implementation.

Van Grembergen, De Haes and Guldentops (2004) referenced the relationship between cultural influences in the alignment of the IT strategy and the business, with six principles of IT governance, responsibility, strategy, acquisition, performance, compliance and human behaviour, relating principles to aspects of organizational culture. Janssen, Luciano and Testa (2013) indicated that according to the perceptions of the leaders in technology, there is a relationship between various dimensions of organizational culture raised by Hofstede (2001), long-term orientation, the result, individualism and norms and standards, and IT governance framework proposed by Weill and Ross (2004a) who is adopted by the organization.

The study of IT alignment with the business has been a concern of several authors for years focusing on whether there is a relationship between business-IT alignment and organizational performance. In this regard the conclusions of several studies suggest that the alignment should lead to higher levels of performance (Gerow, Grover, Thatcher, & Roth,

2014; Wagner, Beimborn, & Weitzel, 2014; Yayla & Hu, 2012). Then arises the need to understand the relationship between IT governance and business-IT alignment (De Haes & Van Grembergen, 2009a), to thereby understand the contribution that this relationship could offer the performance of the organization.

Statement of the Problem

The difficulty of IT governance is to align the IT strategic objectives with the strategic objectives of the organization (Henderson & Venkatraman, 1993). It seems that the problem is reduced to a matter of strategic planning, but the reality is more than that, IT areas are under different pressures they must support business operations, providing support for the interpretation and use of internal and external information. Then, they have to support the legal and technical requirements from the market that may generate a reactive attitude to the future, finding the urgent and not important (Weill et al., 2002).

In ISACA's Fourth Biennial Information Technology (IT) Governance, a survey that included 834 respondents from 21 countries across the globe report, 94 percent of survey respondents indicated that IT governance was important to their organization. For respondents the contribution of IT to business is clear. In addition, for 90% of respondents creation of value from IT investments it is a fundamental dimension. Similarly, the survey evidenced that IT functionality is aligned with current business needs is the main driver of IT governance activities (Information Systems Audit and Control Association [ISACA], 2011).

The problem arises when a need to establish IT governance to achieve business-IT alignment is perceived, and the organization invests heavily in the establishment of IT governance but the result is not the desired alignment. On the other hand, there is still studying the alignment and its relationship to performance, Yayla and Hu (2012) stated "Although numerous studies have documented positive effects of IT-business alignment on

organizational performance, our knowledge about this relationship is still limited due to the complexity of contingent factors" (p. 373).

Purpose of the study

The purpose of this basic, quantitative, descriptive and cross-sectional research, will attempt to examine the impact of IT governance on Business-IT Alignment. The proposed research method proposed to this study is quantitative, the data collection strategy will be managed through surveys, the data analysis is statistical, in which the unit of analysis will be people and the companies located in Colombia reported in the Superintendencia de Sociedades "System Information and Business Report" [SIREM] in Colombia.

This study assumes as dependent variables the dimensions of Business-IT alignment proposed by Bergeron, Raymond and Rivard (2004), these dimensions are: business strategy, business structure, IT strategy, and IT structure. On other hand, As independent variables the dimensions of IT governance proposed by De Haes and Van Grembergen (2009a), these dimensions are: structures, processes, and relational mechanisms. This research aims to examine the relationship between the two constructs, IT governance and Business-IT alignment suggested by De Haes and Van Grembergen (2009a).

Significance of the Problem

The incidence of IT alignment in organizational performance has been studied by several authors (Bergeron et al., 2004; Jacks et al., 2011; Mohamed, Kaur, & Singh, 2012; Ping-Ju Wu, Straub, & Liang, 2015; Ullah & Lai, 2011; Yayla & Hu, 2012). However, given the heavy investments in IT, organizations continue to demand models to improve performance from adequate infrastructure. In a previous research (Luftman et al., 2013) shows that the Business-IT alignment remains an ultimate organizations' goal that is not so easy to achieve, becoming the main concern of IT management in the U.S. and Europe, the second in Latin America and the sixth in Asia.

Henderson and Venkatraman (1993) proposed the Strategic Alignment Model (SAM), which has mentioned in multiple studies. Luftman and Brier (1999) studied the elements that could facilitate or hinder the analysis of the Business-IT alignment, which they called "facilitators" and "inhibitors". Luftman (2000) developed a model for assessing the maturity of IT alignment and business (SAMM) which included IT governance maturity as an evaluation criterion.

This research will attempt to contribute to the knowledge on the relationship between IT governance and Business-IT alignment thus benefit different stakeholders. First, the academic community of administrative sciences and information technologies, to provide new knowledge on IT factors that improve organizational performance. Similarly, this study could contribute to professional associations in the construction and improvement of frameworks for IT governance and IT management. Finally, this study could provide business professionals and IT arguments that support the development of projects to improve the strategic alignment of business and IT, and the implementation of IT governance practices.

Nature of Study

There are different positions on how to address the issue. In his doctoral dissertation, De Haes (2007) used the case study to find the impact generated by the IT governance practices in the business-IT alignment in Belgian financial sector. Al-Zwyalif (2013) used the quantitative vision to observe the relationship between IT governance and its impact on the usefulness of accounting information reported in the financial statements, while Janssen et al. (2013) using a qualitative study on a group of managers from Latin American companies observed the influence of organizational culture on IT governance.

Buckby (2011) used a mixed-method approach to review perceptions, knowledge and attitudes about IT governance in public sector enterprises. Similarly, Lach-Smith (2010) used

a mixed approach with Delphi method in two rounds and then applied a survey to study the strategic alignment between the objectives and IT in higher educational institutions.

This research assumes De Haes & Van Grembergen (2009a) suggestion about the use of statistical correlation to test some interesting hypotheses to validate the proposed relationship. So, this research seeks to interpret organizational reality in an objective, therefore the research will be developed within a positivist epistemology with descriptive purposes, using a quantitative process with deductive logic, developing surveys to collect information and to thereby it will contribute to clarify the impact of the IT governance on Business-IT alignment.

Research Questions

The seminal researchers have shown that organizations that actively encourage them to plan and to implement IT governance structures they perform significantly much better than those that do not take IT governance into account (Van Grembergen & De Haes, 2008; Weill & Ross, 2004b; Weill et al., 2002). This research addresses the following big research question:

RQ1: Does IT governance have any impact on Business-IT alignment?

From the main question may raise other questions such as:

RQ2: There may be differences in the relationship (IT governance – Business-IT alignment) between companies in different industry types?

RQ3: There may be differences in the relationship (IT governance – Business-IT alignment) between companies according to company size?

Hypotheses

From the research questions, will test the following hypotheses to see whether they are compatible or not, with the support of the perception of respondents. De Haes and Van Grembergen (2009a) argued that the maturity of business-IT alignment is greater when

organizations are applying a mixture of mature IT governance practices. This approach leads to the following hypothesis:

$H1_0$: IT governance has any impact on Business-IT alignment.

$H1_a$: IT governance has impact on Business-IT alignment.

From the above description, the characteristics of the organization could influence the relationship raised. In this regard, previous research argued that, "it is acknowledged that the use of IT governance practices might be different in different types of industries" (De Haes & Van Grembergen, 2009a, p. 125). Similarly, other researchers on strategic alignment (Chan & Reich, 2007; Chan, Sabherwal, & Thatcher, 2006; Luftman, Dorociak, Kempaiah, & Rigoni, 2008; Tallon & Pinsonneault, 2011), argued that this relation is conditioned by the type of industry. This leads to formulate the following hypothesis:

$H2_0$: There is no difference in the impact of IT governance on Business-IT alignment between different industry types.

$H2_a$: There is difference in the impact of IT governance on Business-IT alignment between different industry types.

In their study about of the effect of IT governance in organizational performance, Liang, Chiu, Ping-Ju Wu, and Straub (2011) stated that IT governance is the more practiced in larger companies. In terms of alignment, there are different views, while Chang et al. (2006) found that company size is related to Business-IT alignment, but not in all types of industry. Chang and Reich (2007) suggested that certain alignment components are presented in small companies and not medium. Gutiérrez, Orozco, and Serrano (2009) concluded that the factors that are considered necessary to achieve alignment are relevant to all organizations, regardless of size. Charoensuk, Wongsurawat, and Khang (2014) found that the size of the organization acts as a moderator rather than an antecedent of Business-IT Alignment. This study assumes the issues raised by Ping-Ju Wu et al. (2015) about the company size, ranging from small

firms with less than 100 employees, mid-size firms with 100 or more and less than 1000 employees, and large firms with more than 1000 employees. Based on the information above, it leads to formulate the following hypothesis:

$H3_0$: There is no difference in the impact of IT governance on Business-IT alignment between company sizes.

$H3_a$: There is difference in the impact of IT governance on Business-IT alignment between company sizes.

Theoretical Framework

This research aims to deepen on the explanation of the effects of the implementation the IT governance implementation on Business-IT alignment, as shown in Figure 1. The proposed framework involves examining the interrelationship between two fundamental constructs. First, the IT governance involves three basic areas as described by De Haes & Van Grembergen (2009a), these are: structures, processes, and relational mechanisms.

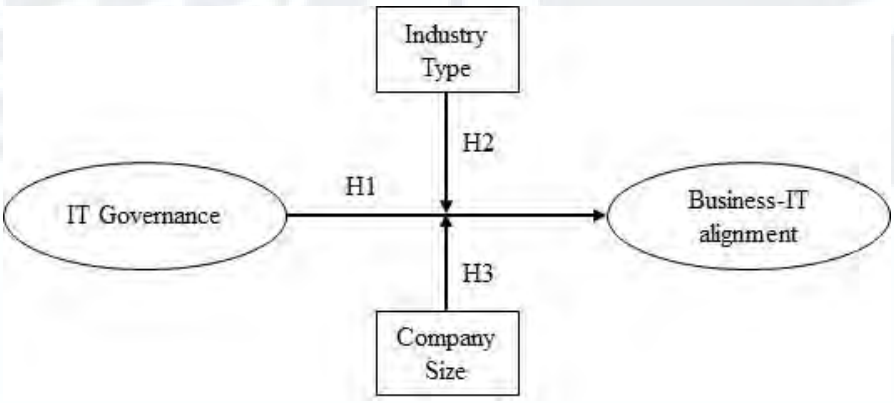

Figure 1. Theoretical Framework

Second, the Business-IT alignment which has been studied by several researches have used the SAM model of Henderson and Venkatraman (1993) as the basis for the construction of measurements. This model suggests that people can understand and address the strategic management related to IT through four basic dimensions like: Business strategy, infrastructure and business processes, IT strategy, and IT infrastructure and processes. From the previous model appear the SAMM model proposed by Luftman (2000) that assesses the

business-IT alignment maturity in six criteria: communications, competence, governance, partnership, scope and architecture, and skills. The valuation of these criteria can provide the organization to identify opportunities to improve the relationship between business and IT.

Bergeron et al. (2004) proposed an operational model of strategic alignment which understands the business-IT alignment, as a holistic approach containing the strategy and structure of business and IT strategy and structure. In the dimension of business strategy, Bergeron et al. (2004) included in their analysis a 7-point scale instrument called Strategic Orientation of Business Enterprises (STROBE), developed by Venkatraman (1989) to measure the strategic orientation, which consists of six components: Aggressiveness (Y1), analysis (Y2), defensiveness (Y3), futurity (Y4), proactivity (Y5), and riskiness (Y6).

Based on Damanpour (1991) study, Bergeron et al. (2004) argued that the most common structural dimensions in organizational theory and Information Systems studies, are the formalization (Y7), centralization or administrative intensity (Y8), professionalization (Y9), specialization (Y10) and vertical differentiation (Y11).

Bergeron et al. (2004) suggested that the IT strategy includes two components, one of them, the IT environment scanning (Y12), which refers to how the company has the ability to detect and react to technological changes in relation to its competitors. The second one refers to the strategic use of IT (Y13), to measure how the implementation of IT to increase the quality, the competitiveness and the performance in a company.

According to Bergeron et al. (2004), the IT structure has two components. The first is the planning and control of IT (Y14), which shows how the company manages its IT function, resources and infrastructure in relation to its competitors. The second is the acquisition and application of IT (Y15), which refers to how the company manages the selection and introduction of new IT applications. Based on the description above, the composition of the framework with their constructs, factors and variables shown in Figure 2.

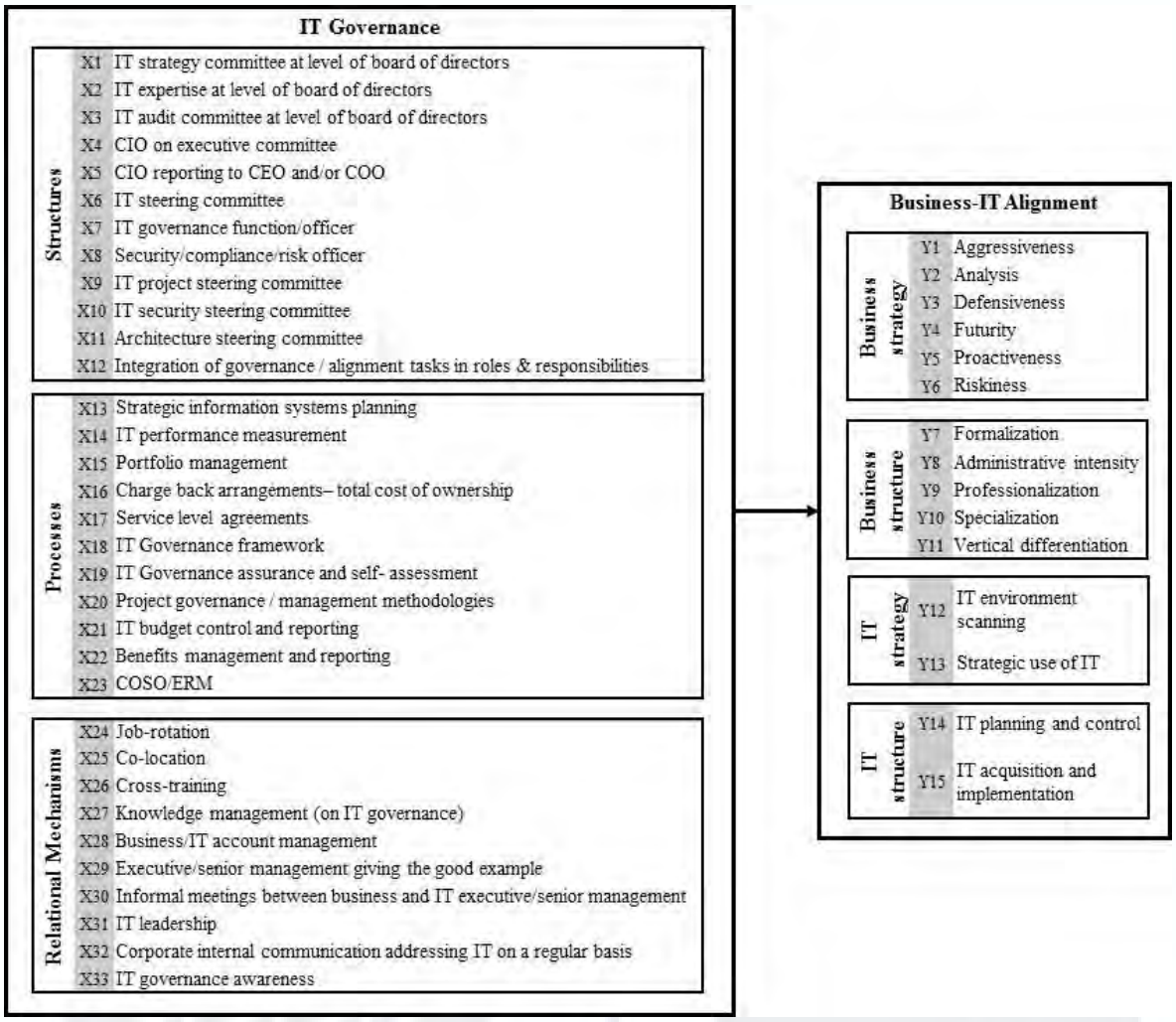

Figure 2. Framework, dimensions and variables

The goal of this study is to determine if there is a positive relationship between the implementation of IT governance and Business-IT alignment. Model variables are shown in Table 1 and Table 2, and they are related to the two basic constructs as follows: IT governance is described from 33 variables and Business-IT Alignment is described from 15 variables.

To the construct IT governance, this study assumes the operationalization developed by De Haes and Van Grembergen (2009a). The IT governance practices correspond from variables X1 to X33 which measure their maturity. "This maturity assessment was based on a generic maturity model as proposed by the IT Governance Institute (ITGI, 2003), providing a scale from 0 (non-existent) to 5 (optimised)." (De Haes & Van Grembergen, 2009a, p. 127)

Table 1

Characterizations of IT governance variables

Dimension	Variables	Characteristics
Structures	X1 - IT strategy committee at level of board of directors	Relation: Exogenous Nature: Qualitative
	X2 - IT expertise at level of board of directors	Cause – Effect: Formative
	X3 - IT audit committee at level of board of directors	Type: Non-metric
	X4 - CIO on executive committee	Source: Primary
	X5 - CIO reporting to CEO and/or COO	Time Horizon: Cross-sectional
	X6 - IT steering committee	Measurement: Scale (0-5)
	X7 - IT governance function/officer	Scale: Ordinal
	X8 - Security/compliance/risk officer	Variation: Small
	X9 - IT project steering committee	Reference: Previous Research (De
	X10 - IT security steering committee	Haes & Van Grembergen, 2009)
	X11 - Architecture steering committee	
	X12 - Integration of governance / alignment tasks in roles & responsibilities	
Processes	X13 - Strategic information systems planning	
	X14 - IT performance measurement	
	X15 - Portfolio management	
	X16 - Charge back arrangements– total cost of ownership	
	X17 - Service level agreements	
	X18 - IT Governance framework	
	X19 - IT Governance assurance and self- assessment	
	X20 - Project governance/ management methodologies	
	X21 - IT budget control and reporting	
	X22 - Benefits management and reporting	
	X23 - COSO/ERM	
Relational Mechanisms	X24 - Job-rotation	
	X25 - Co-location	
	X26 - Cross-training	
	X27 - Knowledge management (on IT governance)	
	X28 - Business/IT account management	
	X29 - Executive/senior management giving the good example	
	X30 - Informal meetings between business and IT executive/senior management	
	X31 - IT leadership	
	X32 - Corporate internal communication addressing IT on a regular basis	
	X33 - IT governance awareness	

Note. Adapted from "An Exploratory Study into IT Governance Implementations and its Impact on Business/IT Alignment," by De Haes, S., and Van Grembergen, W., 2009, Information Systems Management, 26, p. 130-131. Copyright 2009 by Information Systems Management. Adapted with permission.

A questionnaire with a scale of 7 points measures the variables that constitute the construct Business-IT Alignment (Business structure, business strategy, IT strategy and IT structure). This study assumes Bergeron et al. (2004) approach including its four dimensions and its fifteen variables as it is shown in Table 2.

Table 2

Characterizations of Business-IT alignment variables

Dimension	Variables	Characteristics
Business strategy	Y1 - Aggressiveness Y2 - Analysis Y3 - Defensiveness Y4 - Futurity Y5 - Proactiveness Y6 - Riskiness	Relation: Endogenous Nature: Qualitative Cause – Effect: Formative Type: Non-metric Source: Primary Time Horizon: Cross-sectional Measurement: Scale (1-7) Scale: Ordinal Variation: Small Reference: Previous Research (Bergeron et al., 2004); (Venkatraman, 1989)
Business structure	Y7 – Formalization [a] Y8 - Administrative intensity [b] Y9 – Professionalization [c] Y10 – Specialization [d] Y11 - Vertical differentiation [e]	Relation: Endogenous Nature: Quantitative Cause – Effect: Formative Type: Metric Source: Primary Time Horizon: Cross-sectional Scale: Continuous Variation: Large Reference: Previous Research (Bergeron et al., 2004)
IT strategy	Y12 - IT environment scanning Y13 - Strategic use of IT	Relation: Endogenous Nature: Qualitative Cause – Effect: Formative Type: Non-metric Source: Primary Time Horizon: Cross-sectional Measurement: Scale (1-7) Scale: Ordinal Variation: Small Reference: Previous Research (Bergeron et al., 2004)
IT structure	Y14 - IT planning and control Y15 - IT acquisition and implementation	Idem

Note. Adapted from "Ideal patterns of strategic alignment and business performance," by Bergeron, F., Raymond, L., and Rivard, S., 2004, Information & Management, 41, p. 1016-1017. Copyright 2003 by Elsevier B.V. Adapted with permission.
[a] Extent to which rules, procedures, and activities are written. [b] Number of managers/number of employees. [c] Number of professionals/number of employees. [d] Number of distinct job titles in the organization chart. [e] Number of organizational levels below the chief executive.

Definition of Terms

The list of terms defined below focuses on the domain of expertise required in this research.

Business-IT Alignment. Luftman and Kempaiah (2007) defined business-IT alignment as the level of harmony, integration or synchronization between IT and their counterparts in the business units.

IT governance (ITG). Weill and Ross (2004a) defined IT governance as "specifying decision rights and accountability framework to encourage desirable behaviour in the use of IT" (p. 8). Peterson (2004) adds, "IT governance describes the distribution of IT decision-making rights and responsibilities among different stakeholders in the enterprise, and defines the procedures and mechanisms for making and monitoring strategic IT decisions" (p. 7). Finally, De Haes and Van Grembergen (2009a) argued "IT governance acknowledges its complex and dynamic nature, consisting of a set of interdependent subsystems (processes, structures, and relational mechanisms" (p. 124).

Information technology (IT). This term refers "the structure and backbone of computer and related technologies, these include, hardware, software and data related infrastructure within the organization" (Gordon, 2012, p. 11).

Information system (IS). This term refers a set of software, hardware, communication networks and information that supports business operations, decision-making and competitiveness. This research as to the points by Evers (2010) assumes that IS and IT terms are interchangeable as in previous literature there is no differentiation between them.

Assumptions

The perception of the participants in this study is a valid source of information. This research assumes that participants are able to describe the elements that generate the most relevant information possible. This study also assumes that respondents are professional in the areas involved in the research, so they will be able to respond the survey with a brief explanation on how to answer questions, either personally or answering a form on the web. It assumed that the instrument is valid and reliable for the scope of the research.

Limitations

This research is limited to the use of the questionnaire and its validity and honesty of the respondent to answer the survey questions. This research is cross-sectional it gathers

information in a single moment of time, which does not disclose continuously the process followed by organizations in adopting IT governance, and how they can actually change the Business-IT alignment over time. The perspective of an individual in assessing these perceptual measures creates the potential for a bias (either positive or negative) in the assessment of the role of IT in the firm or IT governance (Schwarz et al., 2010).

The study will take place in Colombia, with its market conditions and particular competitiveness, which may be different from other countries that can become a difficulty generalizing the results. Several environmental factors such as economic, legal, culture, etc., can affect the conditions of organizations when collecting data (Chen, 2010). Methodologically, there may be a lack of control authentication using web forms, because the respondent could be supplanted when he or she answers questions, this can provide false information (Evers, 2010).

Delimitations

The unit of analysis taken for convenience will be the companies in Colombia with an area of information technologies or administrative unit established for this purpose. The observation unit shall be the chief executive officer (CEO) or chief operating officer (COO) and the chief information officers (CIO) from selected companies. Given the specificity of the issues in the survey questions, it is not convenient to carry out several surveys in different areas in the organization, because it could generate questionnaires with questions unanswered. On the other hand, to have a single survey by firm could cause that senior managers pressure bias on other people providing the information. In that case, this study aims to create a single online survey for each company that can be filled out by several people, so that each unit of analysis represents a single record in the database.

This study assumes the analysis of practices of IT governance only at the strategic level, as it is proposed by De Haes and Van Grembergen (2008), the analysis of both IT

governance and Business IT-Alignment, at other levels as operating by example, will not be subject to this research.

Summary

The aim of this study to determine if the application of IT governance impacts on the Business-IT alignment. The study develops within a descriptive purpose, a positivist epistemology, using a quantitative process with deductive logic by means of surveys to gather information, and thus help to clarify if the relationship increased the impact of IT governance on Business-IT alignment.

Chapter 2: Review of the Literature

This chapter aims to review from the contributions of previous researches, providing an overview of the concepts that support related variables on which this study is develop. Then it, analyses and reviews the relevant literature related to Information Technology (IT), the study of IT governance, Business-IT alignment and the relationship between the latter two concepts.

Documentation

The literature review presented is part of the published research in scientific journals, books, conference presentations, specialized industry magazines, doctoral dissertations and working papers. On the other hand, it was necessary to search in the engine virtual databases terms such as IT governance, strategic alignment of IT business alignment with IT and combinations of them. Full-text articles were download and classify in three groups, IT governance, IT-business alignment and relationship ITG-BITA, in the Zotero software to manage references.

Literature Review

This review describes the evolution of the constructs that are part of this study, its different meanings, key references that support the research design, dimensions, variables and measuring instruments. The review begins with information technology, then it describes previous studies on IT governance. After that, different positions on the alignment between business and information technology are described. Finally, studies that seek to relate the two concepts above (IT governance and Business-IT Alignment) are reviewed.

Information Technologies

While the concept is relatively new, IT has a history with several shades. The origins of information technology be traced back to the business computer systems in the 50s and 60s, to information systems in the 80s and 90s, reaching the IT design in the last two decades.

Lucas (1999) presented a historical IT overview divided into three periods. The first period is called the computer age where the computer equipment allowed the development of automatized processes that replaces manual tasks. The second period is the database characterized by the software development and enhancement devices for data storage. The third period is known as the era of information technology that integrates the elements of previous stages with the power of telecommunication networks.

The eras described above have been considered as the transformation approach to the stages of growth (Nolan, 1979), which analyses the evolution of technology investment for the time and the incorporation of new technology components. The stages raised by Nolan (1979) are described as follows: First is the initiation stage, which begins with the acquisition of the first computer system generally associated with business obligations, it is characterized by resistance to change and ends with the successful implementation of the first system information. The second is the contagion stage, in which users who work with the first system become a sample to follow in the organization causing a proliferation of applications due to lack of standards, it starts hiring specialized personnel and systems begin to grow significantly. The third is the control stage, in it appears the necessity to implement the computational resources controls, establishing work standards and applications that designed to facilitate the control of business operations to make them more effective. The fourth is the integration stage, in which data are integrated and in it appears a centralized systems department, developing new systems within the company, or sponsored by it. The fifth is the data administration stage, in which the information is recognized as a valuable resource that should be accessible to all users acquiring responsibilities, defining roles, and in which management becomes an important challenge to the company. Finally, the sixth is the maturity stage, in which the computer system are defined as a core function of the business

generating knowledge-based systems, creating activities to manage database services, communications networks with efficiently use hardware and software resources.

Information Technologies (IT) combine two key areas, IT strategy and IT infrastructure. So, IT strategy includes IT governance, distinctive competencies and scope of technology. Then, the infrastructure includes IT architecture (hardware, software, communications, data, etc.), development of specific IT practices (application development, system administration and maintenance activities) and IT skills, which include experience, competence and values of IT employees (Papp, 2001).

IT Governance

IT governance is a part of corporate governance, which leads to an IT organization to implement the required business and develop its approach and strategy. In the Report of the Board of IT Governance, IT governance has been defined by ISACA (2003) as "The responsibility of the board of directors and executive management. It is an integral part of enterprise governance and consists of the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organisation's strategies and objectives" (p.10). Moreover, the implementation of IT governance allows the IT function to add value to the business, controlling the risks associated with IT processes, and making better use of the available technology resources (IT Governance Institute, 2003).

IT governance is a broad term that cover IT resources, IT processes, information related issues, just as it includes the concerns of a variety of stakeholders, managers, process owners, users, auditors and suppliers (Information Systems Audit and Control Association [ISACA], 2012). In their study Gheorghe (2008) said IT governance means an ensemble of procedures and strategies to gain benefits, that permits to it to exploit opportunities and obtain competitive advantage.

IT governance must bring value to the business and be aligned with the organization's goals (Youssfi, Boutahar, & Elghazi, 2014). From elsewhere, IT governance supports the Enterprise Risk Management (ERM) process, seeking to mitigate the risks shared to the use of IT (Rubino & Vitolla, 2014). The two aspects considered before demand the support of appropriated resources and tools to performance measurement and monitor progress towards the desired goals. So, the main five areas of interest of IT governance defined by ISACA in the directive "Implementation and continuous improvement of IT governance" involves: strategic alignment, delivery value, risk management, resource management and performance measurement (Information Systems Audit and Control Association [ISACA], 2012).

According to the "IT Governance Implementation Guide" presented by the ITGI (2003), IT governance has a life cycle which ideally should start from alignment area, once the business and IT strategy are aligned, it focus its attention on to deliver value promised by the strategy and deal with the risks that must be mitigated. Management of IT resources seeks to deliver the promised value at an affordable price at a level of acceptable risk. It monitors and measures the strategy through specific indicators which allow control and make the adjustments required in the alignment.

Peterson (2004) through a longitudinal study in large companies, proposed a roadmap for IT Governance Assessment Process (ITGAP), which has four stages: "(1) Describe and assess IT governance value drivers, (2) Describe and assess the differentiation of IT decision making authority for the portfolio of IT activities, (3) Describe and assess the capabilities of IT governance, and (4) Describe and assess IT value realization" (Peterson, 2004, p. 20).

The first stage of the ITGAP seeks to reflect on the main business and IT strategies, their effects on the drivers of IT governance and whether the programs that are underway contribute to the creation of value guide by IT governance. The second stage of ITGAP, its

attention on the stakeholders considering their decision making, their interests, and defining their levels of authority and responsibility in IT portfolio.

The third stage of ITGAP, concerns to the intention to analyse the structures (committees, organizational units, roles, etc.) and processes (management, monitoring and control activities) of governance and IT management. Finally, the fourth stage consists of determining the contribution of IT to organizational performance and how the performance of IT management supports strategic innovation based on the available infrastructure and the integration of solutions (Peterson, 2004).

Weill and Ross (2004a) presented a model to design and to implement of IT governance. In their study they argued that effective IT governance should focus on solving three key issues. The first refers to the decision making to achieve effective IT management. The second is focused on who assumes the decision making and the third, taken to account the analysis how decisions will be taken and monitored.

Weill and Ross (2004a) defined IT governance in the following terms: "Specifying the decision rights and accountability framework to encourage desirable behaviour in the use of IT" (p. 8). According to these authors, IT governance has three major components: IT decisions domains, IT governance archetypes, and implementation mechanisms. According to these they initially created a Governance Arrangements Matrix that combines the first two elements thus crossing decisions and archetypes, for the operationalization of their work.

The first component is IT decision domains, in which Weill and Ross (2004a) identified five key areas of decision as follows: IT principles, IT infrastructure strategies, IT architecture, business application needs, and IT investment and prioritization. The second element of IT governance categorizes the people who are involved in decision-making, the organization of the domain, who has or decides an impact, and how decisions flow through the organization. Weill and Ross (2004) suggested six archetypes. Business monarchy (An

individual, group, or senior management level, which can sometimes include the same Chief Information Office (CIO)). IT monarchy (An individual or group of senior IT managers. Feudal (Operational unit leaders, key process owners or their delegates). Federal (Shared by senior management and other senior management unit may include CIO). IT duopoly (communion of CIO and another group including operating areas). Anarchy (Each unit or even users act and react independently).

The third element of Weill and Ross (2004a) model, explains how to carry out the process of implementing IT governance, which ultimately makes it an operational structure. The components of model are: Establishment of decisional structures, alignment process definition, and, establishment of communication approaches.

Finally, the implementation process studied by Weill and Ross (2004a) could take the following steps: First, document the status of IT decision domains and IT governance archetypes. Second, state the objectives and behaviour desired by company. Third, determine the type IT governance to achieve the goals and desired behaviours. Fourth, identify performance targets for the governance, including measurements forms, responsibility, etc., and fifth, make the change management to move from the current state to the proposed (Weill & Ross, 2004a).

Derived from studies by Van Grembergen et al. (2004), Peterson (2004), Weill and Ross (2004a) and De Haes (2007), De Haes and Van Grembergen (2008) argued that "IT governance can be deployed using a mixture of various structures, processes, and relational mechanisms" (p. 1). IT governance structures "includes structural (formal) devices and mechanisms for connecting and enabling horizontal, or liaison, contacts between business and IT management (decision-making) functions" (Peterson, 2004, p. 14). IT governance processes have to do with "formalization and institutionalization of strategic IT decision making or IT monitoring procedures" (Peterson, 2004, p. 15). IT governance relational

mechanisms are understood as “the active participation of, and collaborative relationships among, corporate executives, IT management, and business management” (Peterson, 2004, p. 15)

Business-IT Alignment

Chang and Reich (2007) argued that there are two basic ways of observing alignment. The first is to appreciate the alignment as a continuous process, which is subjected to the variations derived from the decisions made, the adjustment in strategies adopted over time and the improvement in IT management capabilities. The second is alignment as a final state, which is conceived as a consequence of the actions taken or as a result of the strategies that the organization has envisioned. As this study is cross-sectional it is oriented towards the second stream, observing the current alignment status of the organization.

In a widely diffused study, Henderson and Venkatraman (1993) characterized the strategic alignment model (SAM), as the description of the possible alignment relationships that could exist between four key components: business strategy, IT strategy, business infrastructure and processes, and IT infrastructure and processes. The authors argued that the power of the model appear when you manage the strategic fit between strategy and processes and infrastructure both business and IT and when you manage functional integration between business strategies and IT and infrastructure and business processes and IT. Figure 3 shows a basic view of the model.

In their study Luftman (2000) operationalized the SAM model of Henderson and Venkatraman, the model “involves the five levels of strategic alignment maturity: (1) Initial / Ad Hoc Process; (2) Committed Process; (3) Established Focused Process; (4) Improved / Managed Process; (5) Optimized Process. Each one of the five levels of alignment maturity focuses, in turn, on a set of six criteria: (1) Communications Maturity, (2) Competency/Value Measurement Maturity, (3) Governance Maturity, (4) Partnership Maturity, (5) Scope &

Architecture Maturity, and (6) Skills Maturity" (p. 10). A description of the criteria is shown in the figure 4. Luftman and Kempaiah (2007) argued that Business-IT alignment must go beyond a one-way relationship, but should focus on how IT and business are aligned with each other, and the role that IT plays to generate business changes.

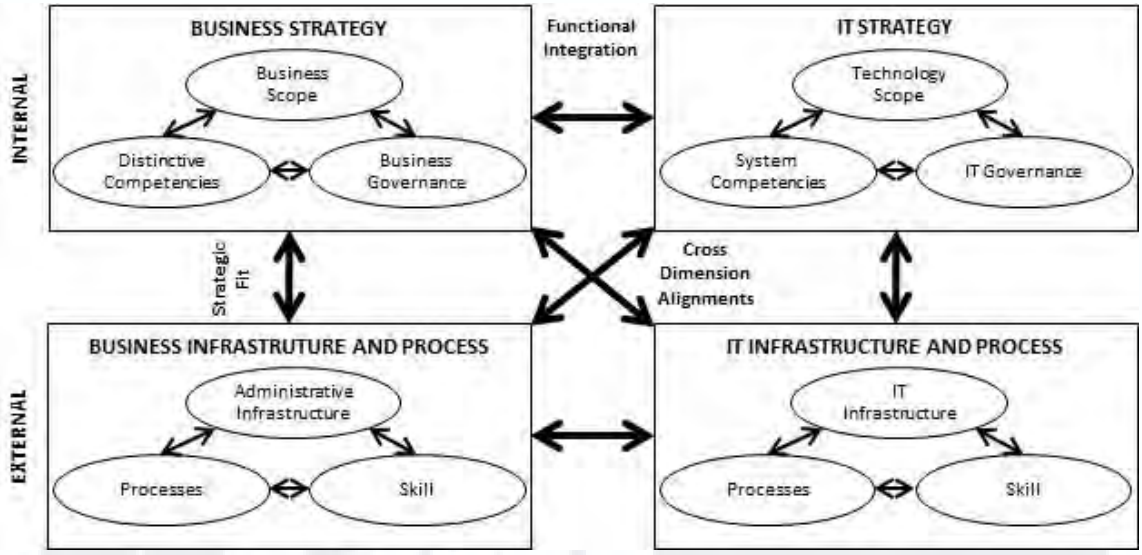

Figure 3. Strategic Alignment Model (SAM). Adapted from "Strategic alignment: leveraging IT for transforming organizations," by Henderson, J. C., and Venkatraman, N., 1993, *IBM Systems Journal*, 32, p. 476. Copyright 1993 by IBM. Adapted with permission.

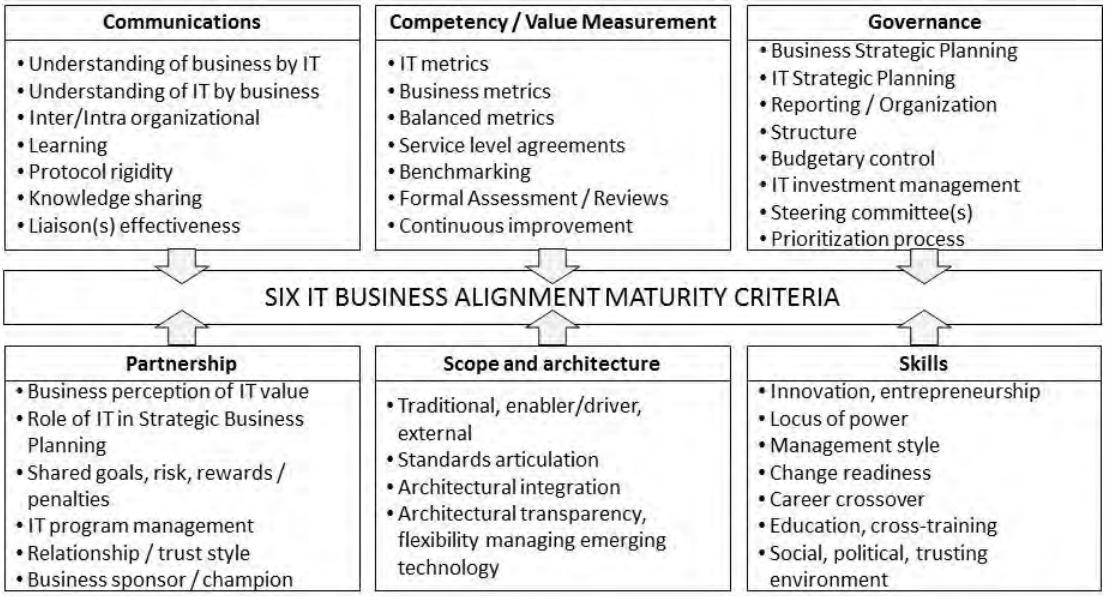

Figure 4. Alignment Maturity Criteria. Adapted from "Assessing Business-IT Alignment Maturity," by Luftman, J., 1993, *Communications of the Association for Information Systems*, 4, p. 12. Copyright 2000 by Association for Information Systems. Adapted with permission.

Although the SAMM model proposed by Luftman (2000) is a widely used tool, this study precludes its use because it uses as one of its dimensions maturity the IT governance, which would create difficulties for endogeneity of variables. Instead, the model subsequently raised by Bergeron et al. (2004), which contains some of the general concepts of model SAM proposed by Henderson and Venkatraman (1989), empirically examining the impact of adjustment between the four alignment dimensions, business strategy, organizational structure, IT strategy and IT structure.

Bergeron et al. (2004) presents a gestalt alignment model, which tries to explain the impact of various factors on the coalignment and at same way the impact of this on organizational performance. The first dimension of the model is the business strategy, which attempts to evaluate the strategy realized instead of strategy intended, focusing on the idea of deploying the necessary resources to achieve business goals. Bergeron et al. (2004) based their analysis on the proposal Venkatraman (1989) to measure the strategic orientation in six elements: Aggressiveness, analysis, defensiveness, futurity, proactiveness, and riskiness.

Bergeron et al. (2004) took a second dimension the business structure measured by five variables as follows: The first is the formalization, which can be measured from the number of rules, procedures and activities are written and documented. The second corresponds to administrative intensity, also known as centralization, calculated by the ratio between the number of managers and the number of employees. The third takes into account the professionalization, calculated by taking the number of professionals divided by the number of employees. The fourth is related to the specialization or also known as horizontal differentiation that includes the number of different job titles in the organizational chart. The last is the vertical differentiation that refers to the number of organizational levels that are below the Chief Executive Officer (CEO).

The third dimension proposed by Bergeron et al. (2004) is the IT strategy, which is measured from two components, the first is the IT environment scanning, which tries to explain the ability of the organization to detect and respond to the changes generated by competitors'. The second component is the strategic use of IT, trying to synthesize what extent, the organization uses IT to thereby increase the quality of its products and services, improve competitiveness and productivity.

Finally, the fourth dimension of the model proposed by Bergeron et al. (2004) is the IT structure, which is composed by two components, one of them is IT planning and control, that includes activities designed to observe management IT function, IT resources and IT infrastructure. The other component is the acquisition and implementation of IT, which refers to activities that explain the selection and introduction of new IT applications in the enterprise.

According to Bergeron et al. (2004) the four dimensions explained above (Business strategy, business structure, IT strategy and IT structure), could take one of three values, high, moderate or low level, generating 81 possible scenarios for alignment. To understand these scenarios, Bergeron et al. (2004) assumed the Strategic Information Systems Management Profile in which six types of alignment are raised, as it shown in Figure 5 (Sabherwal, Hirschheim, & Goles, 2001).

To calculate the types of alignment Bergeron et al. (2004) explained the following comparisons. If the values of strategy and business structure are the same, they considered that the alignment of business is "high" otherwise it is "low". If the values of business strategy and IT strategy are the same, they considered strategic alignment is "high" otherwise it is "low". If the values of business strategy and IT structure are the same, they considered that the structural alignment is "high" otherwise it is "low". If the values of IT strategy and structure are the same, they considered that the alignment of IT is "high" otherwise it is

"low". If the values of business structure and IT strategy are the same, they considered that the cross-dimensional alignment 1 is "high" otherwise it is "low". Finally, if the values of business strategy and IT structure are the same, they considered that the cross-dimensional alignment 2 is "high" otherwise it is "low".

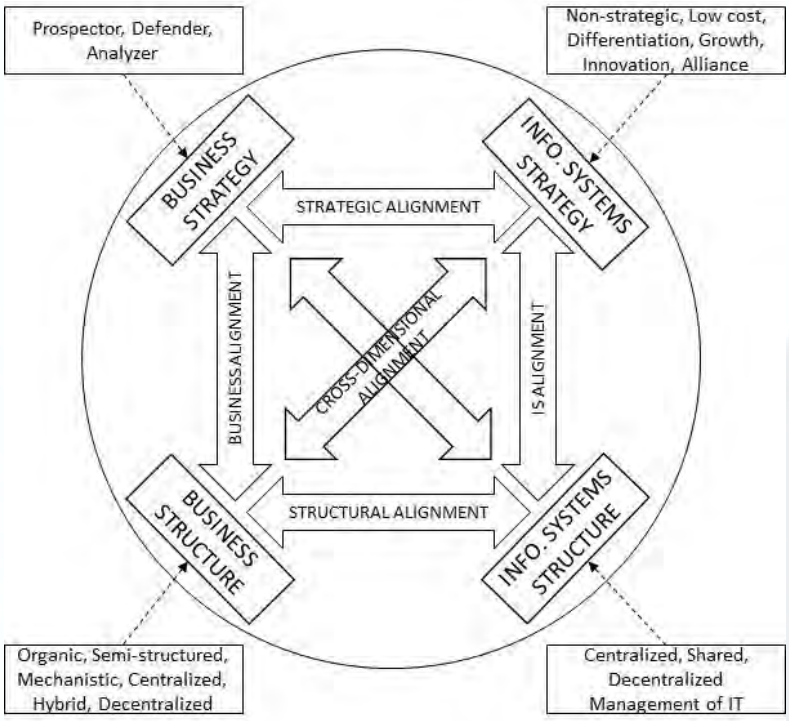

Figure 5. Strategic Information Systems Management Profile. Adapted from "The Dynamics of Alignment: Insights from a Punctuated Equilibrium Model," by Sabherwal, R., Hirschheim, R., and Goles, T., 2001, *Organization Science*, 12, p. 181. Copyright 2001 by Organization Science. Adapted with permission.

Bergeron et al. (2004) after identifying each one of the types of alignment as "high" or "low", they characterized the overall alignment of three ways. The first way was called by them "No conflict" when the number of "high" alignments is greater than the number of "low" alignments. The second way was called "Neutral" when the number of "high" alignments is the same as the number of "low" alignments. Finally, the third way was called "Conflict" when the number of "high" alignments is less than the number of "low" alignments.

Relationship between IT governance and Business-IT Alignment

It has been argued that "Business-IT Alignment and IT Governance can be understood as complementary and deeply related concepts" (Zarvić, Stolze, Boehm, & Thomas, 2012, p. 542). In fact, the seminal studies on IT governance (Peterson, 2004; Weill & Ross, 2004b) authors began to be interested in studying the relationship purpose of this research.

In different studies (De Haes & Van Grembergen, 2004, 2005, 2008; Van Grembergen, 2004; Van Grembergen & De Haes, 2008; Van Grembergen et al., 2004), the authors collected previous studies and suggested that the IT governance can be implemented through the combination of structures, processes and relational mechanisms. Then suggested that there is a relationship between IT governance and Business-IT Alignment (De Haes & Van Grembergen, 2009a, 2009b).

Some authors have taken in many ways the formulation of De Haes and Van Grembergen, on the practical implementation of IT governance. Bhattacharjya and Chang (2007) assumed the practices of IT governance (structures, processes and relational mechanisms) and related them with their peers (structures, processes and relational mechanisms) in the organization developing a study in Australian's higher education institutions. Kuruzovich, Basselier, and Sambamurthy (2012), evaluated how the strategic importance of IT works on some of the implementation processes of IT governance and these it turns on IT alignment. Moreover, Ping-Ju Wu et al. (2015) examined how the mechanisms of IT governance and strategic alignment influence organizational performance.

Asante (2010), studied how IT governance structures raised by Weill and Ross (2004a) (Centralized, Decentralized and Federal) impact the maturity of IT strategic alignment, using the model proposed by Luftman (2000). Harguem, Karuranga, and Mellouli (2014), empirically tested by means of a quantitative study in American companies, that the mechanisms of IT governance positively affect the global IT management capabilities of the

organization, which contributes to improve strategic alignment that could be reflected in the organizational performance. As it is realized some authors have worked these elements in an isolated way but this study tries to assess IT governance practices (structures, processes and relational mechanisms) and its impact on Business-IT Alignment.

Summary

This chapter is focus on definitions and concepts about of IT governance and business-IT alignment. Also, it illustrates some previous studies made by import researchers in order to show the relevance of these topics in institutions such as organizations and professional associations. Summarizing, IT governance integrates and institutionalizes the best IT practices to improve organizational performance (Gheorghe, 2008). Likewise, the business-IT Alignment can be defined as "applying information technology (IT) in an appropriate and timely way, in harmony with business strategies, goals and needs" (Luftman, 2000, p. 3).

This chapter has described the constructs to use in this research, defining its dimensions and relationships, and ways of assessing and measurement. IT governance through the proposal of De Haes and Van Grembergen (2009a) and the business-IT alignment of with the gestalt model proposed by Bergeron et al. (2004).

Conclusion

De Haes and Van Grembergen (2008) raised at the strategic level business and IT, a validated list of 33 structures, processes and relational mechanisms that make IT governance practices. Bergeron et al. (2004) provided a holistic model that used the theoretical model proposed by Henderson and Venkatraman (1993). Based on the characterization of the four dimensions of business-IT alignment (strategy and business structure and strategy and IT structure) 81 alternatives appear as result of evaluating them together these could lead to the six types of alignment described by Sabherwal et al. (2001) these alternatives are called by Bergeron et al. (2004) alignment or misalignment patterns, from these when a combination

has a minimum four of the six alignment types qualified as high the pattern that result is consider as an ideal alignment pattern.

De Haes and Van Grembergen (2009a) suggested in exploratory study, that "there is a clear relationship between the use of IT governance practices and Business-IT alignment" (p. 135). According to the point view of these researchers, it seems that highly aligned organizations are more able to take advantage of mature IT governance compared to misaligned organizations. Therefore, a statistical correlation investigation serves to validate the accuracy of the basic knowledge of the relationship suggested for this research.

Chapter 3: Method

This research aims to examine the relationship between the IT governance and Business-IT alignment, through basic, quantitative, descriptive and cross-sectional study. The data collection strategy will be develop by means surveys, data analysis will be statistical, where the unit of analysis will be the companies and unit of observation will be the chief executive officer (CEO) or chief operations officer (COO), and chief information officers (CIO) of the companies. The population will be the companies located in Colombia reported in the Superintendencia de Sociedades "System Information and Business Report" [SIREM] Once described the theoretical framework has been described and a description of the variables that take a part of this study, have been made, then raises the research design the research questions, the population and the characteristics of the sample, and the features of the measurement instrument, among others, will be taken into account in the other sections of this chapter.

Research Design

This study will be develop within a positivist epistemology with descriptive purposes, through a quantitative process, with deductive logic using surveys as strategy to collect data (Saunders, Thornhill, & Lewis, 2009), and it contributes to clarify the relationship raised the impact of the IT governance on Business-IT alignment (De Haes & Van Grembergen, 2009a). The survey is a tool widely used that allows the collection of data that can be analysed using statistical techniques of descriptive and inferential type. Similarly, data from the surveys could be used to suggest specific relationships between the variables under analysis (Saunders et al., 2009). In the same way, the surveys allow to know the opinions and perceptions from a large number of representative people from a population, in order to measure different types of variables (Vanderstoep & Johnston, 2009).

This research will study the phenomenon of the proposed relationship at particular time, so it is considered cross-sectional (Saunders et al., 2009). The research' objective of the study is determine the impact of IT governance on the business-IT alignment, based on the suggested relationship by De Haes and Van Grembergen (2009a) in his case study on the Belgian financial sector, so it is necessary to includes analysis and testing hypotheses in this research design.

The key research questions were shown in Chapter 1, RQ1: Does IT governance have any impact on Business-IT alignment? The hypothesis is, H1: IT governance has impact on Business-IT alignment. Based on the theoretical framework, this research employed Structural Equation Model (SEM) as an alternative to estimate the effects and the relationships between multiple variables (Kline, 2011).

Structural equation models (SEM) allows to propose the type and direction of relationships expected to be found among the variables, seeking to estimate the parameters associated with the theoretic relations proposed (Ruiz, Pardo, & Martín, 2010). This research takes a structural equation modelling with Confirmatory Factor Analysis (CFA) as a mechanism to show the analysis of the theoretic relationships proposed between IT governance and Business-IT Alignment.

SEM technique includes six steps for implementation: specification, identification, select measures and parameter estimation, estimate the model, re-specification model and results interpretation (Kline, 2011). Generally, in the specification phase the researcher draws a diagram model using a set of standard graphic symbols. However, the researcher can also describes the model through series of equations defining the model parameters and the alleged relationships between variables (Kline, 2011).

Byrne (2010) argued that the schematic representations of the models are called causal diagrams because they provide a visual representation of the relationships between variables

be assumed in the study. The SEM general model comprises two sub-models, a measurement model and a structural model. The structural model defines the relations between the unobservable variables, Figure 6 shows the structural model of the research.

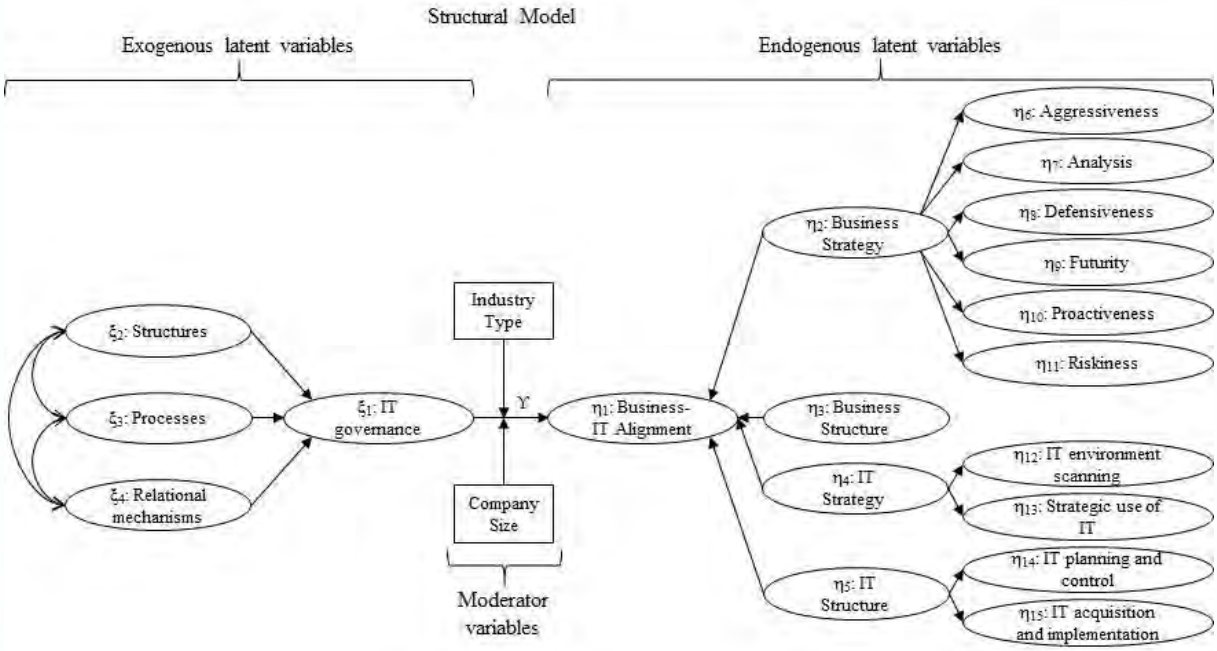

Figure 6. Structural Model

The measurement model defines the relationships between the observed and unobserved variables, providing the link between scores on a measuring instrument (observed indicator variables) and the underlying model to measure variables (unobserved latent variables) (Byrne, 2010).

Coltman, Devinney, Midgley, and Venaik (2008) argued that there are three theoretical considerations in deciding whether a measurement model is reflective or formative. The first concerns to the nature of the construct. Whereby, in reflective model the latent variable exists independently from the measurements. In contrast, in the formative model the latent variable is a combination of indicators. The second is focus on the direction of causality. In the reflective models causality flows from latent variables to indicators and in the formative it flows in opposite direction. Finally, the third consideration are the characteristics of the indicators. In reflective models a change in the latent variable precedes

the change in the indicator, the items are expressed by the latent variable and share common topics. In contrast, in formative models the indicators define latent variable and not necessarily share common aspects.

This research assumes reflective model between the latent variables and indicators, based on the proposal by Bergeron et al. (2004) in their research model, and a formative model between the latent variables that form the main constructs. The exogenous measurement model is shown in Figure 7, and the endogenous measurement model is shown in Figure 8.

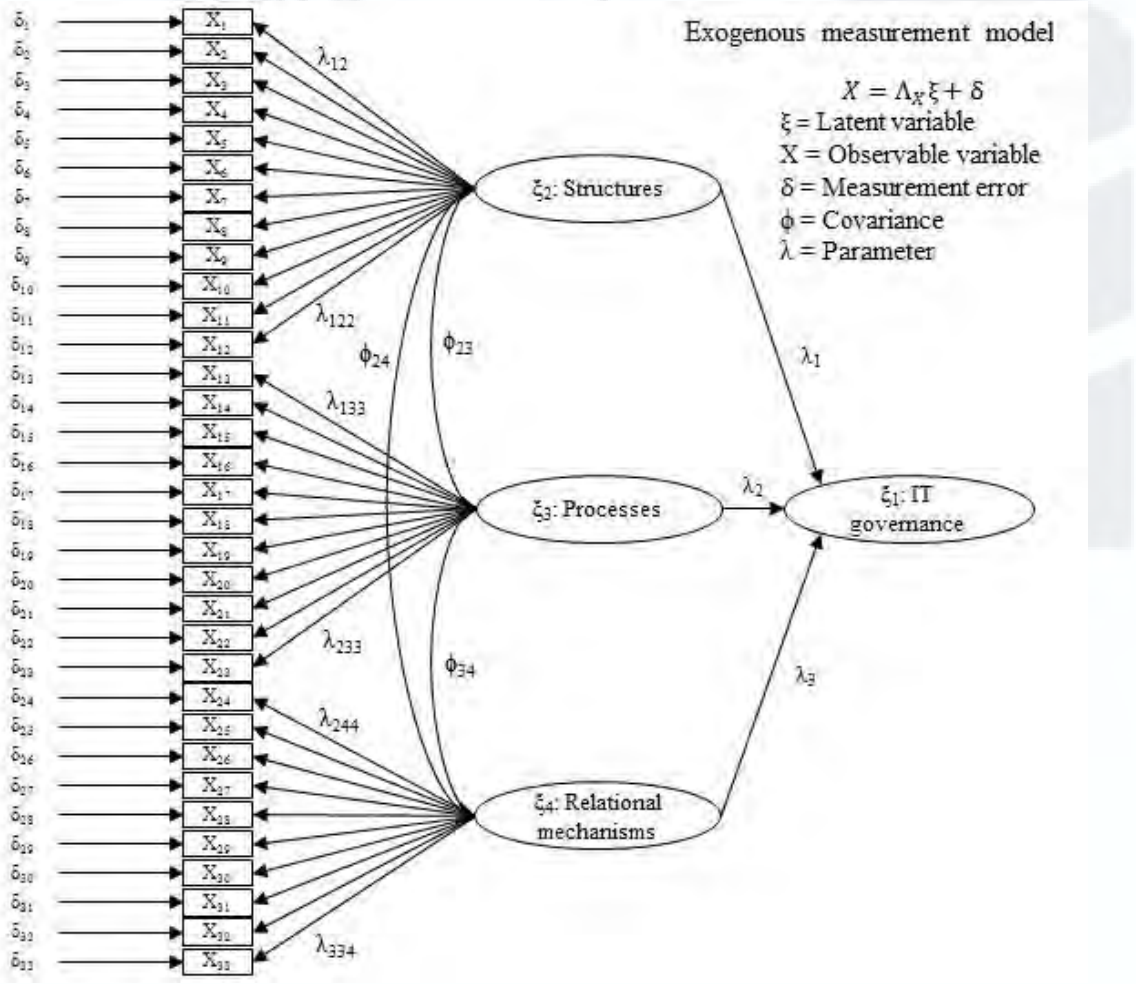

Figure 7. Exogenous Measurement Model

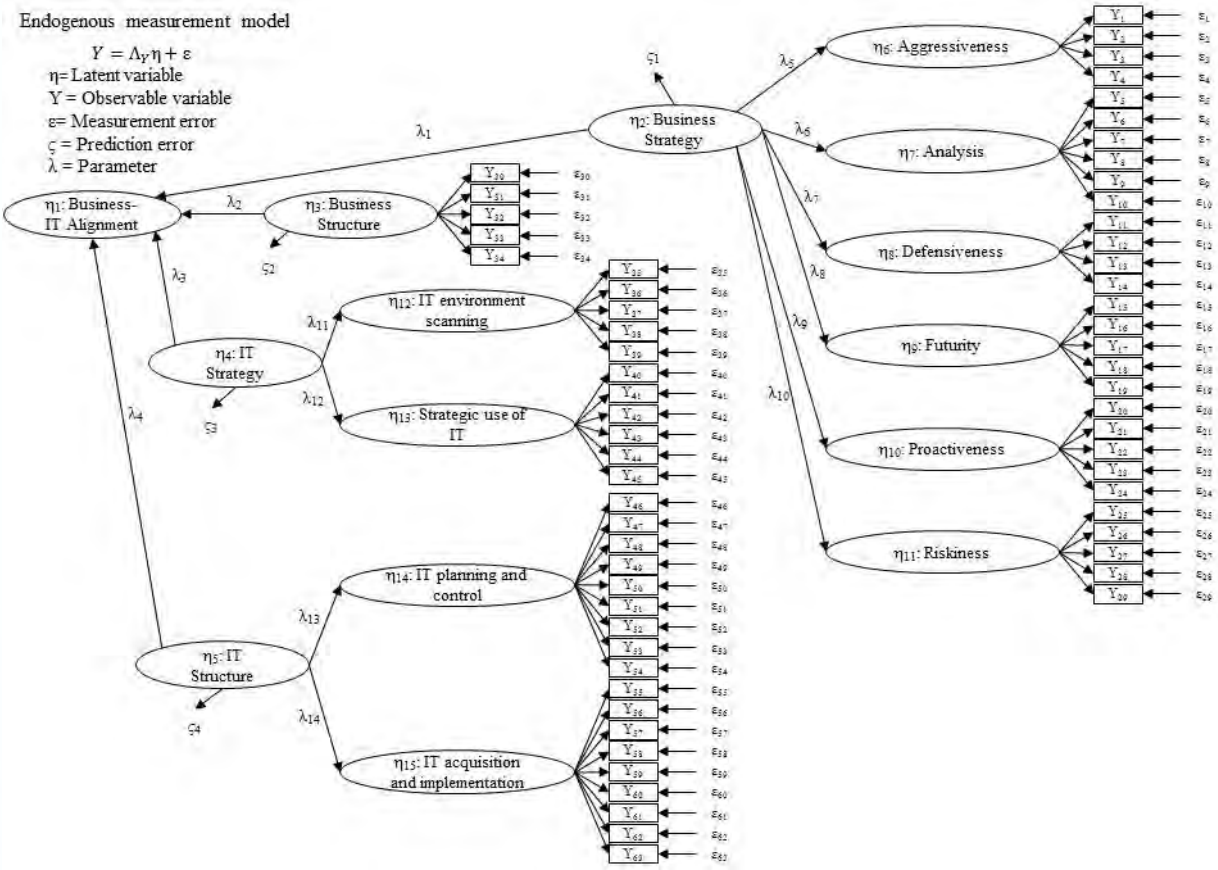

Figure 8. Endogenous Measurement Model

The second step of the SEM technique is identification. A model is identified if it is theoretically possible to provide a single estimate to each one of the parameter model; otherwise, the model is not identified (Kline, 2011). There are a number of general rules to identify a model, one of them for example the rule of the degrees of freedom (*df*), which states that the model degrees of freedom must be greater than or equal to zero ($df_M \geq 0$) (Kline, 2011). The calculation procedure df_M is shown in Figure 9. As the value is greater than zero the model is identified.

$$df_M = p - q = 4656 - 209 = 4447$$

$$p = \frac{v(v+1)}{2} = \frac{96(96+1)}{2} = 4656$$

p: *Number of observations* $= 4656$

q: *Number of estimated parameters* $= 209$

v: *Observed variables* $= 96$

Figure 9. Model Degrees of Freedom

Prior to the analysis and estimation of the model it is advisable to examine all variables in order to assess the quality of the database. The first issue to address is the sample size, determining its requirements for SEM it is an often challenge faced by researchers (Wolf, Harrington, Clark, & Miller, 2013). Some authors suggested that the sample size depends on the desired statistical power, bias, the evaluation of the null hypothesis and the complexity of the model; if the model is more complex a larger the sample size is required (Iacobucci, 2010; MacCallum, Browne, & Sugawara, 1996; Wolf et al., 2013). In this research, the sample size is 384 (see Figure 10) that it is considered appropriate to enhance the statistical power, "For studies with moderate to large, reasonable power is achieved with moderate sample sizes, and very high power is achieved with large samples. For instance, with d = 100, power is well above 0.90 if N is 200 or more" (MacCallum et al., 1996, p. 139).

Another aspect to consider is the multicolinearity between variables, where highly correlated variables considered redundant. A guideline to see if there is multicolinearity between variables using bivariate correlation and where r = 0.85 above values can point out potential problems (Kline, 2011). When it is observed that two variables are highly correlated, the most practical solution is to remove the variable from the model. In addition, researchers should also consider the existence of cases with marginal scores (outliers) as univariate and multivariate. Finally, the statistics used in SEM assume that the multivariate normality (Kline, 2011).

The design of this research taken into account moderating variables which regulate the degree of intensity on which one variable impacts another one (Chion & Charles, 2016). For this research, the moderate variables are industry type and organizational size. Chan et al. (2006) argued that there are several antecedents that the importance of alignment depends on the industry in which the organization operates. Similarly, they argued that the size of the organization is associated with the alignment. Chan and Reich (2007) suggested

communication and coordination in small firms is easy to put in practice, because of it, these firms may tend to better aligned than midsize firms where there might be less evidence of existence' alignment.

This research aims to address the different sizes of company, IT governance studies have mainly focused on large companies, this does not mean that the IT governance does not exist in small and medium enterprises (SME) (Bergeron, Croteau, Uwizeyemungu, & Raymond, 2015). In fact, most SMEs use IT for their basic needs, but show a tendency to use it for more advanced activities (Mardikyan, 2010). This research takes the form of categorizing the size of companies according to Ping-Ju Wu et al. (2015), in which small firms are those with fewer than 100 employees, medium are those with between 100 and 1000, and large those with more than 1000 employees.

Mardikian (2010) argued that there are significant differences in the use of IT among different types of industry. Tallon, Ramirez, and Short (2013) studied practices to IT govern, interviewing 30 executives belonging to 17 kinds of different industries, focus on, health, energy, finance, IT, pharmaceutical, retail, education, air transport, among others. Concluding that the governance of information is associated with a number of benefits for organizations in the development of their processes and in general for the industrial sector in which they operate. This study basically will be use 10 industry types, manufacturing, financial services, IT, health, education, energy, costumer products, transport, retail and chemical - pharmaceutical.

It will be considered as a control variable the antecedent of use IT governance framework in the company, to thereby observe whether there are differences in organizations that have knowledge or experience in the use of such frameworks in relation with those companies using IT governance practices empirically.

Appropriateness of Design

This study will use a quantitative approach with survey strategy because quantitative research seeks to test hypothesis about a phenomenon and requires that the variables considered are measured (Treiman, 2009). "Some research questions inherently lend themselves more to a quantitative than the qualitative approach" (Patten, 2009, p. 21).

Researchers in social sciences and especially in information systems have found great benefits with the use of the SEM (Cenfetelli & Bassellier, 2009). Several studies (Ali & Green, 2012; Hajikhani & Azadi, 2013; Harguem et al., 2014; Kuruzovich et al., 2012; Liang et al., 2011; Ping-Ju Wu et al., 2015) have covered the topic of IT governance, they have been supported on the SEM. They have done as a mechanism to incorporate unobservable constructs (latent variables) as in the case of this research (IT governance and Business-IT Alignment). Also, they used to confront hypothesis with empirical data, to model the measurement errors, and to model the relationships between predictor variables (independent, exogenous) and dependent or endogenous variables.

In relation to the measurement model, although some authors do not recommend the use of formative endogenous variables (Cadogan & Lee, 2013), this approach could not be generalized to all situations in which the reflective and formative specifications may work well for to evaluate the constructs (Chang, Franke, & Lee, 2016).

Some studies strongly criticized the use of formative and reflective approaches of higher order variables, even going so far to state that "higher-order reflective constructs are, at worst, misleading, and at best meaningless" (Lee & Cadogan, 2013, p. 244), these statements have caused various reactions (Finn & Wang, 2014; Rigdon, 2014; Temme & Diamantopoulos, 2016). Because this study uses these relationships, taking the arguments of Temme and Diamantopoulos (2016) in the sense that the use of such models is not invalidated on the basis of the arguments presented by Lee and Cadogan (2013), and as it was proposes

by Jarvis, MacKenzie, and Podsakoff (2012) “it is essential that researchers correctly specify their measurement models to match their theoretical conceptualizations” (p. 140).

Research Questions

This study addresses the following big research question: RQ1: Does IT governance have any impact on Business-IT alignment? From the main question may raise other questions such as: RQ2: There may be differences in the relationship (IT governance – Business-IT alignment) between companies in different industry types? RQ3: There may be differences in the relationship (IT governance – Business-IT alignment) between companies according to company size?

From the research questions, it will test the following hypotheses to see whether they are compatible or not, with the support of the perception of respondents:

$H1_0$: IT governance has any impact on Business-IT alignment.

$H1_a$: IT governance has impact on Business-IT alignment.

$H2_0$: There is no difference in the impact of IT governance on Business-IT alignment between industry types.

$H2_a$: There is difference in the impact of IT governance on Business-IT alignment between different industry types.

$H3_0$: There is no difference in the impact of IT governance on Business-IT alignment between company sizes.

$H3_a$: There is difference in the impact of IT governance on Business-IT alignment between company sizes.

Population

The population for the study are Colombian companies, to characterize it is taken into account the ranking of the 5,000 largest companies in the country, conducted by the prestigious magazine "Dinero", which shows data about the performance of certain industry

types. The Colombian economy grew 4.6% in 2014; the companies in the sample operating revenues recorded by $933 billion, 15.6% more than in 2013. While in 2013, largest Colombian companies got sales of $15,300 million on, in 2014 the minimum turnover was $17,900 million ("Artículo de apertura de las 5000 Empresas más grandes del país según Revista Dinero - Dinero.com," 2015). For the selection of a representative sample, the official list of companies that reported financial statements to the Superintendencia de Sociedades will be taken from "System Information and Business Report" [SIREM] in Colombia, where in 2013 the number of companies reported is 13,027.

The sampling technique depends on the research question and research objectives (Saunders et al., 2009). Given the large number of the population (N>1000), it is considered the calculation of sample size for an infinite population. In that case, the expected proportion of the population that meets the relationship (p = 50%) and in addition, the value of the probability of failure will complement estimated p (q = 50), the value Z: Value obtained by confidence levels (95%) equals 1.96, e: Acceptable limit of sampling error for case 5% will be taken. The total number of companies to be consulted to be 384. The result is shown in Figure 10.

$$n = \frac{Z^2 pq}{e^2} = 384 \quad Where\ p = 50\%, q = 50\%, e = 5\%\ and\ Z = 1.96$$

Figure 10. Sample Size

This study assumes a type random sampling, in which any of the companies of the population has an equal chance of being included in the sample, ensuring that there is no bias in the choice of respondents (Treiman, 2009). The study participants signed informed consent, in acquiescence of voluntary participation and confidence that your data and the organization data will be kept in strict confidentiality and anonymity.

In recent times, the use of web surveys has become popular (Swanson & Holton, 2005; Treiman, 2009), because of the sample size is large, the greater cost efficiency and

geographical distribution of participants (Gordon, 2012) ; in this research, data will be collected through web surveys or personally according to the case. Birnbaum (2004) argued that use Web allows contact via surveys efficiently large and heterogeneous samples. Collecting data coming from the instruments developed by De Haes and Van Grembergen (2009a) to construct IT governance, and the instrument developed by Bergeron et al. (2004) for Business-IT Alignment, which includes the STROBE instrument developed by Venkatraman (1989).

Informed Consent

The participation of respondents is voluntary. The researcher shall send an invitation to participate in the study (see Appendix A) emphasizing the commitment to maintain the confidentiality of responses. Before starting the process of the survey, the participants will be informed about of the purpose and the scopes of the research, then sign a consent form (see Appendix B) in which they accept their voluntary participation.

Sampling Frame

The sampling frame contains about 13,000 companies in Colombia. This research will uses simple random sampling. To ensure a random sample, first, enumerate companies to which the population belong. Second, determine sample size (previously determined, 384). Third, select the sample based on the generation of random numbers. Given the high rates of non-response survey, it is advisable to expand the number of requests for participation in research (Swanson & Holton, 2005).

Confidentiality

The survey did not collect data that can identify people involved in the research. Identifying information will not be included in the survey forms, seeking to maintain anonymous information. In addition, participants in this research would not have any direct interaction with other participants. To ensure participants' identity and confidentiality the

data sets, the researcher assumes as guarantor of compliance with current legislation and concerning the "Habeas Data". The researcher will be responsible for the custody and security of data that are part of the research.

Geographic Location

The companies are geographically dispersed throughout the Colombian territory, however, approximately 80% of the companies are concentrated in the five major cities of the country, the percentages are represented as well 50% of companies are located in Bogotá, 15% in Medellin, 8% in Cali, 5% in Barranquilla and 3% in Bucaramanga.

Instrumentation

The data for this research will be obtained using two existing instruments. The first, on the practices of IT governance (De Haes & Van Grembergen, 2009a) and second, measures Business-IT Alignment (Bergeron et al., 2004), which includes the STROBE instrument (Strategic Orientation of Business Enterprises), that it measures the dimension of business strategy (Venkatraman, 1989).

For the independent variable, the instrument used that seeks to measure the structures, processes and relational mechanisms of IT governance (De Haes & Van Grembergen, 2009a). The instrument contains 33 variables measured on an ordinal 6-point scale, where (0 = Non-existent, 1 = Initial, 2 = Repeatable, 3 = Defined, 4 = Managed, and 5 = Optimised). IT Governance Institute (2003) described the scale as follows:

> 0 Non-existent. Complete lack of any recognisable processes. The enterprise has not even recognised that there is an issue to be addressed.
>
> 1 Initial/Ad Hoc. There is evidence that the enterprise has recognised that the issues exist and need to be addressed. There are, however, no standardised processes; instead there are ad hoc approaches that tend to be applied on an individual or case-by-case basis. The overall approach to management is disorganised.

2 Repeatable but Intuitive. Processes have developed to the stage where similar procedures are followed by different people undertaking the same task. There is no formal training or communication of standard procedures, and responsibility is left to the individual. There is a high degree of reliance on the knowledge of individuals and, therefore, errors are likely.

3 Defined Process. Procedures have been standardised and documented, and communicated through training. It is mandated that these processes should be followed; however, it is unlikely that deviations will be detected. The procedures themselves are not sophisticated but are the formalisation of existing practices.

4 Managed and Measurable. Management monitors and measures compliance with procedures and to take action where processes appear not to be working effectively. Processes are under constant improvement and provide good practice. Automation and tools are used in a limited or fragmented way.

5 Optimised. Processes have been refined to a level of good practice, based on the results of continuous improvement and maturity modelling with other enterprises. IT is used in an integrated way to automate the workflow, providing tools to improve quality and effectiveness, making the enterprise quick to adapt. (pp. 48-49)

The structure of names, index and definitions of the IT governance construct are shown below. In Table 3 the definitions of IT governance structures are shown, in the Table 4 the definitions of IT governance processes are shown, and in the Table 5 the definitions of IT governance relational mechanisms are shown. A translated Spanish version of the instrument is shown in Appendix C.

For the dependent variable, the instrument designed by Bergeron et al. (2004), which has four sections will be used. The first section measures the size of the business strategy, for which the authors use the STROBE instrument developed by Venkatraman (1989), which

uses an ordinal scale 7-point (1 = Strongly disagree, ... , 7 = Strongly agree) to evaluate six variables (aggressiveness, analysis, defensiveness, futurity, proactiveness, and riskiness) through 29 items.

Table 3

Definitions of IT governance structures

	Variable [a]	Index	Definition
X1	IT strategy committee at level of board of directors	S1	Committee at level of board of directors to ensure IT is regular agenda item and reporting issue for the board of directors
X2	IT expertise at level of board of directors	S2	Members of the board of directors have expertise and experience regarding the value and risk of IT
X3	(IT) audit committee at level of board of directors	S3	Independent committee at level of board of directors overviewing (IT) assurance activities
X4	CIO on executive committee	S4	CIO is a full member of the executive committee
X5	CIO (Chief Information Officer) reporting to CEO (Chief Executive Officer) and/or COO (Chief Operational Officer)	S5	CIO has a direct reporting line to the CEO and/or COO
X6	IT steering committee (IT investment evaluation / prioritization at executive / senior management level)	S6	Steering committee at executive or senior management level responsible for determining business priorities in IT investments.
X7	IT governance function / officer	S7	Function in the organization responsible for promoting, driving and managing IT governance processes
X8	Security / compliance / risk officer	S8	Function responsible for security, compliance and/or risk, which possibly impacts IT
X9	IT project steering committee	S9	Steering committee composed of business and IT people focusing on prioritizing and managing IT projects
X10	IT security steering committee	S10	Steering committee composed of business and IT people focusing on IT related risks and security issues
X11	Architecture steering committee	S11	Committee composed of business and IT people providing architecture guidelines and advise on their applications.
X12	Integration of governance / alignment tasks in roles & responsibilities	S12	Documented roles & responsibilities include governance/alignment tasks for business and IT people

Note. Adapted from "An Exploratory Study into IT Governance Implementations and its Impact on Business/IT Alignment," by De Haes, S., and Van Grembergen, W., 2009, Information Systems Management, 26, p. 130-131. Copyright 2009 by Information Systems Management. Adapted with permission.

[a] This study assumes the use of generic maturity model proposed by the IT Governance Institute (ITGI, 2003), which uses a scale from 0 to 5, where (0 = Non-existent, 1 = Initial, 2 = Repeatable, 3 = Defined, 4 = Managed, and 5 = Optimised)

The second section measures the business structure includes five variables, Formalization (extent to which rules, procedures, and activities are written). Administrative intensity (number of managers / number of employees). Professionalization (number of professionals / number of employees). Specialization (number of distinct job titles in the organization chart), and vertical differentiation (number of organizational levels below the

chief executive). The third section measures the IT strategy, which includes two variables (IT environment scanning, the strategic use of IT) which are assessed through 11 items, using an ordinal 7-point scale (1 = Strongly disagree, ... , 7 = Strongly agree). The fourth section measures the IT structure, which includes two variables (planning and control of IT and the acquisition and application of IT) which are assessed through 18 items, using an ordinal 7-point scale (1 = Strongly disagree, ... , 7 = Strongly agree).

Table 4

Definitions of IT governance processes

	Variable [a]	Index	Definition
X13	Strategic information systems planning	P1	Formal process to define and update the IT strategy
X14	IT performance measurement (e.g. IT balanced scorecard)	P2	IT performance measurement in domains of corporate contribution, user orientation, operational excellence and future orientation
X15	Portfolio management (incl. business cases, information economics, ROI, payback)	P3	Prioritization process for IT investments and projects in which business and IT is involved (incl. business cases)
X16	Charge back arrangements - total cost of ownership (e.g. activity based costing)	P4	Methodology to charge back IT costs to business units, to enable an understanding of the total cost of ownership
X17	Service level agreements	P5	Formal agreements between business and IT about IT development projects or IT operations
X18	IT governance framework COBIT	P6	Process based IT governance and control framework
X19	IT governance assurance and self-assessment	P7	Regular self-assessments or independent assurance activities on the governance and control over IT
X20	Project governance / management methodologies	P8	Processes and methodologies to govern and manage IT projects
X21	IT budget control and reporting	P9	Processes to control and report upon budgets of IT
X22	Benefits management and reporting	P10	Processes to monitor the planned business benefits during and after implementation of the IT investments / projects.
X23	COSO / ERM	P11	Framework for internal control

Note. Adapted from "An Exploratory Study into IT Governance Implementations and its Impact on Business/IT Alignment," by De Haes, S., and Van Grembergen, W., 2009, Information Systems Management, 26, p. 130-131. Copyright 2009 by Information Systems Management. Adapted with permission.

[a] This study assumes the use of generic maturity model proposed by the IT Governance Institute (ITGI, 2003), which uses a scale from 0 to 5, where (0 = Non-existent, 1 = Initial, 2 = Repeatable, 3 = Defined, 4 = Managed, and 5 = Optimised)

The structure of names, index and definitions of the Business-IT alignment construct are shown below. In the Table 6 business strategy definitions are shown, the Table 7 business structure definitions are shown, the Table 8 IT strategy definitions are shown, and the Table 9 IT structure definitions are shown. A Spanish translated version of the instrument is shown in

Appendix C. In addition, a copy of the authorization for the use and translation of the instrument is shown in Appendix D.

Table 5

Definitions of IT governance Relational Mechanisms

Variable [a]		Index	Definition
X24	Job-rotation	R1	IT staff working in the business units and business people working in IT
X25	Co-location	R2	Physically locating business and IT people close to each other
X26	Cross-training	R3	Training business people about IT and/or training IT people about business
X27	Knowledge management (on IT governance)	R4	Systems to share and distribute knowledge about IT governance framework, responsibilities, tasks, etc.
X28	Business/IT account management	R5	Bridging the gap between business and IT by means of account managers who act as in-between
X29	Executive / senior management giving the good example	R6	Senior business and IT management acting as "partners"
X30	Informal meetings between business and IT executive / senior management	R7	Informal meetings, with no agenda, where business and IT senior management talk about general activities, directions, etc. (e.g. during informal lunches)
X31	IT leadership	R8	Ability of CIO or similar role to articulate a vision for IT's role in the company and ensure that this vision is clearly understood by managers throughout the organization
X32	Corporate internal communication addressing IT on a regular basis	R9	Internal corporate communication regularly addresses general IT issues.
X33	IT governance awareness campaigns	R10	Campaigns to explain to business and IT people the need for IT governance.

Note. Adapted from "An Exploratory Study into IT Governance Implementations and its Impact on Business/IT Alignment," by De Haes, S., and Van Grembergen, W., 2009, Information Systems Management, 26, p. 130-131. Copyright 2009 by Information Systems Management. Adapted with permission.

[a] This study assumes the use of generic maturity model proposed by the IT Governance Institute (ITGI, 2003), which uses a scale from 0 to 5, where (0 = Non-existent, 1 = Initial, 2 = Repeatable, 3 = Defined, 4 = Managed, and 5 = Optimised)

The moderate variables are industry type and organizational size, in the case of the variable industry type (index INT), a nominal 11-Point scale is taken, when (1) Manufacturing, (2) Financial Services, (3) Information Technologies and Communications, (4) Healthcare/Medical, (5) Education, (6) Energy, (7) Consumer Products, (8) Transport, (9) Retail, (10) Chemical – pharmaceutical and (11) Others.

In the case of the variable company size (index CS), from the number of employees, this research assumes a nominal three-point scale, where (1) corresponds small firms are those with fewer than 100 employees, (2) medium are those companies between 100 and 1000 employees, and (3) large one are those with more than 1000 employees (Ping-Ju Wu et al.,

2015). For the control variable, it is use the variable called antecedent of IT Governance framework use (ITGF), this study will use a 4-point scale, where (1) COBIT, (2) ISO 38500, (3) Calder-Moir or (4) None.

Table 6

Definitions of Business Strategy

	Variable	Index	Definition
Y1	Aggressiveness	AG1	Sacrificing profitability to gain market share.
		AG2	Cutting prices to increase market share.
		AG3	Setting prices below competition.
		AG4	Seeking market share position at the expense of cash flow and profitability.
Y2	Analysis	AN1	Emphasize effective coordination among different functional areas.
		AN2	Information systems provide support for decision-making.
		AN3	When confronted with a major decision, we usually try to develop thorough analysis.
		AN4	Use of planning techniques.
		AN5	Use of the outputs of management information and control systems.
		AN6	Manpower planning and performance appraisal of senior managers.
Y3	Defensiveness	DE1	Significant modifications to the manufacturing technology.
		DE2	Use of cost control systems for monitoring performance.
		DE3	Use of production management techniques.
		DE4	Emphasis on product quality through the use of quality circles.
Y4	Futurity	FU1	Our criteria for resource allocation generally reflect short-term considerations.
		FU2	We emphasize basic research to provide us with future competitive edge.
		FU3	Forecasting key indicators of operations.
		FU4	Formal tracking of significant general trends.
		FU5	"What-if" analysis of critical issues.
Y5	Proactiveness	PR1	Constantly seeking new opportunities related to the present operations.
		PR2	Usually the first ones to introduce new brands or products in the market.
		PR3	Constantly on the lookout for businesses that can be acquired.
		PR4	Competitors generally preempt us by expanding capacity ahead of them.
		PR5	Operations in larger stages of life cycle are strategically eliminated.
Y6	Riskiness	RI1	Our operations can be generally characterized as high-risk.
		RI2	We seem to adopt a rather conservative view when making major decisions.
		RI3	New projects are approved on a "stage-by-stage" basis rather than with "blanket" approval.
		RI4	A tendency to support projects where the expected returns are certain.
		RI5	Operations have generally followed the "tried and true" paths.

Note. Adapted from "Ideal patterns of strategic alignment and business performance," by Bergeron, F., Raymond, L., and Rivard, S., 2004, *Information & Management*, 41, p. 1016-1017. Copyright 2003 by Elsevier B.V. Adapted with permission.

Table 7

Definitions of Business Structure

	Variable	Index	Definition
Y7	Formalization	FO	Extent to which rules, procedures, and activities are written.
Y8	Administrative intensity	AI	Number of managers / number of employees.
Y9	Professionalization	PF	Number of professionals / number of employees.
Y10	Specialization	SP	Number of distinct job titles in the organization chart.
Y11	Vertical differentiation	VD	Number of organizational levels below the chief executive.

Note. Adapted from "Ideal patterns of strategic alignment and business performance," by Bergeron, F., Raymond, L., and Rivard, S., 2004, *Information & Management*, 41, p. 1016-1017. Copyright 2003 by Elsevier B.V. Adapted with permission.

Table 8

Definitions of IT Strategy

Variable		Index	Definition
Y12	IT environment scanning	ES1	Using an external information network to identify your requirements in information technology.
		ES2	Knowing the information technology used by your competition.
		ES3	Instituting a technology watch in order to change rapidly your information technology when necessary.
		ES4	Ensuring that your choice of information technology follows the evolution of your environment.
		ES5	Using the information technologies that will permit a rapid reaction to environmental pressure.
Y13	Strategic use of IT	SU1	Use of IT to reduce your production costs.
		SU2	Use of IT to make substantial savings.
		SU3	Use of IT to improve your firm's productivity.
		SU4	Use of IT to increase your firm's profitability.
		SU5	Use of IT to improve the quality of products or services.

Note. Adapted from "Ideal patterns of strategic alignment and business performance," by Bergeron, F., Raymond, L., and Rivard, S., 2004, *Information & Management*, 41, p. 1016-1017. Copyright 2003 by Elsevier B.V. Adapted with permission.

Table 9

Definitions of IT Structure

Variable		Index	Definition
Y14	IT planning and control	PC1	Mastering current information technology products.
		PC2	Maintaining control over projects involved with the acquisition of new technology.
		PC3	Being considered as a leader in information technology usage.
		PC4	Development of a technological culture in your firm.
		PC5	Having the required human and organizational resources to manage the information systems.
		PC6	Having the ability to effectively identify and fill your needs in information technology.
		PC7	Strategic planning of information systems in relation to the organization's business objectives.
		PC8	Mastering the technology presently in use in your organization.
		PC9	Using a distributed system to share information within the firm.
Y15	IT acquisition and implementation	AI1	Structured approach to acquire the needed information systems.
		AI2	Use of specific selection criteria for the acquisition of new information systems.
		AI3	Using financial tools in planning the acquisition of new information systems.
		AI4	Choosing information technology related to the strategic orientation of your firm.
		AI5	Knowing the impact that IT will have on the different functions of your firm.
		AI6	Evaluating potential problems related to the strategic orientation of your firm.
		AI7	Knowing the results of a financial feasibility study before the acquisition of IT.
		AI8	Identification of possible sources of resistance to change before implementation.
		AI9	Evaluating the employee's aptitude to use the chosen IT.

Note. Adapted from "Ideal patterns of strategic alignment and business performance," by Bergeron, F., Raymond, L., and Rivard, S., 2004, *Information & Management*, 41, p. 1016-1017. Copyright 2003 by Elsevier B.V. Adapted with permission.

Data Collection

Data collection for this research use existing instruments. The organizations will be contacted by phone or in person to give an introduction to the study, as well as, to confirm their contact information, also to validate that these companies have an IT department and conduct an initial screening about of the participation's interest in the research (Kaur, Mohamed, & Ahlan, 2011). The instrument will be distributed by e-mail, the participant will find a presentation letter of the study, the informed consent form and the link to the survey. Based on the index (see Table 3 to 9) the data collected will be coded and loaded into a file previously labelled in SPSS software for statistical analysis and in AMOS complement to the revision of Structural Equation Model.

Data Analysis

Data analysis will be divided into three stages. In the first stage, using a SPSS software the data will be analysed by using descriptive statistics and thus highlighting possible patterns or traits of study that can help explain the results (Asante, 2010). In the second stage, using SPSS data will be explored to analyse outliers, normality, linearity and homoscedasticity. Finally, the third stage, that is confirmatory factor analysis (CFA) will be used the AMOS software to assess the measurement model and the dimensionality, reliability and validity of the research constructs.

Validity and Reliability

Creswell (2013) stated that a study should have supported the construct validity and reliability to be recognized as a scientific research. In that sense, "Validity, from a realistic perspective, refers to accuracy of a result" (Robson & McCartan, 2016, p. 105). The validity can be internal, which refers specifically to whether an experimental treatment makes a difference or not, and whether there is sufficient evidence to support a claim. In addition, the validity may be external, based on the generalization of the study results (Creswell, 2013).

Because this study did not develop the questionnaires, and it uses the instruments from other empirical studies, it is necessary to perform three types of validity: construct validity, convergent validity and discriminant validity. Construct validity appears when a variable measurements behave exactly the same way as the variable itself (Gravetter & Forzano, 2012). Convergent validity refers to the use two different methods to measure the same construct, to find a strong relationship between measures obtained from the two methods (Gravetter & Forzano, 2012). Discriminant validity is the degree in which an observable variable of a construct does not measure at the same time a different construct (Stangor, 2010).

Reliability "is the stability or consistency with which we measure something" (Robson & McCartan, 2016, p. 105). In addition, test reliability "refers to the extent to which scores on the same measured variable correlate with each other on two different measurements given at two different times" (Stangor, 2010, p. 91). In this study, to measure the reliability of the scale it will be used Cronbach's alpha coefficient, to estimate the internal consistency of the scale or homogeneity of the variables or observable elements within the scale (Stangor, 2010).

In the case of IT governance construct, De Haes and Van Grembergen (2009a) argued that, "As this research can be categorised as applied research, the primary focus is on internal validity" (p. 125). However, after determining IT governance practices in Delphi study, they applied a widely used scale (Luftman, 2000; Luftman et al., 2013), to measure the maturity of practices in their case study. Sledgianowski, Luftman, and Reilly (2006) calculated Cronbach's alpha equals 0.73 for measure governance practices that is the scale used in this study.

The data collection instrument used to measure the Business-IT Alignment in this research is designed by Bergeron et al. (2004). The authors concluded that "the constructs were shown to be reliable and valid overall" (Bergeron et al., 2004, p. 1010). From their

study, they determined the unidimensional correlation of the constructs and ρ values are 0.86 for business strategy, 0.60 for business structure, 0.71 for IT strategy and 0.90 for IT structure. In terms of reliability, the authors calculated the Cronbach's alpha to each one of the variables of the construct, with the following values: 0.70 for aggressiveness, 0.90 for analysis, 0.65 for defensiveness, 0.85 for futurity, 0.69 for proactiveness, 0.40 for riskiness, 0.81 for IT environment scanning, 0.85 for strategic use of IT, 0.91 for IT planning and control, and 0.87 for IT acquisition and implementation of IT. The above values are closed to one, which supports the internal consistency of the instrument scale. However, specifically in this study is necessary to conduct a pilot study to confirm the validity and reliability of this study.

Summary

This chapter describes the methodology to be used for the development of this study, detailing the research questions, assumptions, statistical methods and general aspects to be consider for data collection (population, sample characteristics, instrument, confidentiality, validity, etc.) after that the processing further analysis. The research model was raised, constructs, dimensions and variables were defined, the measuring elements were taken from questionnaires developed by other researchers (Bergeron et al., 2004; De Haes & Van Grembergen, 2009a; Venkatraman, 1989).

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Appendix A: Invitation to participate in the study

Estimado participante,

Mi nombre es Weimar Santos Castellanos, soy estudiante doctoral de Centrum Graduate Business School de la Pontificia Universidad Católica del Perú y de Maastricht School of Management de Holanda. Estoy desarrollando la investigación titulada, "Impacto del Gobierno de Tecnologías de Información (TI) en el alineamiento de Negocio y de TI".

El propósito de esta comunicación es invitarlo a usted a participar en una encuesta que ayudaría a incrementar el conocimiento sobre la medida en que El gobierno de TI afecta la alineación de negocio y de TI. El estudio explorará la relación entre las prácticas de gobierno de TI y la alineación de negocio y TI.

La gobernabilidad de TI y la alineación de negocio y de TI, están documentadas en la literatura como un proceso crítico en las organizaciones, que les permiten alcanzar los objetivos de negocio y con ello se tiene el potencial para aumentar la eficiencia y la ventaja competitiva.

Como se indica claramente en el formulario de consentimiento informado adjunto, tenga en cuenta que su nombre, la organización y sus propios datos no van a aparecer en cualquier dato o informe generado a partir de sus respuestas. Códigos e identificadores serán asignados a todas las respuestas para los propósitos de tratamiento, análisis estadístico y presentación de informes. Puede estar usted seguro de la confidencialidad y el anonimato de su información. Todos los materiales de investigación serán administrados únicamente por el investigador y serán almacenados y protegidos en lugar seguro.

Los materiales electrónicos estarán protegidos con contraseña. Puede retirarse en cualquier momento, su participación en esta investigación es estrictamente voluntaria. También puede solicitar que sus datos se destruyan en cualquier momento sin repercusiones.

La dirección electrónica adjunta le llevará a la encuesta que hace preguntas acerca de su percepción de las prácticas de gobierno de TI y la alineación entre su organización y las TI. Le pido que siga el enlace y pueda contestar el cuestionario.

Esta investigación se lleva a cabo bajo la supervisión de la Dra. Beatrice Avolio. Si usted tiene alguna pregunta o inquietud acerca de cómo completar la encuesta o sobre la participación en este estudio, puede comunicarse conmigo al (número de teléfono) o en (dirección de correo electrónico). Si usted tiene alguna pregunta sobre sus derechos como sujeto de investigación, puede comunicarse con el Comité Doctoral de Centrum Graduate Business School de la Pontificia Universidad Católica del Perú al (número de teléfono) o en (dirección de correo electrónico)

Muchas gracias de antemano por tu participación.

Cordialmente,

Weimar Santos Castellanos

Estudiante Doctoral
Centrum Graduate Business School
Pontificia Universidad Católica del Perú

El siguiente es el enlace al cuestionario:
(Link al cuestionario)
O por favor copie y pegue el enlace en su navegador de Internet:
(Link al cuestionario)

Appendix B: Informed Consent Form

CONSENTIMIENTO INFORMADO

Me comprometo a participar en el estudio titulado "Impacto del Gobierno de Tecnologías de Información (TI) en el alineamiento de Negocio y de TI", el cual es conducido por Weimar Santos Castellanos, bajo la supervisión de la Dra. Beatrice Avolio. Entiendo que la participación en esta investigación es estrictamente voluntaria, que puedo retirar mi consentimiento en cualquier momento, así como también puedo solicitar que mis datos se destruyan en cualquier momento sin repercusiones.

Me han explicado lo siguiente:

El propósito de la investigación es estudiar la relación entre las prácticas de gobierno de TI y la alineación de negocio y TI. La gobernabilidad de TI y la alineación de negocio y de TI, están documentadas en la literatura como un proceso crítico en las organizaciones, que les permiten alcanzar los objetivos de negocio y con ello se tiene el potencial para aumentar la eficiencia y la ventaja competitiva.

No se prevé tener ningún tipo de estrés o situación incómoda.

No hay ningún riesgo.

Estoy de acuerdo con los siguientes procedimientos:

Responder el cuestionario sobre aspectos demográficos de la organización, las prácticas de gobierno de TI y aspectos de alineación de negocio y de TI.

La información que yo provea se mantendrá confidencialidad y anónima, mi información no será publicada en ninguna forma que sea personalmente identificable sin mi previo consentimiento.

El investigador responderá a cualquier pregunta adicional, en este momento o durante el transcurso del proyecto.

Nombre del Investigador	Nombre del Participante

Firma del Investigador / Fecha	Firma del Participante / Fecha

POR FAVOR, FIRMAR AMBAS COPIAS, RETENER UNA Y DEVOLVER LA OTRA AL INVESTIGADOR

Appendix C: Research Instrument

Instrucciones

La información que proporcione no será utilizada para identificar a su empresa.

Existen múltiples formatos de respuesta, en algunas se debe escribir un número, mientras que las respuestas a algunas preguntas están en diferentes escalas de medición, tales como estar en desacuerdo o de acuerdo. ***Seleccione solo una respuesta por cada pregunta***.

Agradecemos su amabilidad por responder el cuestionario que sigue. Una vez más, muchas gracias su participación es muy apreciada.

SECCIÓN 1: ASPECTOS DEMOGRÁFICOS Y DE ESCTRUCTURA ORGANIZACIONAL			
1	Sector:	(1) Manufactura, (2) Servicios Financieros, (3) Tecnologías de la Información y Comunicaciones, (4) Servicios de Salud, (5) Educación, (6) Energía, (7) Consumo Masivo, (8) Transporte, (9) Comercial, (10) Químico- Farmacéutico, (11) Otro.	
2	Número de empleados		
3	Número de normas, procesos y procedimientos que se encuentran documentados		
4	Número de empleados con cargo directivo		
5	Número de empleados con título profesional		
6	Número de especialidades distintas en la planta de personal		
7	Número de niveles organizacionales que se encuentran bajo el director ejecutivo		

SECCIÓN 2: PRÁCTICAS DE GOBIERNO DE TECNOLOGIAS DE INFORMACIÓN
En la siguiente sección seleccione una sola alternativa, evaluando el grado de madurez de la práctica de gobierno de TI, en la siguiente escala:
0 – Inexistente: Ausencia completa de cualquier proceso reconocible. La empresa ni siquiera ha reconocido que hay un problema que gestionar.
1 – Inicial: Hay evidencia de que la empresa reconoce que existe el problema y que hay que abordarlo. Sin embargo, no hay procesos estandarizados. En su lugar hay enfoques ad hoc que tienden a aplicarse de forma individual o caso por caso. La aproximación general a la gestión es desorganizada.
2 – Repetible: Los procesos están desarrollados hasta el punto que procedimientos similares son seguidos por personas diferentes ejecutando la misma tarea. No hay capacitación formal o comunicación de los procedimientos estándar, y la responsabilidad se deja a la persona de forma individual. Hay un alto grado de dependencia en el conocimiento individual y, por lo tanto, los errores son probables.
3 – Definido: Se han estandarizado, documentado y comunicado los procedimientos mediante formación. Es obligatorio seguir estos procedimientos, sin embargo es poco probable que se detecten desviaciones. Los procedimientos no son sofisticados en sí mismos, pero sí la formalización de las prácticas existentes.
4 – Gestionado: Los responsables de la gestión monitorean y miden el cumplimiento con procedimientos y llevan a cabo acciones donde los procesos parecen no estar funcionando con efectividad. Los procesos están bajo constante mejora y proporcionan buenas prácticas. Automatización y herramientas son usadas de forma limitada o fragmentada.
5 – Optimizado: Los procesos han sido refinados a nivel de buena práctica, sobre la base de los resultados de mejora continua y de modelado de madurez con otras empresas. Las TI se usan de forma integrada para automatizar los flujos de trabajo, proporcionando herramientas para mejorar la calidad y la efectividad, haciendo a la empresa rápida para adaptarse.

SECCIÓN 2: PRÁCTICAS DE GOBIERNO DE TECNOLOGIAS DE INFORMACIÓN							
		COBIT	ISO 38500	Calder - Moir	Ninguno		
		1	2	3	4		
7	Marco de Gobierno de TI utilizado						

		Inexistente	Inicial	Repetible	Definido	Gestionado	Optimizado
		0	1	2	3	4	5
8	Comité a nivel de la junta directiva para garantizar que TI es tema regular de la agenda y produce informes para la junta directiva.						
9	Los miembros de la junta directiva tienen conocimientos y experiencia en relación con el valor y el riesgo de TI.						
10	Comité independiente a nivel de la junta directiva con visión panorámica de actividades de auditoría TI.						
11	El director de TI o quien haga sus veces es un miembro tiempo completo del comité ejecutivo.						
12	El director de TI o quien haga sus veces tiene una línea de reporte directa con el gerente y/o director ejecutivo.						
13	El comité de dirección ejecutiva o a la alta dirección es responsable de determinar las prioridades de negocio en las inversiones en TI.						
14	Dependencia con función en la organización responsable de promover, conducir y gestionar los procesos de gobierno de TI.						
15	Dependencia con función responsable de la seguridad, el cumplimiento y / o de riesgo, los posibles impactos de TI.						
16	Comité de dirección compuesto por personas de negocios y de TI centrado en la priorización y la gestión de proyectos informáticos.						
17	Comité de dirección compuesto por personas de negocios y de TI centrado en los riesgos relacionados con las TI y las cuestiones de seguridad.						
18	Comité compuesto por personas de negocios y de TI que proporcionan orientaciones sobre la arquitectura de TI y asesoran sobre sus aplicaciones.						
19	Documentación de roles y responsabilidades que incluye tareas de gobierno / alineación para personal de negocios y de TI.						
20	Proceso formal para definir y actualizar la estrategia de TI.						
21	Medición del rendimiento de TI en los dominios de la contribución corporativa, la orientación del usuario, la excelencia operativa y la orientación futura.						
22	Proceso de priorización de las inversiones y proyectos de TI, en los cuales están involucrados el negocio						

	y TI (incl. los casos de negocios)						
23	Metodología para cargar los costos de TI a las unidades de negocio, para permitir una comprensión del costo total de propiedad.						
24	Acuerdos formales entre el negocio y TI sobre proyectos de desarrollo de TI para las operaciones de TI.						
25	Procesos basados en marco de control y gobierno de TI.						
26	Autoevaluaciones regulares o actividades de aseguramiento independientes en el gobierno y control sobre TI.						
27	Procesos y metodologías para gobernar y administrar proyectos de TI.						
28	Procesos para controlar e informar sobre los presupuestos de TI.						
29	Procesos para monitorear los beneficios previstos durante y después de la implementación de las inversiones y proyectos de TI.						
30	Marco para el control interno.						
31	Personal de TI trabaja en las unidades de negocio y recurso humano de unidades de negocio trabaja en TI.						
32	Localización física de personas de negocio y de TI cercana entre sí.						
33	Formación a la gente de negocios sobre TI y / o formación en negocios a la gente TI.						
34	Sistemas para compartir y distribuir el conocimiento sobre el marco de gobierno de TI, responsabilidades, tareas, etc.						
35	Cerrar la brecha entre el negocio y TI a través de gestores de cuentas que actúan como intermediarios.						
36	El alto nivel de negocios y la gestión de TI actúan como "socios".						
37	Reuniones informales, sin agenda, donde alto nivel de los negocios y de gestión TI charla sobre las actividades generales, direcciones, etc. (por ejemplo, durante los almuerzos informales)						
38	Capacidad del director de TI o quien hace sus veces, para articular una visión para el rol de TI en la empresa y asegurar que esta visión esté claramente entendida por los administradores de toda la organización.						
39	La comunicación interna de la empresa se ocupa de regular las cuestiones generales de TI.						
40	Existen campañas para explicar a la						

	gente de negocios y de TI la necesidad del gobierno de TI.						

SECCIÓN 3: ESTRATEGIA DE NEGOCIOS								
		Totalmente en desacuerdo	En desacuerdo	Algo en desacuerdo	Ni de acuerdo ni en desacuerdo	Algo de acuerdo	De acuerdo	Totalmente de acuerdo
		1	2	3	4	5	6	7
41	Sacrificamos rentabilidad para ganar cuota de mercado							
42	Reducimos los precios para aumentar la cuota de mercado							
43	Ajustamos precios por debajo de la competencia							
44	Buscamos cuota de mercado a expensas de flujo de caja y rentabilidad							
45	Hacemos hincapié en la coordinación efectiva entre las diferentes áreas funcionales							
46	Los sistemas de información proporcionan apoyo a la toma de decisiones							
47	Cuando enfrentamos una decisión importante, por lo general tratamos de desarrollar análisis exhaustivo							
48	Usamos técnicas de planificación							
49	Usamos las salidas de sistemas de información de gestión y de control							
50	Se realiza planificación de Recursos Humanos y evaluación del desempeño de los altos directivos							
51	Hacemos modificaciones importantes de la tecnología de producción							
52	Usamos sistemas de control de costos para el control del desempeño							
53	Usamos técnicas de gestión de la producción							
54	Hacemos énfasis en la calidad del producto mediante el uso de los círculos de calidad							
55	Nuestros criterios para la asignación de recursos en general, reflejan consideraciones a corto plazo							
56	Hacemos hincapié en la investigación básica que nos proporcione en el futuro ventaja competitiva							
57	Se realiza previsión de indicadores clave de las operaciones							
58	Se hace seguimiento formal de las tendencias importantes de carácter general							
59	Se hace el análisis "Qué pasaría si..." de temas críticos							

60	Estamos en constante búsqueda de nuevas oportunidades relacionadas con las operaciones actuales							
61	Por lo general, somos los primeros en introducir nuevas marcas o productos en el mercado							
62	Estamos siempre en la búsqueda de empresas que pueden ser adquiridas							
63	Los competidores en general, nos adelantan mediante la ampliación de su capacidad							
64	Las operaciones en etapas más grandes de ciclo de vida se eliminan estratégicamente							
65	Nuestras operaciones se pueden caracterizar en general como de alto riesgo							
66	Parece que adoptamos una visión bastante conservadora cuando se toman decisiones importantes							
67	Los nuevos proyectos son aprobados con base en "etapa por etapa" en lugar de aprobación "en general"							
68	Existe una tendencia a apoyar proyectos en los que los rendimientos esperados son ciertos							
69	Las operaciones siguen en general rutas "probadas"							

SECCIÓN 4: ESTRUCTURA Y ESTRATEGIA DE TI								
		Totalmente en desacuerdo	En desacuerdo	Algo en desacuerdo	Ni de acuerdo ni en desacuerdo	Algo de acuerdo	De acuerdo	Totalmente de acuerdo
		1	2	3	4	5	6	7
70	Usamos una red de información externa para identificar necesidades en tecnología de la información							
71	Conocemos las TI utilizadas por la competencia							
72	Instituimos la vigilancia tecnológica con el fin de cambiar rápidamente las TI cuando sea necesario							
73	Nos aseguramos que la elección de las TI sigue la evolución del entorno							
74	Usamos las TI que permiten una rápida reacción a la presión del entorno							
75	Usamos las TI para reducir los costos de producción							
76	Usamos las TI para hacer ahorros sustanciales							
77	Usamos las TI para mejorar la productividad de la empresa							
78	Usamos las TI para mejorar la rentabilidad de la empresa							
79	Usamos las TI para mejorar la							

	calidad de los productos o servicios							
80	Usamos las TI para respetar los plazos solicitados por los clientes							
81	Tenemos dominio de los productos de TI actuales							
82	Mantenemos control sobre los proyectos involucrados con la adquisición de nuevas tecnologías							
83	Somos considerados como líderes en el uso de TI							
84	Desarrollamos de una cultura tecnológica en la empresa							
85	Contamos con los recursos humanos y organizacionales necesarios para gestionar los sistemas de información							
86	Tenemos la capacidad para identificar con eficacia y cubrir las necesidades en TI							
87	Tenemos una planificación estratégica de sistemas de información relacionada con los objetivos del negocio							
88	Tenemos el dominio de la tecnología que actualmente está en uso en la organización							
89	Existe un sistema distribuido para compartir información dentro de la empresa							
90	Existe un enfoque estructurado para adquirir los sistemas de información necesarios							
91	Usamos criterios de selección específicos para la adquisición de nuevos sistemas de información							
92	Usamos instrumentos financieros en la planificación de la adquisición de nuevos sistemas de información							
93	La elección de las TI está relacionada con la orientación estratégica de la empresa							
94	Conocemos el impacto que tendrán las TI sobre las diferentes funciones de la empresa							
95	La evaluación de los posibles problemas está relacionada con la orientación estratégica de su empresa							
96	Conocemos los resultados de un estudio de viabilidad financiera antes de la adquisición de TI							
97	Identificamos las posibles fuentes de resistencia al cambio antes de la implementación de TI							
98	Evaluamos la aptitud del empleado para utilizar las TI seleccionadas							

Appendix D: Permission for Use of Research Instrument

Bergeron François <[redacted]> 15 abr.

para mi

Dear Mr Castellanos,
I think that you chose a very interesting topic for your dissertation. I am pleased to authorize you to translate and use the research instrument.
Best regards,

François Bergeron, PhD.
Professeur de Gouvernance des technologies de l'information
ESA - TELUQ| [redacted] | Université du Québec| [redacted] | Québec (QC), Canada [redacted] | [redacted]
[redacted]

De : Weimar Santos Castellanos [weimar.santos@gmail.com]
Envoyé : vendredi 15 avril 2016 12:00
À : Bergeron François
Objet : Permission

Appendix E: Informe de Conformidad del Asesor sobre la Propuesta de Investigación

Por el presente documento el suscrito, en su calidad de asesor de la Disertación Doctoral o de la Propuesta de Investigación del estudiante: Weimar Santos Castellanos

Quien ha elaborado el trabajo denominado: Impact of the Information Technology (IT) Governance on Business-IT Alignment.

Manifiesta que ha asesorado, revisado y calificado el Trabajo de Investigación Final-Tesis, encontrándolo Apto para ser entregado al Comité Doctoral para proceder a su Defensa Pública, en los siguientes aspectos:

( ) Gramática y redacción
( ) Forma según el *Manual de Estilo de Publicaciones de la APA* (APA, 2010) en su 6ª edición.
( ) En los aspectos de fondo del tema doctoral propuesto.

Como asesor, confirmo haber revisado integralmente los aspectos de forma y de fondo de la Propuesta de Investigación adjunta y que se ajusta a los lineamientos solicitados por el programa doctoral:

Nombres y apellidos:	
Fecha:	
Firma:	

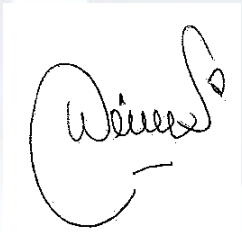
Appendix F: Informe de Declaración de Revisión de Estilo, Redacción y Gramática

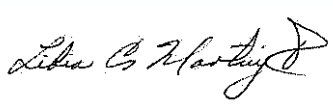
Por el presente documento, el alumno del Programa Doctoral Weimar Santos Castellanos, identificado con DNI 79.467.765, del programa DBA II Colombia quien ha elaborado el Research Proposal titulado: Impact of the Information Technology (IT) Governance on Business-IT Alignment
para optar el grado de Doctor en Administración Estratégica de Empresas otorgado por la Pontificia Universidad Católica del Perú, declara que el presente trabajo de tesis ha sido íntegramente elaborado por el mismo y que en el no existe plagio de ninguna naturaleza, en especial copia de otro trabajo de tesis o similar presentado por cualquier persona ante cualquier instituto educativo o no.

Además, deja expresa constancia que el documento ha sido revisado por un corrector de estilo de redacción y de gramática- Se adjunta la constancia de revisión.

Asimismo, afirma que es plenamente consciente de todo el contenido de la tesis doctoral. Por ello, asume la responsabilidad de cualquier error u omisión en el documento y es conscientes que este compromiso de fidelidad de la tesis tiene connotaciones éticas, pero también de carácter legal.

En caso de incumplimiento de esta declaración, nos sometemos a lo dispuesto en las normas académicas de la Pontificia Universidad Católica del Perú.

Nombre del alumno	Weimar Santos Castellanos
Firma del alumno	
Fecha	29/11/2016

Nombre del revisor de estilo	Libia Consuelo Martínez Rivera
Firma del revisor	
Fecha de revisión.	29/11/2016

Chapter IV: Results

Introduction

As mentioned earlier, this doctoral thesis is made up of six parts: (a) the Abstract and Resumen Ejecutivo; (b) the Table of Contents; (c) the Research Proposal (RP), which was defended earlier; (d) the Results, made up of the accepted or published research paper presenting the doctoral research results; (e) the Conclusions and Recommendations; and (f) the Appendices. The abstract presents the research purpose, the research method, and the main finding in a maximum of 250 words: the new doctoral contribution to management science.

Chapter IV the thesis contains an identical copy of the accepted or published research paper. The requirement by CENTRUM PUCP is that the research paper should be accepted or published in a Q1 to Q3 Scopus journal before the doctoral student can defend his/her thesis. The authorship of the paper should show the student´s name as the first author. Then other name(s) can also appear, must notably the name of the thesis advisor, and a co advisor. The paper must be published in English.

As stated earlier, this paper, as it should be, includes all the details that appear in the journal where it will be published o where it has been published: article title, author(s) name(s), abstract, keywords, paper contents, including the results, where the doctoral contribution to the management science should be included. It also includes the Conclusions, and the list of References.

Research Paper Published

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Impact of Information Technology (IT) Governance on Business-IT Alignment

Impacto del gobierno de las Tecnologías de Información (TI) en el alineamiento entre negocio y TI

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ABSTRACT

Purpose: This basic, quantitative, descriptive, cross-sectional research aims to empirically examine the impact of IT governance on business-IT alignment. Method: This study adopts the Structural Equation Model (SEM) technique with Confirmatory Factor Analysis (CFA) to evaluate the relationship between IT governance and business-IT alignment, testing three basic hypotheses on the data collected from 672 web-based surveys of companies in Colombia. Main finding: IT governance significantly and directly affects business-IT alignment, but there are no differences in such influence as per industry type or company size. Limitations: This study only considered companies located in Colombia with a limited sample size in several industry types, which may become a possibility for further studies. Additionally, the data collected relies on the honesty of respondents and is not completely free of bias.

Keywords: IT governance, business-IT alignment, strategic alignment

RESUMEN

Objetivo de la investigación: El propósito de esta investigación básica, cuantitativa, descriptiva y transversal es examinar empíricamente el impacto de la gobernanza de TI en el alineamiento de negocio y TI. Metodología: Este estudio adopta la técnica Modelo de Ecuaciones Estructurales (SEM) con Análisis Factorial Confirmatorio (CFA) con el fin de evaluar la relación planteada entre gobierno de TI y alineamiento de negocio y TI, poniendo a prueba tres hipótesis básicas, usando los datos recolectados procedentes de 672 encuestas realizadas vía web a empresas en Colombia. Hallazgos: Este estudio encontró que el gobierno de TI afecta de manera significativa y directa la alineación de negocio y de TI, pero no existen diferencias en dicha influencia entre tipos de industria y tamaños de empresa. Limitaciones: Este estudio solo tomó en cuenta empresas localizadas en Colombia con limitación en tamaño de muestra en varios sectores de actividad, lo que puede constituirse como una posibilidad para estudios posteriores. Adicionalmente, los datos recolectados están basados en la honestidad de los encuestados y no están completamente libres de sesgo.

Palabras clave: Gobierno de TI, Alineamiento de negocio y TI, alineamiento estratégico

1. INTRODUCTION

Information technologies (IT) are one of the key factors in organizational competitiveness (Weill *et al.* 2002), along with processes, investments, expenses, IT assets (hardware, software and communications networks), and the firms' knowledge to provide technological services (Aduloju 2014; Mardikyan 2010). This is why organizations increasingly depend on IT and their capabilities to efficiently integrate IT resources into other organizational and management processes (Zhang *et al.* 2016). As a result, the IT management approach in many organizations has evolved from an operational support role to a more strategic role involving aspects such as business transformation, innovation, and obtaining IT-based business opportunities (Tanriverdi *et al.* 2010).

Since an organization's strategic IT management is increasingly based on its IT governance (ITG) (Caluwe and De Haes 2019; Cervone 2017; Kude *et al.* 2018), it is necessary to achieve adequate business and IT alignment (BITA) given its positive effects on business performance (Gerow *et al.* 2014; Wagner *et al.* 2014; Yayla and Hu 2012). Organizations will operate better when key IT resources are aligned with the business strategy and when appropriate structures are used to monitor the deployment and effective management of these resources (Coltman *et al.* 2015).

Despite the abundant body of knowledge of ITG and BITA, there is a need for describing and explaining the nature and scope of the relationships between ITG and strategic BITA, as well additional empirical evidence that allows for an integrated understanding of such relationship (De Haes and Van Grembergen 2009; Raymond *et al.* 2019). This leads to the following research questions: What is the impact of ITG practices on BITA? And consequently, will there be any differences in that impact depending on industry type or company size?

In response to the above questions, the research objectives are formulated: a) to study the direct effect of ITG on BITA, and b) to examine the moderating effects of industry type and company size on the relationship between ITG and BITA. To achieve these two objectives, an empirical research model was developed and tested using a Structural Equation Model (SEM), using survey data from a sample of 672 Colombian companies. It was found that ITG has a positive effect on BITA and there are no differences in the relationship according to industry type and company size.

The rest of the article is divided as follows: Section 2 presents the literature review and the following section shows the theoretical background, hypotheses, and research model. Section 4 then expounds on the research method. Section 5 contains the empirical results obtained from the analysis of the SEM method. The last section presents the conclusions, describes the limitations of the study, discusses the contributions and implications for future research, and provides some closing remarks.

2. LITERATURE REVIEW

This study is based on three research streams in the literature on IT business use: (1) the components and practices of ITG (Caluwe and De Haes 2019; Lunardi *et al.* 2017); (2) the BITA model and its measurement (Gerow *et al.* 2014; Jia *et al.* 2018; Zhang *et al.* 2018), and (3) the relationship between ITG and BITA (De Haes and Van Grembergen 2009; Héroux and Fortin 2018). As discussed in the introduction, there is still a need for knowledge that involves the measurement of ITG practices and their ability to generate BITA.

This study was based on recent articles that reviewed the literature on each construct. In the case of ITG, the definitions and mechanisms or practices of ITG studied by Levstek, Hovelja, and Pucihar (2018) were reviewed. The research gap raised by Caluwe and De Haes (2019) on the uncertainty of ITG consequences was also taken into account. In the case of BITA, the 5W1H (When, Who, What, Why, Where, How) analysis by Zhang, Chen, and Luo (2018) was considered to understand BITA from the perspective of the company's architecture. Likewise, this study analyzes the four main research topics on BITA (model, measurement, background, and dynamics) suggested by Jia, Wang, and Ge (2018).

2.1. IT Governance (ITG)

Academic and practitioner literature has addressed the issue of ITG since the 1990s, focusing on two perspectives, one that analyses it as a derivation of corporate governance and another that sees it as a determining factor of the alignment between business objectives and IT (Balocco *et al.* 2013). ITG can be understood as part of corporate governance that enables the IT function to add value to the business by controlling the risks associated with IT processes and making better use of available technology resources (IT Governance Institute 2003). However, ITG is not an easy notion to understand, and previous research has examined different aspects of ITG in various contexts that often have different interpretations (Buchwald *et al.* 2014).

In a longitudinal study on large enterprises, Peterson (2004) offered a roadmap for the IT Governance Assessment Process (ITGAP), which has four stages: "(1) Describe and assess ITG value drivers, (2) Describe and assess the differentiation of IT decision-making authority for the portfolio of IT activities, (3) Describe and assess the capabilities of ITG, and (4) Describe and assess IT value realization" (Peterson 2004, p. 20).

Weill and Ross (2004) defined ITG in the following terms: "Specifying the decision rights and accountability framework to encourage desirable behavior in the use of IT" (p. 8). According to these authors, ITG is a framework of interaction among three key components: the first is known as structures that derive from business units, functions, roles, and responsibilities for proper IT decision-making. The second is processes, which refer to the design of procedures for implementing management following IT strategies and policies. The last component is relational mechanisms, which are considered the devices that look for opportunities to guarantee the effectiveness of ITG implementation.

Derived from studies by Van Grembergen *et al.* (2004), Peterson (2004), Weill and Ross (2004) and De Haes (2007), De Haes and Van Grembergen (2008) argued that, "IT governance can be deployed using a mixture of various structures, processes, and relational mechanisms" (p. 1). ITG structures "include

structural (formal) devices and mechanisms for connecting and enabling horizontal, or liaison, contacts between business and IT management (decision-making) functions" (Peterson 2004, p. 14). ITG processes have to do with "formalization and institutionalization of strategic IT decision-making or IT monitoring procedures" (Peterson 2004, p. 15). ITG relational mechanisms are understood as "the active participation of, and collaborative relationships among, corporate executives, IT management, and business management" (Peterson 2004, p. 15).

Caluwe and De Haes (2019) set out to find knowledge gaps in board-level ITG at the, summarizing existing research and identifying opportunities for future research. Such a study found that at the level of ITG structures there is extensive research on background and consequences. It concluded that there is little research available on ITG processes, as well as on ITG relational mechanisms. This suggests that while ITG structures are quite clear and described in detail in previous research, little was found about ITG processes and relational mechanisms (Caluwe and De Haes 2019). This study leverages this gap and seeks to study and measure ITG in its three dimensions together (structures, processes, and relational mechanisms).

2.2. Business-IT Alignment (BITA)

BITA is defined as the degree of alignment between IT and business strategy (Jia *et al.* 2018) and has been a concern of senior management for decades (Queiroz 2017). This can be seen, for example, in the study by Luftman *et al.* (2013) in which they state that BITA has consistently been ranked as one of the top three challenges for scholars, IT professionals, and business executives over the past three decades, showing that BITA remains the ultimate goal of organizations. This is not so easy to achieve and, as such, it has become the main concern of IT management in the US and Europe, the second in Latin America and the sixth in Asia. However, despite much research, the effect of IT strategic alignment on organizational performance remains evident (Gerow *et al.* 2016, 2015; Sabherwal *et al.* 2001; Yayla and Hu 2012), but with mixed results in the literature (Queiroz 2017).

In a bibliometric review of literature on BITA, Jia *et al.* (2018) identify four relevant BITA research factors, model, measurement, background, and dynamics. The first factor referred to is the BITA model. In a widely publicized study, Henderson and Venkatraman (1993) characterized the strategic alignment model (SAM) as describing all possible alignment relationships among four key components: business strategy, IT strategy, business infrastructure and processes, and IT infrastructure and processes.

The second BITA factor analyzed is how alignment is measured. There have been many methods for measuring BITA but the existing ones are based on a static perspective. In essence, each method is different and can lead to different types of results (Jia *et al.* 2018). For example, Luftman (2000) designed a widely publicized survey based on the SAM model, while Bergeron *et al.* (2004) present a form of alignment measurement that attempts to explain the impact of various factors on alignment and at the same time its impact on organizational performance.

The third factor is the BITA background; Jia *et al.* (2018) identify numerous BITA antecedents that subsequently group into four dimensions (social, cultural, strategic, and structural). Within the various BITA antecedents studied, some ITG practices can be found but these studies deal with individual effects of some ITG practices on BITA and not the joint effect of ITG practices (structures, processes, and relational mechanisms) on BITA.

The fourth factor is the BITA dynamics; Chan and Reich (2007) argued that there are two basic ways of looking at alignment. The first way is to appreciate alignment as a continuous process, which is subject to variations resulting from decisions made, adjustment of adopted strategies over time, and improvement of IT management capabilities. The second way is alignment as a final state, which is conceived as resulting from either action taken or the strategies the organization has planned.

Thus, in this research, BITA is reviewed from the perspective of alignment measurement, taking into account the proposal of Bergeron *et al.* (2004) and not that of Luftman (2000) since ITG maturity is one of its dimensions, causing endogeneity. From the perspective of BITA dynamics, this study, given its cross-sectional nature, looks at the current state of alignment in the organization and not its continuous process.

2.3. Relationship between ITG and BITA

In different studies (De Haes and Van Grembergen 2004; Van Grembergen 2004; Van Grembergen *et al.* 2004; Van Grembergen and De Haes 2008), the authors collected previous studies and suggested that ITG can be implemented through a combination of structures, processes, and relational mechanisms. They then suggested that there is a relationship between ITG and BITA (De Haes and Van Grembergen 2009).

Some authors have taken up in many ways the formulation of De Haes and Van Grembergen (2009) on the implementation of TI governance practices. Kuruzovich, Basselier, and Sambamurthy (2012) assessed how the strategic importance of IT influences the governance practices of IT involving the board of directors and how they affect IT alignment. Besides, Ping-Ju Wu *et al.* (2015) examined how ITG mechanisms and strategic alignment influence organizational performance.

Asante (2010) studied how the ITG structures (Focused, Decentralized, and Federal) established by Weill and Ross (2004) impact the maturity of IT strategic alignment, using Luftman's model (2000). Harguem, Karuranga, and Mellouli (2014) empirically proved through a quantitative study in US companies that ITG mechanisms positively affect the organization's global IT management capabilities, contributing to improved strategic alignment that could be reflected in the organization's performance.

As can be seen, the authors have used each of the ITG practices separately. There is consensus that organizations should use ITG mechanisms, but few researchers attempt to describe and provide a complete explanation for ITG mechanisms or practices (Levstek *et al.* 2018). For this reason, this study attempts to assess ITG practices or mechanisms (structures, processes, and relational mechanisms) together to observe their impact on BITA.

3. THEORETICAL BACKGROUND, HYPOTHESIS, AND RESEARCH MODEL

Seminal researchers have argued that organizations that actively seek to plan and implement ITG structures perform significantly better than those that do not consider ITG (Van Grembergen and De Haes 2008; Weill *et al.* 2002; Weill and Ross 2004). Other authors argue that alignment, communication, and the relationship between IT and business are important aspects to consider in the implementation of ITG (Alreemy *et al.* 2016).

In a qualitative exploratory study, Buchwald *et al.* (2014) affirmed that the greater the success of ITG, the greater the alignment of business and IT objectives. De Haes and Van Grembergen (2009) suggested that the maturity of BITA is greater when organizations apply a combination of mature ITG practices (structures, processes, and relational mechanisms).

Therefore, it can be assumed that better ITG development will result in the firm's ability to achieve a better level of BITA. Under the previous arguments, the following hypothesis can be formulated:

H1: IT governance has an impact on business-IT alignment

From the above description, the characteristics of the organization could influence the specified relationship. In this regard, previous researchers have argued that "it is acknowledged that the use of ITG practices might be different in different types of industries" (De Haes and Van Grembergen 2009, p. 125). Similarly, other researchers on strategic alignment (Chan *et al.* 2006; Chan and Reich 2007; Luftman *et al.* 2008; Tallon and Pinsonneault 2011) argued that this relationship is conditioned by industry type. This leads to the following hypothesis:

H2: There is a difference in the impact of IT governance on business-IT alignment depending on industry type.

Small and medium-sized enterprises (SMEs) evolving in a dynamic environment are characterized by an unpredictable market and technological change and face more pressures than large companies in the same environment (Raymond *et al.* 2019). Concerning ITG, most theories and frameworks have been criticized as being more appropriate to large enterprises and less so to SMEs (Bergeron *et al.* 2015). In fact, in their study on the effect of ITG on organizational performance, Liang *et al.* (2015) stated that ITG is most practiced in large enterprises. Some authors argue that IT adoption is faster in large firms than in SMEs because large firms assume that ITG practices or mechanisms create value for the business, while in SMEs, decision-making is primarily focused on one person (Levstek *et al.* 2018).

In terms of alignment, there are different views. Chan *et al.* (2006) found that firm size is related to BITA, but not in all industry types. Chan and Reich (2007) suggested that certain components of alignment occur in small rather than medium-sized firms. Gutiérrez, Orozco, and Serrano (2009) concluded that the factors considered necessary to achieve alignment are relevant to all organizations, regardless of their size. Charoensuk, Wongsurawat, and Khang (2014) found that company size acts as a moderator rather than a predecessor to BITA. Shihab and Rahardian (2017) found that organizations of different sizes differ significantly in their approach to alignment. The above information leads to the following hypothesis:

H3: There is a difference in the impact of IT governance on business-IT alignment depending on company size.

The purpose of this research is to further explain the effects of ITG implementation on BITA, as shown in Figure 1. The proposed framework involves examining the interrelationship between two fundamental structures. First, about ITG practices, this study is based on De Haes and Van Grembergen's approach (2009), which involves three basic elements: structures, processes, and relational mechanisms. These ITG practices correspond to variables that measure maturity, "This maturity assessment was based on a generic maturity model as proposed by the IT Governance Institute (2003), providing a scale from 0 (non-existent) to 5 (optimized)" (De Haes and Van Grembergen 2009, p. 127).

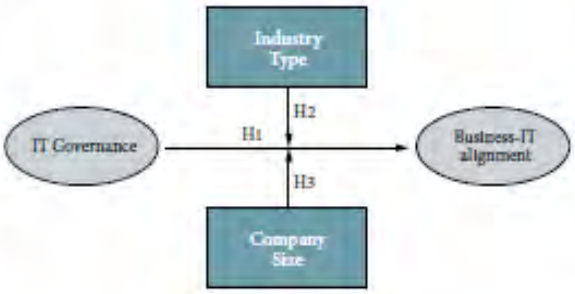

Figure 1
Theoretical Framework
Source: Own elaboration.

Secondly, in the case of BITA, this study employs a measurement model with a holistic approach as proposed by Bergeron *et al.* (2004), which evaluates BITA from four perspectives: business strategy, IT strategy, business structure, and IT structure. The business strategy dimension includes a 7-point scale instrument called Strategic Business Orientation (STROBE), developed by Venkatraman (1989) to measure strategic orientation, and consists of six components: aggressiveness, analysis, defensiveness, futurity, proactivity, and riskiness.

Based on the study by Damanpour (1991), Bergeron *et al.* (2004) argued that the most common structural dimensions in organizational theory and Information Systems studies are formalization, centralization or administrative intensity, professionalization, specialization, and vertical differentiation. Bergeron *et al.* (2004) suggested that IT strategy includes two components, one of which, the analysis of the IT environment, refers to how the firm can detect and react to technological changes compared to its competitors. The second concerns the strategic use of IT and measure how IT implementation increases quality, competitiveness, and business performance.

According to Bergeron *et al.* (2004), the IT structure has two components. The first is IT planning and control, which shows how the company manages its IT function, resources, and infrastructure concerning its competitors. The second component is IT acquisition and implementation, which refers to how the firm manages the selection and introduction of new IT applications.

4. METHOD

4.1. Research design

This research studies the phenomenon of the specified relationship at a particular time and is therefore considered cross-sectional (Saunders *et al.* 2019). The study aims to determine the impact of ITG on BITA, based on the relationship suggested by De Haes and Van Grembergen (2009) in their case study of the Belgian financial sector, and it is, therefore, necessary to include analysis and hypothesis testing in this research design.

This research used the SEM as an alternative to estimate the effects and relationships among multiple variables (Kline 2016). SEMs allow us to suggest the type and direction of the relationship expected to be found among variables, seeking to estimate the parameters associated with the proposed theoretical relationships (Ruiz *et al.* 2010). This research takes an SEM technique with Confirmatory Factor Analysis (CFA) as a mechanism to show the analysis of the theoretical relationships between ITG and BITA.

The SEM technique includes six steps for implementation: (1) specification, (2) identification, (3) measure selection and parameter estimation, (4) model estimation and fit evaluation, (5) model re-specification and (6) result interpretation (Kline 2016). In general, in the specification phase, the researcher draws a diagram model using a standard set of graphic symbols. However, the researcher can also describe the model through a series of equations that define the model's parameters and the assumed relationships among variables (Kline 2016).

Byrne (2010) argued that schematic representations of models are called causal diagrams because they provide a visual representation of the relationships among variables that will be used in the study. The general SEM model comprises two sub-models, a measurement model, and a structural model. The structural model defines the relationships among non-observable variables, including exogenous latent variables (ITG practices in this case) and endogenous latent variables (BITA in this case), as shown in Figure 2.

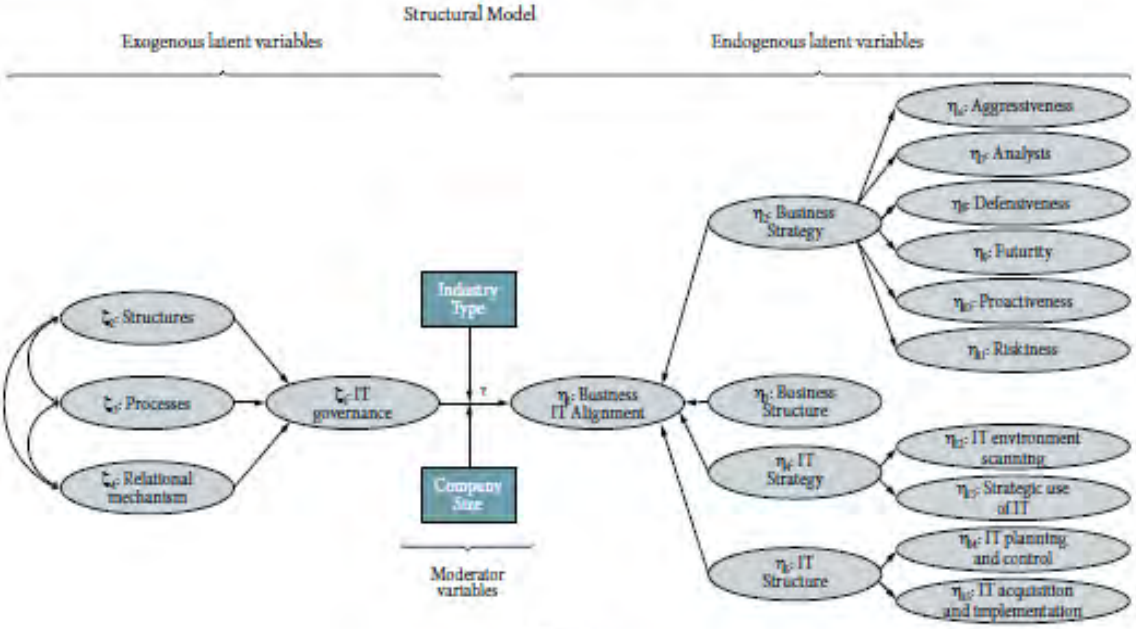

Figure 2
Structural Model
Source: Own elaboration.

The measurement model defines the relationships between observed and unobserved variables, providing the link between scores on a measurement instrument (observed indicator variables) and the underlying model for measuring variables (unobserved latent variables) (Byrne 2010).

Coltman *et al.* (2008) argued that there are three theoretical considerations in deciding whether a measurement model is reflective or formative. The first concerns the nature of the construction. Therefore, in the reflective model, the latent variable exists independently of measurements. In contrast, in the formative model, the latent variable is a combination of indicators. The second consideration is to focus on the direction of causality. In reflective models, causality flows from latent variables to indicators and in the formative model, it flows in the opposite direction. The last consideration is the characteristics of indicators. In reflective models, a change in the latent variable precedes a change in the indicator; elements are expressed by the latent variable and share common themes. In contrast, in training models, indicators define latent variables and do not necessarily share common themes. This research adopts a reflexive model between latent variables and indicators, based on the proposal of Bergeron *et al.* (2004) in their research model.

The design of this research took into account the moderating variables that regulate the degree of intensity with which one variable impacts another (Chion and Charles 2016). For this research, the moderating variables are industry type and company size. Chan *et al.* (2006) argued that there are several precedents that the importance of alignment depends on the industry in which the organization operates and that the size of the organization is associated with alignment. Chan and Reich (2007) suggested that communication and coordination in small firms are easy to implement, so these firms may tend to align themselves better than medium-sized firms, where there may be less evidence of alignment.

This research aims to address the different sizes of enterprises; ITG studies have focused primarily on large enterprises, but this does not mean that ITG does not exist in SMEs (Bergeron *et al.* 2015). In fact, most SMEs use IT for their basic needs but show a tendency to use it for more advanced activities (Mardikyan 2010). However, implementing ITG in the context of SMEs is a complex effort, mainly due to their nature and structure (Olutoyin and Flowerday 2016).

4.2. *Measurement*

A. IT governance (ITG)

To measure ITG, this study was based on the generic model of ITG maturity (De Haes and Van Grembergen 2009; IT Governance Institute 2003), in which 12 items are used to evaluate structures (e.g., the existence of a steering committee at executive or senior management level responsible for determining business priorities in IT investments), 11 items to evaluate processes (e.g., the existence of regular self-assessments or independent assurance activities on IT governance and control), and 10 to evaluate relational mechanisms (e.g., the existence of systems to share and distribute knowledge of ITG framework, responsibilities, tasks, etc.). Then, using a 6-point scale (0- Non-existent, 1- Initial/ad hoc, 2- Repeatable but intuitive, 3- Defined process, 4- Managed and measurable, and 5- Optimized), the respondent indicates the extent to which each ITG practice is applied by the enterprise.

B. Business-IT alignment (BITA)

To measure BITA, this study was built on the holistic model by Bergeron *et al.* (2004), which has four dimensions (business strategy, IT strategy, business structure, and IT structure). The first dimension of the model is the business strategy, which attempts to evaluate the strategy carried out rather than the strategy planned, focusing on the idea of deploying the resources needed to achieve business objectives. Bergeron *et al.* (2004) based their analysis on Venkatraman's proposal (1989) to measure strategic orientation on six elements: aggressiveness (4 items), analysis (6 items), defensiveness (4 items), futurism (5 items), proactivity (5 items), and riskiness (5 items). Then, using a 7-point ordinal scale (1- Strongly disagree, ..., 7- Strongly agree), the respondent indicates the extent to which the company meets each criterion.

The second dimension is the business structure measured by five variables. The first is formalization, which can be measured by the number of rules, procedures, and activities that are written and documented. The second is administrative intensity, also known as centralization, calculated by the relationship between the number of managers and the number of employees. The third element is professionalization, calculated by dividing the number of professionals by the number of employees. The fourth is related to specialization, also known as horizontal differentiation, which includes the number of different job titles in the organization chart. The last one is vertical differentiation and refers to the number of organizational levels that are below the CEO.

The third dimension suggested by Bergeron *et al.* (2004) is the IT strategy, which is measured from two components. The first is IT environment scanning (4 items), which attempts to explain the organization's capacity to detect and respond to changes generated by competitors. The second component is the strategic use of IT (6 items), trying to synthesize the extent to which the organization uses IT to increase the quality of its products and services and improve competitiveness and productivity. Then, using a 7-point ordinal scale (1- Strongly disagree, ..., 7- Strongly agree), the respondent indicates the extent to which the company meets each criterion.

Finally, the fourth dimension is the IT structure, which is made up of two components. One is IT planning and control (9 items), which includes activities designed to observe the IT management function, IT resources and IT infrastructure. The other component is IT acquisition and implementation (9 items), which refers to activities that explain the selection and introduction of new IT applications into the business. Then, using a 7-point ordinal scale (1- Strongly disagree, ..., 7- Strongly agree), the respondent indicates the extent to which each criterion is met by the enterprise.

C. Moderating variables

This research takes the form of categorizing company size according to Ping-Ju Wu *et al.* (2015), in which small companies are those with less than 100 employees, medium companies are those with 100 to 1000 employees, and large companies are those with more than 1000 employees.

Mardikyan (2010) argued that there are significant differences in the use of IT among different industry types. Then, this study will use ten industry types, to wit, manufacturing, services, IT, health, education, energy, customer products, transportation, retail, and chemical-pharmaceutical.

D. Data collection

This research used an instrument developed by other researchers (Bergeron *et al.* 2004; IT Governance Institute 2003). The instrument was translated into Spanish under the supervision of a reviewer based on the indices proposed by the authors. The questionnaire was tested with a group of 100 people to observe different aspects. Initially, it was observed that the respondents had no comprehension problems because the questions and instructions were provided both in the invitation to participate and on the survey website and were very clear to them. Finally, it was demonstrated that the information was stored comprehensively and that the participant could know that his or her answers were effectively saved.

Based on the database of 26,533 companies that report to the Superintendence of Companies in Colombia in the SIREM system as of 2015, 1,500 companies were randomly selected and contacted by phone, email, or in-person to take part in the study. In this way, their existence and contact information were confirmed and it was validated that they have an IT department or an area that fulfills the appropriate functions of IT management to evaluate their interest in participating in this research (Kaur *et al.* 2011).

The instrument was coded and entered into an institutional web platform to generate an individual link to the questionnaire for each company; then, on the same platform, a list of companies invited to participate was created with their contact emails. The questionnaire was divided into four sections and the website was programmed in such a way that it was impossible to save the data from each section until all the questions were answered. First, of the 1,500 companies selected, 945 were verified and sent specific information to the emails, including a letter of introduction to the study, an informed consent form, and the individual link to the survey. In the first round, 126 surveys were completed. In a second round, 829 emails were sent to the remaining companies, eliciting 107 responses, with a total of 333 responses at the time.

To complete the sample, awareness-raising work was carried out with associations and chambers of commerce to contact companies interested in participating in the research. In this third round, after several days of work in which a group of 339 companies completed the questionnaire, 672 companies ended up participating in the study. The data were collected from October 2016 to February 2018 on a web platform, from which they were coded and loaded into a data file in SPSS, version 24 for statistical analysis and in AMOS add-on, version 24, for reviewing the structural equation model.

5. RESULTS

Initially, the quality of the measures used in the relationship model was determined to contrast the causal relationships of the conceptual model. The phases of application of the SEM technique are as follows: (a) specification, (b) identification, (c) measure selection and data collection, (d) model estimation (evaluation of model fit and interpretation of parameter estimates), (e) re-specification and (f) result interpretation (Kline 2016).

5.1. *Review of the Measures Involved in the Model*

To perform an analysis of the measures used in the model, a review of reliability, convergent validity, and discriminant validity was performed (Table 1). Reliability was obtained through Cronbach's alpha (α), achieving indicators above the recommended limits in all variables (greater than 0.7). Regarding convergent validity, the indicators of composite reliability (CR) and mean extracted variance (AVE) were used, which show favorable results (higher than 0.7 and 0.5, respectively) and ensure the consistency of the measurements used (Farooq 2016).

Likewise, discriminant validity was analyzed to verify that each variable shares more variance with its indicators than with other variables. To this end, the square root of the AVE was extracted and placed in the diagonal of Table 1. The result of the values found in the diagonal is higher than the correlations among the variables reflected in the values outside the diagonal, which supports the discriminant validity of the measures used (Kline 2016).

Table 1
Reliability and Validity Indexes

Construct	Reliability	Convergent Validity		Discriminant Validity												
	α	CR	AVE	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Structures	0.98	0.98	0.78	0.88												
2. Processes	0.97	0.97	0.74	0.30	0.86											
3. Relational Mechanisms	0.97	0.97	0.75	0.26	0.46	0.86										
4. Aggressiveness	0.95	0.95	0.82	0.05	0.01	−0.03	0.90									
5. Analysis	0.96	0.96	0.80	0.04	0.02	0.00	0.80	0.90								
6. Defensiveness	0.94	0.94	0.81	0.03	0.06	0.02	0.75	0.75	0.90							
7. Futurity	0.95	0.95	0.79	0.04	−0.01	−0.02	0.67	0.82	0.63	0.89						
8. Proactiveness	0.94	0.94	0.75	0.01	0.00	−0.04	0.60	0.70	0.53	0.78	0.87					
9. Riskiness	0.94	0.94	0.77	0.01	0.02	−0.01	0.71	0.68	0.65	0.59	0.54	0.88				
10. IT environment scanning	0.94	0.94	0.77	0.02	0.04	0.00	0.65	0.64	0.61	0.56	0.52	0.60	0.88			
11. Strategic use of IT	0.96	0.96	0.78	0.03	0.05	0.00	0.57	0.59	0.56	0.52	0.48	0.56	0.83	0.89		
12. IT planning and control	0.97	0.97	0.77	0.05	0.03	0.01	0.59	0.61	0.58	0.55	0.51	0.55	0.85	0.75	0.88	
13. IT acquisition and implementation	0.97	0.97	0.78	0.02	0.01	0.01	0.54	0.56	0.53	0.49	0.46	0.50	0.77	0.69	0.87	0.88

α: Cronbach's Alpha, CR: Composite Reliability, AVE: Average Variance Extracted
Source: Own elaboration.

5.2. *Analysis of the Structural Model*

The six phases of application of the SEM technique are described below. The first phase is known as the identification phase and establishes the hypothetical relationship between latent and observed variables and is represented graphically (Figure 3).

The second step of the SEM technique is identification. A model is identified if it is theoretically possible to provide a unique estimate for each of the model parameters; otherwise, the model is not identified (Kline 2016). There are several general rules for identifying a model, one of which, for example, is the rule of degrees of freedom (df), which states that the model's degrees of freedom must be greater than or equal to zero ($dfM \geq 0$). Since dfM = 4255 (a value greater than zero), the model is identified.

Before analysis and model estimation, it is advisable to examine all variables in order to assess the quality of the database. The first problem to address is the sample size; determining its requirements for SEM is often a challenge researchers face (Wolf *et al.* 2013). Some authors have suggested that sample size depends on the desired power, bias, and evaluation of the null hypothesis and the complexity of the model; if the model is more complex, a larger sample is required (Iacobucci 2010; MacCallum *et al.* 1996; Wolf *et al.* 2013). In this research, the sample size is 672 which is considered appropriate for improving statistical power, "For studies with moderate to large df, reasonable power is achieved with moderate sample sizes, and very high power is achieved with large samples. For instance, with df = 100, power is well above 0.90 if N is 200 or more" (MacCallum *et al.* 1996, p. 139).

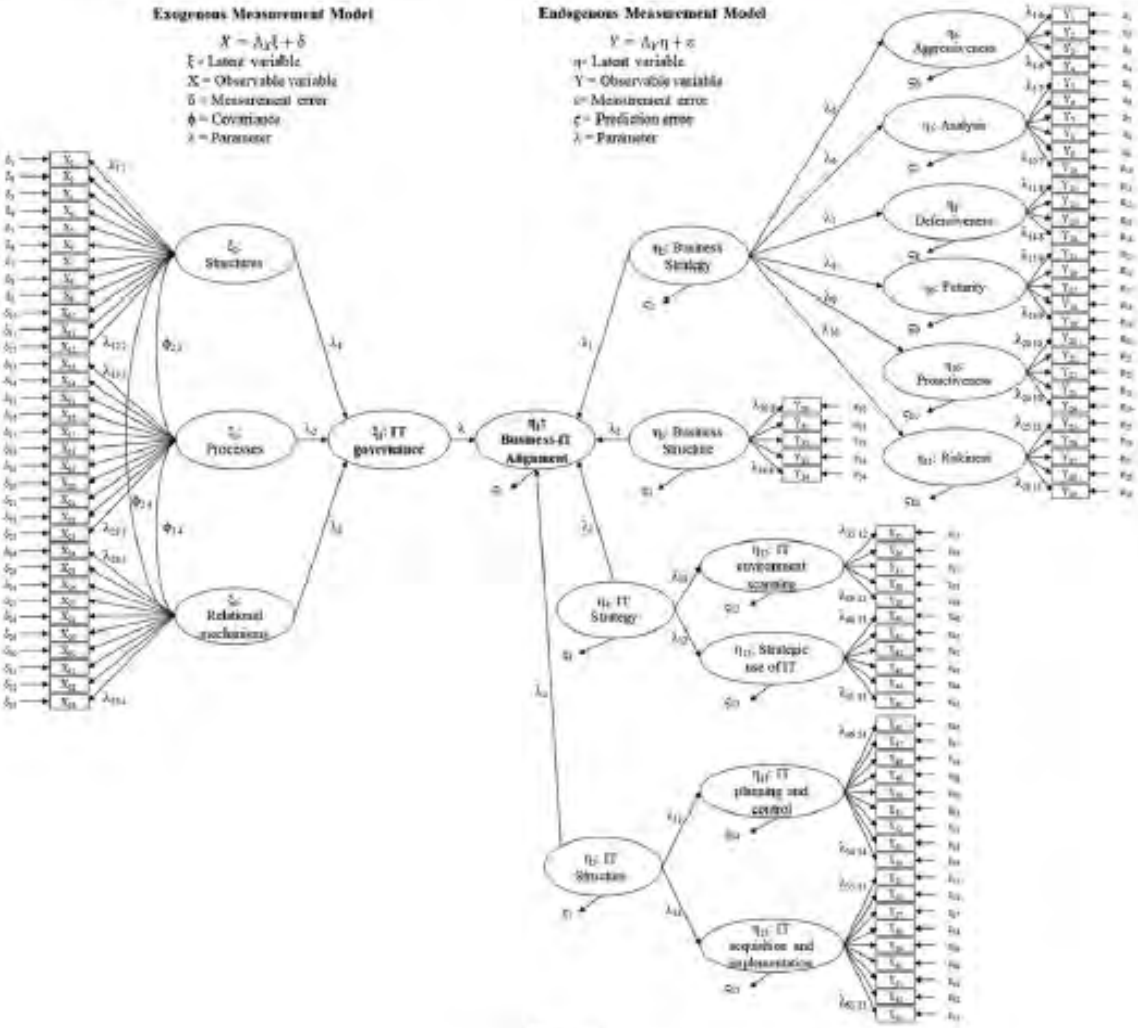

Figure 3
Research Model
Source: Own elaboration.

Another aspect to consider is multicollinearity among variables, where highly correlated variables are considered redundant. In this research, collinearity tests were performed; the multiple squared correlations (R^2) between each variable and the others were initially calculated, obtaining a maximum value of 0.0043 that is lower than the reference value (> 0.90) for extreme multivariate collinearity (Kline 2016). Also, collinearity statistics were calculated for each of the independent variables (Table 2). Tolerance points to the proportion of the total standardized variance that is unique and not explained by other variables (values < 0.10 indicate extreme multivariate collinearity), while the variance inflation factor (VIF), whose reference value is VIF > 10, may indicate that the variable may be redundant (Kline 2016). As can be seen, multi-collinearity occurs in neither case. Finally, the results of univariate normality tests show that of 94 observable variables, only two did not have adequate values of asymmetry and kurtosis. Concerning multivariate normality, AMOS provided the result of the Mardia's coefficient (452.1) and showed that there is no multivariate normality. To counteract the absence of normality, the sample size is sufficient to demonstrate that the impact of the sampling error could be minimal (Kline 2016).

Table 2
Collinearity Statistics

Independent Variable	Tolerance	Variance Inflation Factor (VIF)
Structures	0.89	1.12
Processes	0.75	1.33
Relational Mechanisms	0.77	1.30

Source: Own elaboration.

In the estimation phase, the values of the unknown parameters are determined, as well as their respective measurement error. The parameter estimation process was carried out under the Maximum Likelihood Estimation (MLE), which is considered efficient and not biased when multivariate assumptions of normality are not found. In this phase, the results of the model goodness-of-fit were obtained and some modifications were made to the specification model to improve the fit. Measures of fit quality can be of three types: absolute fit, incremental fit, and measures of parsimony fit. The model results without the moderating effect achieve satisfactory fit to data

Table 3
Goodness-of-fit Measures

Measure	Index	Shorthand	Value	Rating		
				Low	Medium	High
Absolute Fit	Chi-square	CMIN	5898.20	X		
	Minimum Discrepancy (Normed Chi-Square)	CMIN/DF	1.39			X
	Non-Centrality Parameter	NCP	1643.20	X		
	Scaled Non-Centrality Parameter	SNCP	2.45	X		
	Goodness-of-Fit Index	GFI	0.84		X	
	Adjusted Goodness-of-Fit Index	AGFI	0.84		X	
	Root Mean Square Residual	RMR	0.08			X
	Akaike Information Criterion	AIC	6318.20	X		
	Expected Cross Validation Index	ECVI	9.07	X		
	Browne-Cudeck Criterion	BCC	6387.47	X		
	Bayes Information Criterion	BIC	7265.35	X		
	Root Mean Square Error of Approximation	RMSEA	0.02			X
	Hoelter .05 Index	HOELTER05	502			X
	Hoelter .01 Index	HOELTER01	509			X
Comparative or Incremental Fit	Tucker–Lewis Index	TLI or Rho 2	0.98			X
	Normed Fit Index	NFI or Delta 1	0.93			X
	Relative Non-centrality Fit Index	RFI or Rho 1	0.92			X
	Incremental Fit Index	IFI or Delta 1	0.98			X
	Comparative Fit Index	CFI	0.98			X
Parsimonious Fit	Parsimony-Adjusted NFI	PNFI	0.90			X
	Parsimony-Adjusted CFI	PCFI	0.95			X
	Parsimony Goodness of Fit Index	PGFI	0.81		X	
	Parsimony Ratio	PRATIO	0.97			X

Source: Own elaboration using AMOS indexes.

as shown in Table 3. The minimum discrepancy ratio CMIN/DF (5898.2/4255) takes a value of 1.39, proof of the statistical significance of the model; the root mean square error of approximation (RMSEA) shows a value of 0.02 and the goodness-of-fit index (GFI) takes a value of 0.84. As for the incremental fit indexes, they are all above the cut-off value (0.90), with the Comparative Fit Index (CFI) taking a value of 0.97 and the Normalized Fit Index (NFI) taking a value of 0.93. As for the parsimony fit indexes, most of them are above the reference value (0.90). This shows that the ratio model estimates are above the recommended threshold for a good fit (Schreiber *et al.* 2006).

To verify the relative capacity of the model to explain the total variance of BITA, the determination coefficient (R^2) was used, obtaining a result of 0.955. This value indicates that the joint explanatory capacity of the variables is high since they represent 95.5 % of the variability of BITA. The path coefficients for the research model are shown in Figure 4.

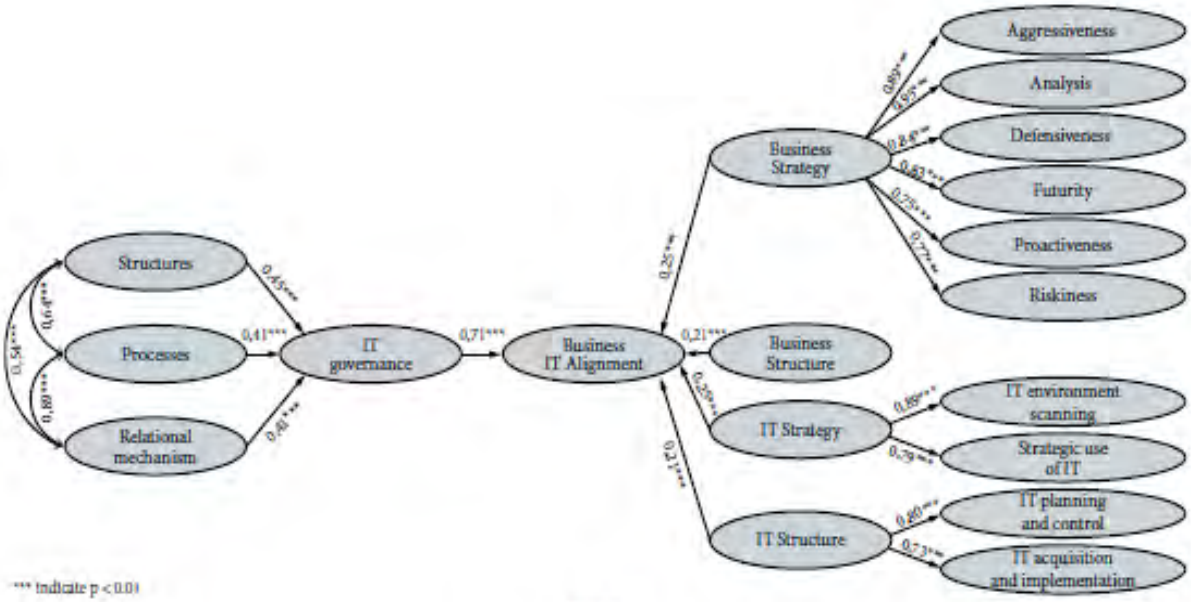

Figure 4
Research Model Results
Source: Own elaboration.

Once the good fit of the model was demonstrated, the resulting relationships were analyzed to verify the validity of the hypotheses and thus determine their predictive capacity (Table 4). Initially, the strong and direct relationship between ITG and BITA is shown (0.71), which is significant for a p-value < 0.01 and allows rejecting $H1_0$ and accepting $H1_a$.

The relationship model includes moderating variables that try to explain whether there are differences in the relationship between different sizes and types of companies. For this purpose, a multi-group analysis was carried out to test hypotheses 2 and 3. In this regard, the data set was divided into two variables (company size and industry type) to estimate whether the proposed relationship behaved differently depending on the effect that the moderating variables might have. For this, the sample was distributed into several groups depending on the moderating variables; the results of the parameters and adjustment are shown in Table 4.

The results show that the parameters vary in the case of industry type ranging from 0.68 to 0.78 with the same level of significance (p-value < 0.01); in the case of company size, they are in the range of 0.58 to 0.62 with the same level of significance (p-value < 0.01). The chi-square test of ratios was applied to H2 and H3, i.e., if there is no difference in the moderation of the impact of ITG on BITA by industry type and company size, respectively. In the first case, the value was 0.999 and in the second case, 0.998, which certified the non-rejection of $H2_0$ and $H3_0$.

Table 4
Model Results

Results	Default Model	Industry Type						Company Size		
		Manufacturing	Services	IT	Healthcare/ Medical	Education	Retail	Small	Medium	Large
	n = 672	n = 109	n = 100	n = 101	n = 106	n = 103	n = 104	n = 340	n = 228	n = 104
CMIN/DF	1.39	1.67	1.88	1.83	1.72	1.88	1.71	1.32	1.28	1.83
GFI	0.84	0.53	0.51	0.49	0.50	0.49	0.53	0.75	0.68	0.49
RMSEA	0.02	0.08	0.09	0.09	0.08	0.09	0.08	0.03	0.04	0.09
CFI	0.98	0.80	0.75	0.75	0.79	0.75	0.79	0.96	0.95	0.75
ITG → BITA	0.71***	0.78***	0.73***	0.71***	0.68***	0.69***	0.69***	0.58***	0.62***	0.59***
R^2 - ITG	0.91	0.89	0.92	0.91	0.90	0.90	0.90	0.82	0.85	0.83
R^2 - BITA	0.96	0.94	0.96	0.96	0.95	0.95	0.95	0.94	0.94	0.94

*** $p < 0.01$

Source: Own elaboration using AMOS estimates.

6. CONCLUSIONS, LIMITATIONS, AND FURTHER RESEARCH

Given the need to delve into the causal explanations in ITG studies (Tiwana *et al.* 2013), this research aimed to identify whether ITG had an impact on BITA following the suggestion of De Haes and Van Grembergem (2009). Furthermore, some authors consider BITA to be an important aspect of ITG (De Haes *et al.* 2013; Information Systems Audit and Control Association [ISACA] 2012; Tanriverdi 2006).

Several authors have studied certain relationships between the two main constructs of this study from different perspectives and found different results. Asante (2010) in an exploratory study identified a statistical correlation between some of the ITG structures proposed by Weill and Ross (2004) and strategic alignment. On the other hand, Gordon (2012) replicated Asante's (2010) study with a different sample using Luftman's model (2003) and adding the moderating effects of industry type and company size, without finding a relationship between ITG structures and BITA.

Meanwhile, Kuruzovich *et al.* (2012) found that the four ITG practices outlined by De Haes and Van Grembergem (2009) involving the board of directors affect BITA. Similarly, Hiekkanen (2016) used a mixed-method based on De Haes and Van Grembergem's (2009) model to measure ITG and Luftman's (2000) model to measure BITA, applied the above models qualitatively in a case study, and then conducted quantitative work with a sample of 42 surveys from 29 companies, finding a moderate positive relationship between ITG and BITA. Similarly, Lunardi *et al.* (2017) conclude that the adoption of structural, procedural, and relational mechanisms of ITG is positively associated with ITG domains, including strategic alignment. In contrast, Parry (2014) found no significant linear relationship between Weill and Ross's (2005) effective ITG and Tanriverdi's (2006) approach to BITA, based on a sample of 201 participants.

Unlike the studies mentioned above, this study used a method different from Luftman's (2000) to measure BITA in order to avoid endogeneity issues, as the latter looks at ITG as part of BITA. This research found that the mechanisms or practices of ITG (structures, processes, and relational mechanisms) have an impact on BITA, so a model was proposed to understand this impact. Due to the methodological application, results and the model evaluation show an adequate statistical adjustment of the proposed model, as well as the verification of the main hypothesis, which allows us to affirm that the model explains the relationship between ITG and BITA. About the moderating effect of the industry type and company size variables, it can be shown that it is not significant. From this finding, it is inferred that, although BITA is affected by ITG, there are no differences when it comes to firms of different sizes and sectors of activity.

The importance of jointly evaluating ITG mechanisms or practices is also noted, given their high correlation values and their contribution to the impact of ITG on BITA. The results described here have practical implications for enterprises, suggesting that the implementation of better ITG practices will generate better degrees of BITA and therefore improve organizational performance indicators. Instead, the non-implementation of such ITG practices may be one of the factors why BITA may not be developed. Having demonstrated ITG impact on BITA, one might think that BITA would act as a mediator of ITG impact on other constructs, for example, a firm's innovation capacity.

Future research should also include additional moderating or mediating effects, such as the type of ITG framework used by the company, the maturity of the company's IT department, whether multinational or not, and so on. Additional longitudinal research could also be conducted to analyze variation in ITG and BITA over time.

Finally, it should be noted that this study is not without its limitations, which could be considered in future research. The data have been obtained in Colombia during a specific period, and it would be convenient to consider other countries, with larger samples of companies that include other industry types.

7. ACKNOWLEDGMENTS

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Chapter V: Conclusions and Recommendations

The research problem raised in this study arises from the need to establish an ITG to achieve BITA, and the organization invests a lot in establishing ITG, but the result is not the desired alignment. Therefore, the purpose of this basic, quantitative, descriptive and cross-sectional research, will attempt to examine the impact of ITG on BITA. For the development of the research, it was used the SEM technique with the Confirmatory Factor Analysis (CFA) as a mechanism to show the analysis of the proposed theoretical relationships.

This research was limited to the use of the questionnaire and its validity and honesty to answer the questions of the survey. As the research is cross-sectional, it can only observe the behaviour of the variables in a moment of time, not their evolution. The information received was based on the perspective of who answered the survey and its possible bias. The study was conducted in Colombia, with its market conditions and its particular competitiveness. The environmental, economic, legal, cultural factors, etc. of the organizations were not taken into account. The procedures that were available to ensure the authenticity of those who responded to the surveys and avoid their impersonation were carried out.

In the subsequent sections, the conclusions, implications and recommendations are shown, derived from the interpretation of the results obtained.

Conclusions

Given the need to delve into causal explanations in ITG studies (Tiwana et al., 2013), this research aimed to identify whether ITG had an impact on BITA following the suggestion of De Haes and Van Grembergem (2009). Furthermore, some authors consider BITA to be an important aspect of ITG (De Haes et al., 2013; Information Systems Audit and Control Association [ISACA], 2012; Tanriverdi, 2006).

Several authors have studied certain relationships between the two main constructs of this study from different perspectives and found different results, although some studies have

found an existing relationship between the two concepts (Asante, 2010; Gordon, 2012; Hiekkanen, 2016; Kuruzovich et al., 2012; Vaia & Carmel, 2013; Wolmarans et al., 2016), others do not corroborate this relationship (Parry, 2014; Tallon et al., 2013). Asante (2010) in an exploratory study identified a statistical correlation between some of the ITG structures proposed by Weill and Ross (2004a) and strategic alignment. On the other hand, Gordon (2012) replicated Asante's (2010) study with a different sample using Luftman's (2000) model and adding the moderating effects of industry type and company size, without finding a relationship between ITG structures and BITA.

Meanwhile, Kuruzovich et al. (2012) found that the four ITG practices outlined by De Haes and Van Grembergem (2009) involving the board of directors affect BITA. Similarly, Hiekkanen (2016) used a mixed-method based on De Haes and Van Grembergem's model (2009) to measure ITG and Luftman's (2000) model to measure BITA, applied the above models qualitatively in a case study, and then conducted quantitative work with a sample of 42 surveys from 29 companies, finding a moderate positive relationship between ITG and BITA. Similarly, Lunardi et al. (2017) conclude that the adoption of structural, procedural, and relational mechanisms of ITG is positively associated with ITG domains, including strategic alignment. In contrast, Parry (2014) found no significant linear relationship between Weill and Ross's effective ITG (2005) and Tanriverdi's (2006) approach to BITA, based on a sample of 201 participants.

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verification of the main hypothesis, which allows us to affirm that the model explains the relationship between ITG and BITA. About the moderating effect of the industry type and company size variables, it can be shown that it is not significant. From this finding, it is inferred that, although BITA is affected by ITG, there are no differences when it comes to firms of different sizes and sectors of activity.

Implications

The importance of jointly evaluating ITG mechanisms or practices is also noted, given their high correlation values and their contribution to the impact of ITG on BITA. The results described here have practical implications for enterprises, suggesting that the implementation of better ITG practices will generate better degrees of BITA and therefore improve organizational performance indicators. Instead, the non-implementation of such ITG practices may be one of the factors why BITA may not be developed. Having demonstrated ITG impact on BITA, one might think that BITA would act as a mediator of ITG impact on other constructs, for example, a firm's innovation capacity.

Recommendations

Future research should also include additional moderating or mediating effects, such as the type of ITG framework used by the company, the maturity of the company's IT department, whether multinational or not, and so on. Additional longitudinal research could also be conducted to analyze variation in ITG and BITA over time.

Finally, it should be noted that this study is not without its limitations, which could be considered in future research. The data have been obtained in Colombia during a specific period, and it would be convenient to consider other countries, with larger samples of companies that include other industry types.

Appendix A: Presentation of the defended RP

CENTRUM GRADUATE BUSINESS SCHOOL PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ | MSM MAASTRICHT SCHOOL OF MANAGEMENT

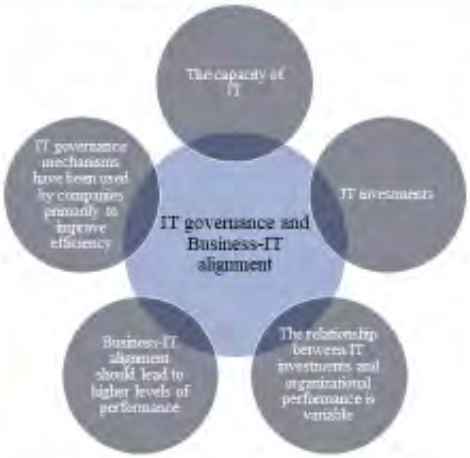
Impact of the Information Technology (IT) Governance on Business-IT Alignment

by Weimar Santos Castellanos

Supervisor: Beatrice Avolio Alecchi

Introduction | Literature Review | Method | References

Background of the Problem

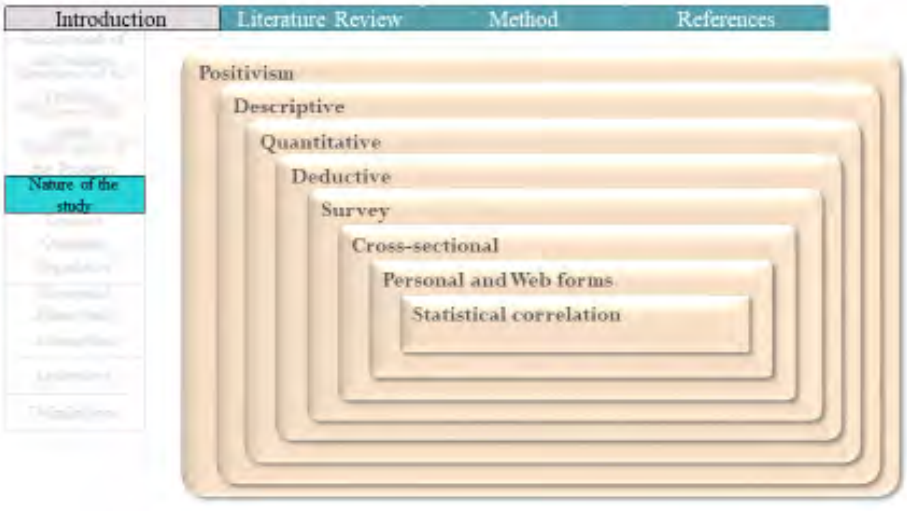


Introduction | Literature Review | Method | References

Statement of the Problem


Introduction
Literature Review
Method
References
Purpose of the study
The purpose of this basic, quantitative, descriptive, cross-sectional research is to examine
IT Governance
Business-IT alignment
by means of


Introduction
Literature Review
Method
References
Significance of the Problem
Academic community
Professionals and companies
Professional associations


Introduction
Literature Review
Method
References
Nature of the study
Positivism
Descriptive
Quantitative
Deductive
Survey
Cross-sectional
Personal and Web forms
Statistical correlation

Research Questions

RQ1: Does IT governance have any impact on Business-IT alignment?

RQ2: There may be differences in the relationship (IT governance – Business-IT alignment) between companies in different industry types?

RQ3: There may be differences in the relationship (IT governance – Business-IT alignment) between companies according to company size?

Hypothesis

$H1_0$: IT governance have any impact on Business-IT alignment.
$H1_a$: IT governance have impact on Business-IT alignment.

$H2_0$: There is no difference in the impact of IT governance on Business-IT alignment between different industry types.
$H2_a$: There is difference in the impact of IT governance on Business-IT alignment between different industry types.

$H3_0$: There is no difference in the impact of IT governance on Business-IT alignment between company sizes.
$H3_a$: There is difference in the impact of IT governance on Business-IT alignment between company sizes..

Theoretical Framework

Assumptions

Participant's perception

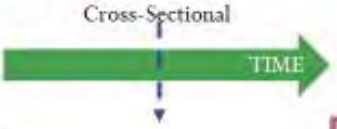
Participant's relevant information

Respondents are professional

Valid and reliable instrument

Limitations

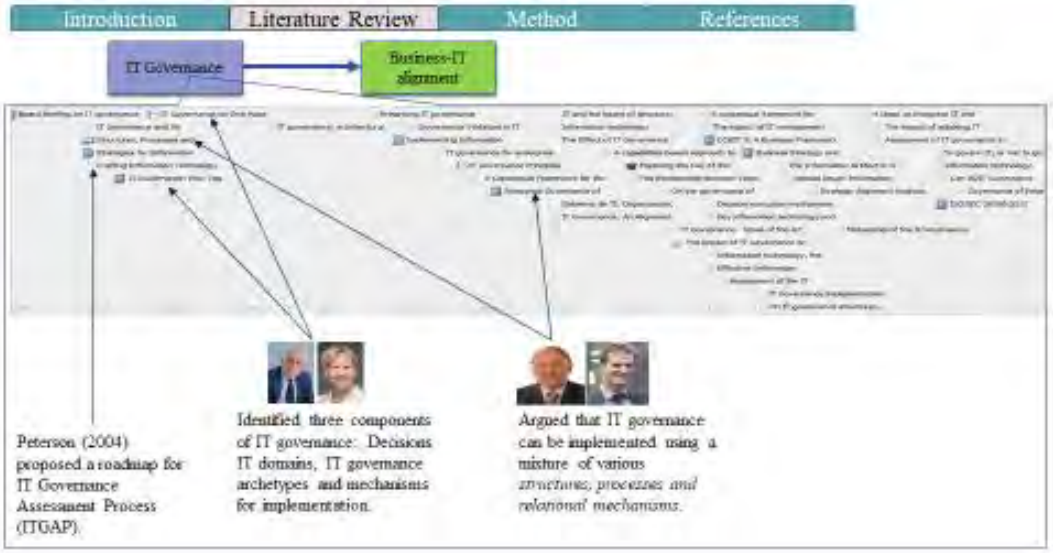
Cross-Sectional



Delimitations

The analysis unit will be taken by convenience

The practices of IT governance will be taken only at the strategic level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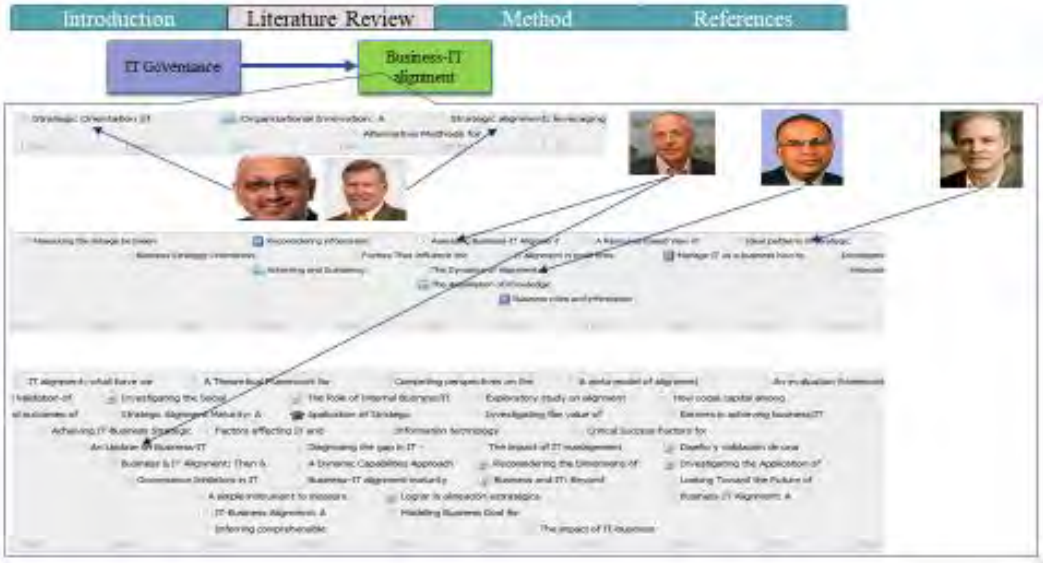
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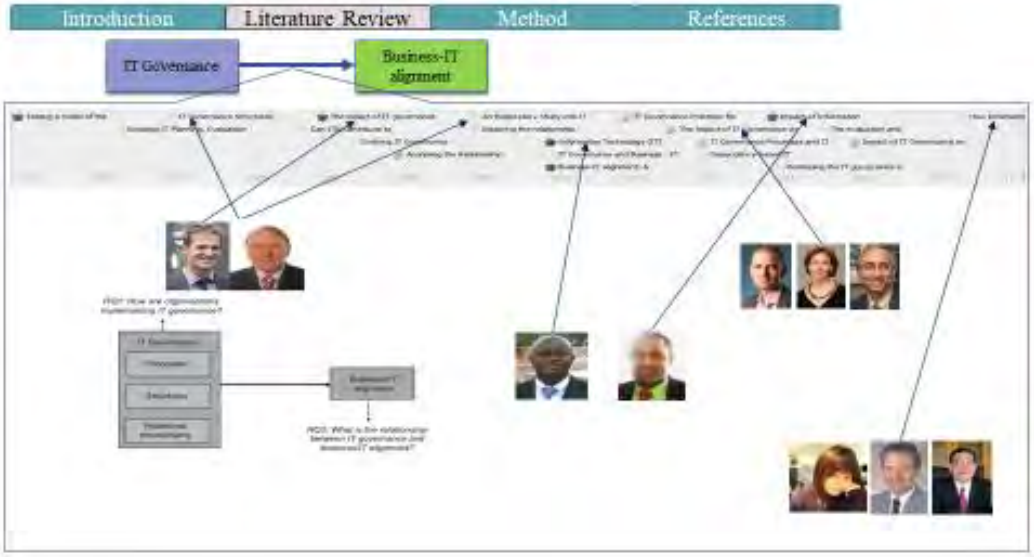
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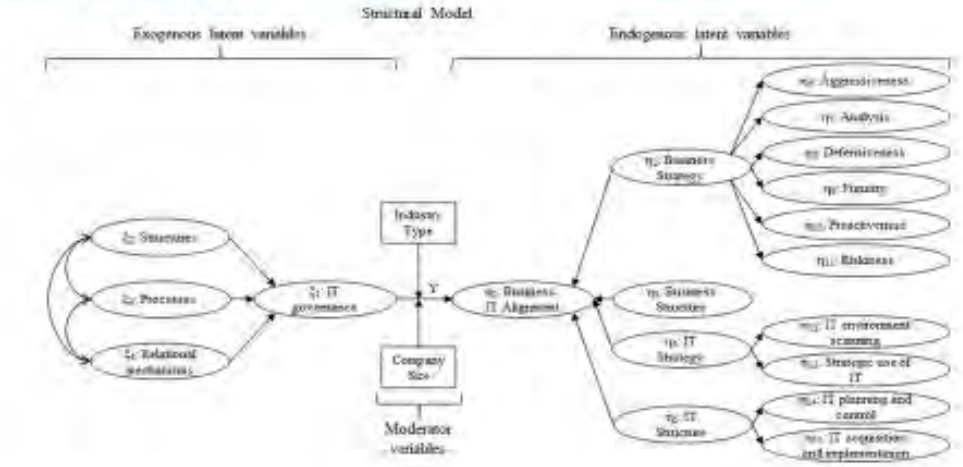
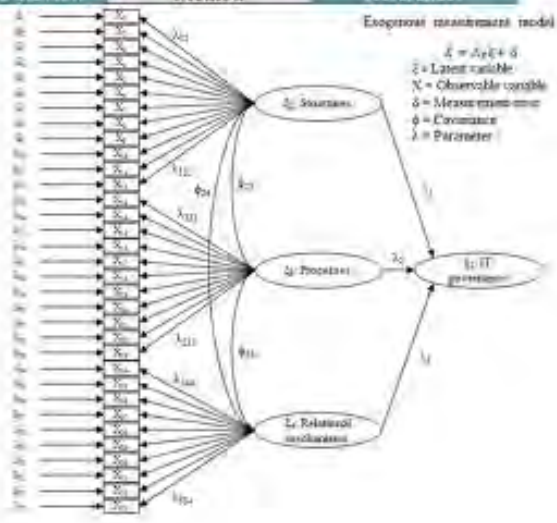
Aspect		Reference
Technique	Structural Equation Modelling (SEM) with Confirmatory Factor Analysis (CFA)	Ali and Green (2012), Hajikhani and Azadi (2013), Harguem et al. (2014), Kmenovich et al. (2012), Liang et al. (2011), Ping-Ju Wu et al. (2015)
Data collection strategy	Surveys	Sledgianowski et al. (2006), Luftman (2000), Bergeron et al. (2004), Venkatraman (1989)
Data Analysis	Statistical Analysis	Byrne (2010), Hair et al. (2010), Kline (2011)
Unit of analysis	Company	Luftman et al. (2013), Lazic (2013)
Unit of observation	Chief Executive Officer and Chief Information Office (CIO) of companies	Bergeron et al. (2004)
Population and Sample	Companies in Colombia. $n = \frac{Z^2 pq}{e^2} = 384 \quad Where\ p = 50\%, q = 50\%, e = 5\%$ and $Z = 1.96$	Iacobucci (2010), Saunders et al. (2009)
Validity and Reliability	Unidimensional correlation of the constructs and Cronbach's alpha calculated by the designers of the instrument.	Bergeron et al. (2004)

SEM Specification phase



SEM Specification phase



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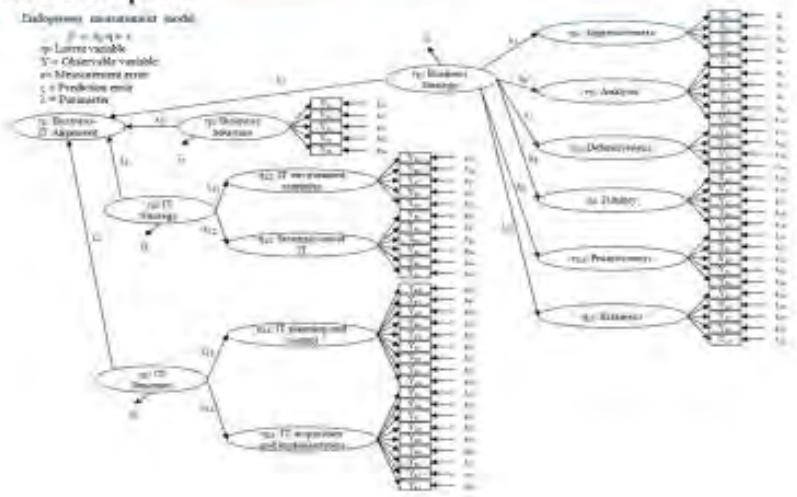

SEM Identification phase

$$df_M = p - q = 4656 - 209 = 4447$$

$$p = \frac{v(v+1)}{2} = \frac{96(96+1)}{2} = 4656$$

p: *Number of observations* = 4656
q: *Number of estimated parameters* = 209
v: *Observed variables* = 96

SEM select measures and parameter estimation phase

SEM estimate the model phase

SEM re-specification model phase

SEM interpretation of results phase

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Appendix B: Presentation of the defended Thesis

STATEMENT OF THE PROBLEM

- Information technologies (IT) are one of the key factors in organizational competitiveness (Weill et al., 2002).
- The organizations increasingly depend on IT and their capabilities to efficiently integrate IT resources into other organizational and management processes (Zhang et al., 2016).
- The IT management approach in many organizations has evolved from an operational support role to a more strategic role involving aspects such as business transformation, innovation, and obtaining IT-based business opportunities (Tanriverdi et al., 2010).
- Since an organization's strategic IT management is increasingly based on its IT governance (ITG) (Caluwe and De Haes, 2019; Cervone, 2017; Kude et al., 2018), it is necessary to achieve adequate business and IT alignment (BITA) given its positive effects on business performance (Gerow et al., 2014; Wagner et al., 2014; Yayla and Hu, 2012).
- Organizations will operate better when key IT resources are aligned with the business strategy and when appropriate structures are used to monitor the deployment and effective management of these resources (Coltman et al., 2015).
- Despite the abundant body of knowledge of ITG and BITA, there is a need for describing and explaining the nature and scope of the relationships between ITG and strategic BITA, as well additional empirical evidence that allows for an integrated understanding of such relationship (De Haes and Van Grembergen, 2009; Raymond et al., 2019).

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RATIONALE FOR THE STUDY

The purpose of this basic, quantitative, descriptive, cross-sectional research is to examine

by means of

RQ: Does IT governance have any impact on Business-IT alignment?

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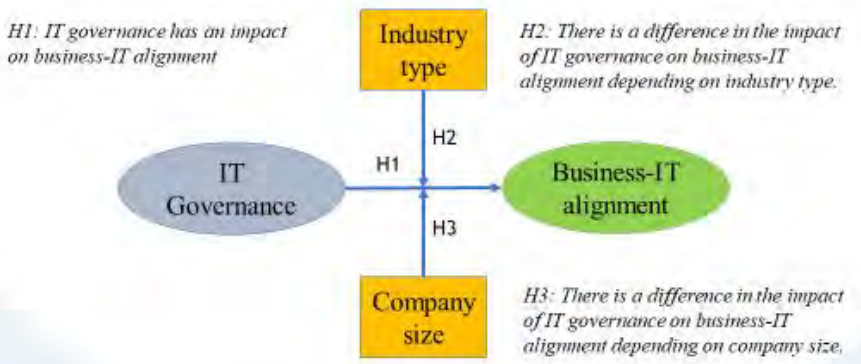
THEORETICAL FRAMEWORK



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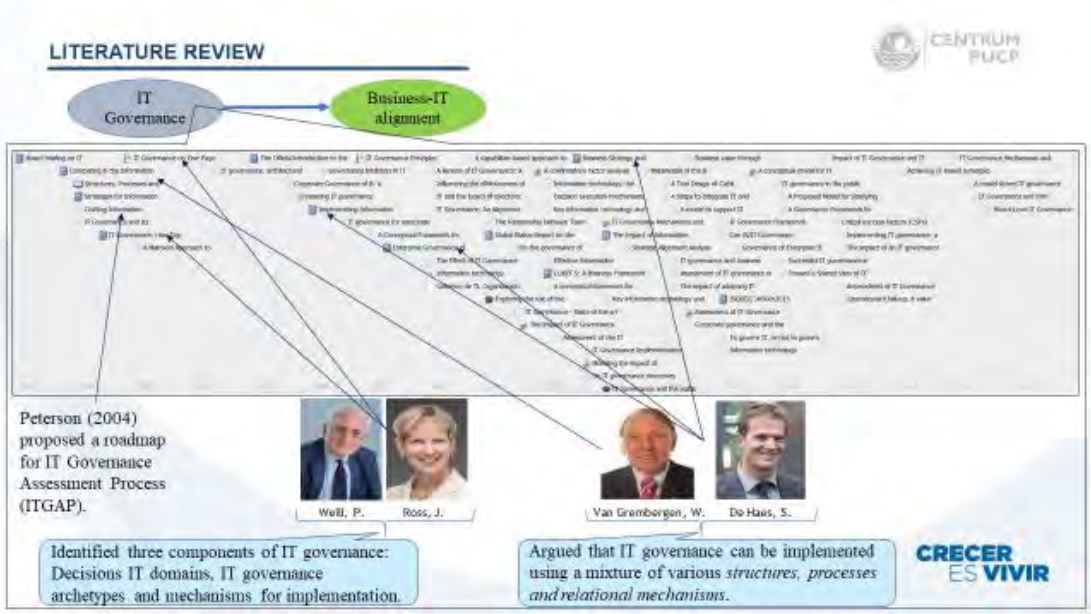
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IT Governance
Business-IT alignment
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Weill, P.
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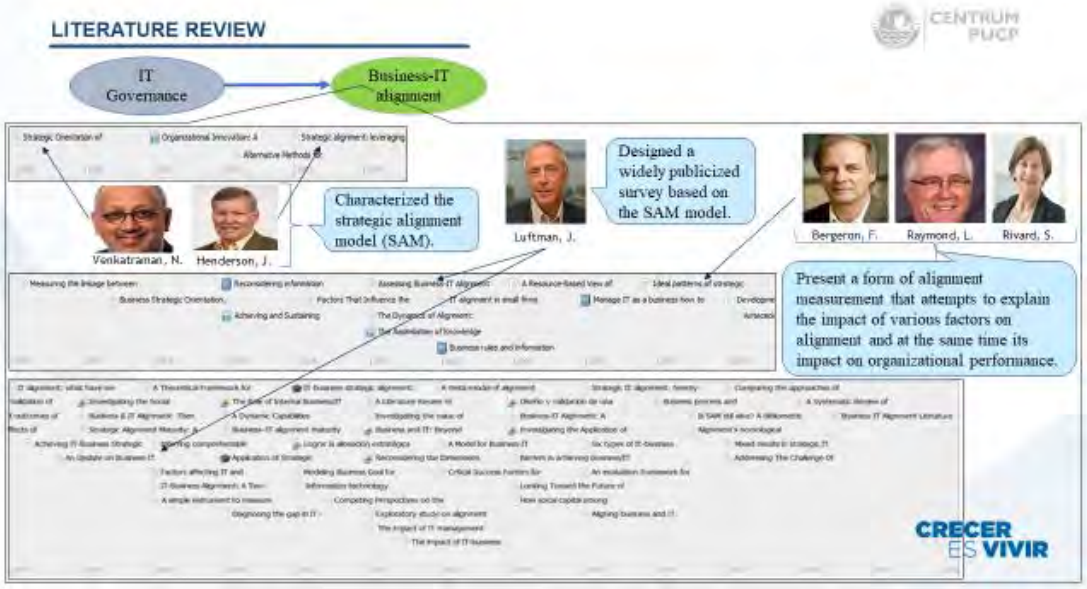
LITERATURE REVIEW
CENTRUM PUCP
IT Governance
Business-IT alignment
Venkatraman, N.
Henderson, J.
Characterized the strategic alignment model (SAM).
Luftman, J.
Designed a widely publicized survey based on the SAM model.
Bergeron, F.
Raymond, L.
Rivard, S.
Present a form of alignment measurement that attempts to explain the impact of various factors on alignment and at the same time its impact on organizational performance.
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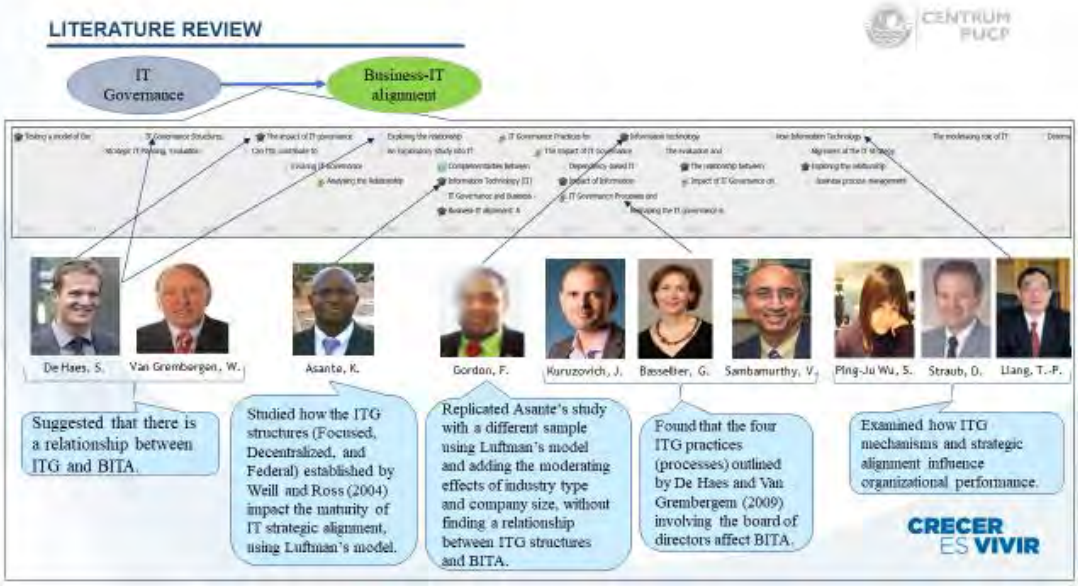
LITERATURE REVIEW
CENTRUM PUCP
IT Governance
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De Haes, S.
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Asante, K.
Gordon, F.
Kuruzovich, J.
Bisselter, G.
Sambamurthy, V.
Ping-Ju Wu, S.
Straub, D.
Liang, T.-P.
Suggested that there is a relationship between ITG and BITA.
Studied how the ITG structures (Focused, Decentralized, and Federal) established by Weill and Ross (2004) impact the maturity of IT strategic alignment, using Luftman's model.
Replicated Asante's study with a different sample using Luftman's model and adding the moderating effects of industry type and company size, without finding a relationship between ITG structures and BITA.
Found that the four ITG practices (processes) outlined by De Haes and Van Grembergen (2009) involving the board of directors affect BITA.
Examined how ITG mechanisms and strategic alignment influence organizational performance.
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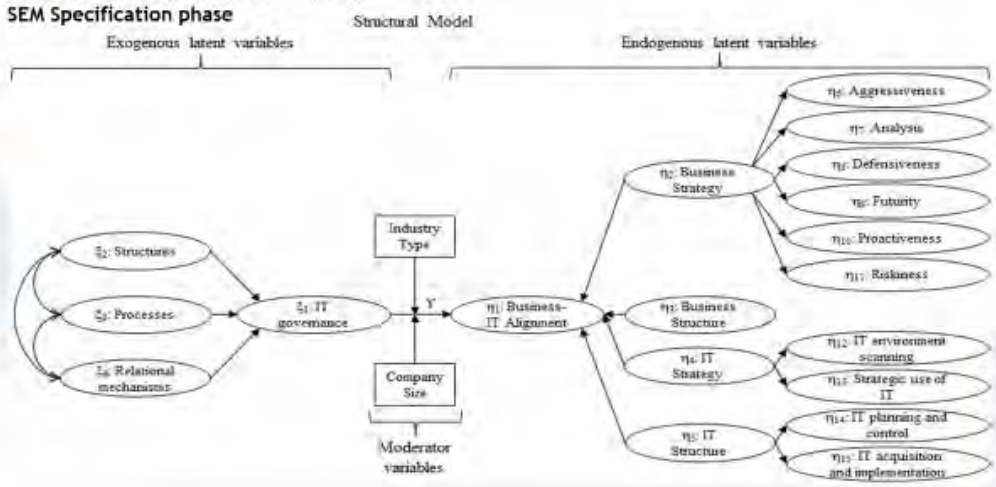
METHOD

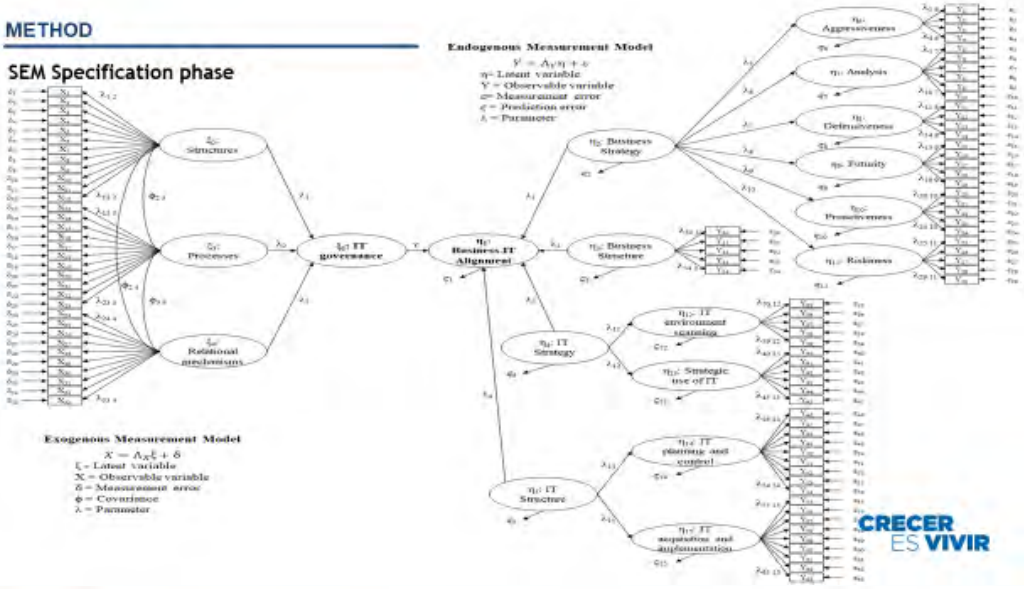
STRUCTURAL EQUATION MODEL (SEM)

SEM Specification phase



METHOD

SEM Specification phase



METHOD

SEM Identification phase

$$p = \frac{v(v+1)}{2} = \frac{96(96+1)}{2} = 4656$$

v: *Observed variables* $= 96$

p: *Number of observations* $= 4656$

q: *Number of estimated parameters* $= 401$

$df_M = p - q = 4656 - 401 = 4255$

SEM select measures and parameter estimation phase

Measure	Index	Shorthand	Value	Rating		
				Low	Medium	High
Absolute Fit	Chi-square	CMIN	5898.20	X		
	Minimum Discrepancy (Normed Chi-Square)	CMIN/DF	1.39			X
	Non-Centrality Parameter	NCP	1643.20	X		
	Goodness-of-Fit Index	GFI	0.84		X	
	Adjusted Goodness-of-Fit Index	AGFI	0.84		X	
	Root Mean Square Residual	RMR	0.08			X
	Root Mean Square Error of Approximation	RMSEA	0.02			X
Comparative or Incremental Fit	Tucker–Lewis Index	TLI or Rho 2	0.98			X
	Normed Fit Index	NFI or Delta 1	0.93			X
	Relative Non-centrality Fit Index	RFI or Rho 1	0.92			X
	Incremental Fit Index	IFI or Delta 1	0.98			X
	Comparative Fit Index	CFI	0.98			X
Parsimonious Fit	Parsimony-Adjusted NFI	PNFI	0.90			X
	Parsimony-Adjusted CFI	PCFI	0.95			X
	Parsimony Goodness of Fit Index	PGFI	0.81		X	
	Parsimony Ratio	PRATIO	0.97			X

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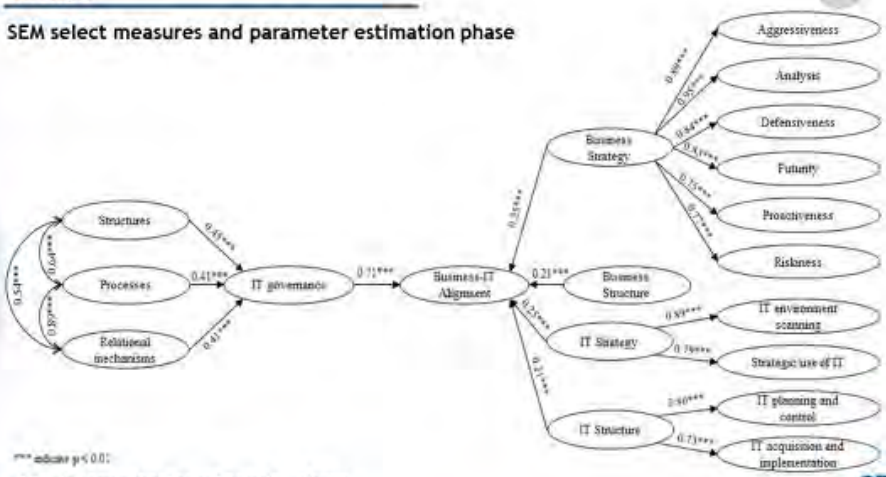
METHOD

SEM select measures and parameter estimation phase



SEM interpretation of results phase

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RESULTS

Results	Default Model	Industry Type						Company Size		
		Manufacturing	Services	IT	Healthcare/ Medical	Education	Retail	Small	Medium	Large
ITG → BITA	0.71***	0.78***	0.73***	0.71***	0.68***	0.69***	0.69***	0.58***	0.62***	0.59***

*** p < 0.01

Alternate Hypothesis	Sig.	Support
H1: IT governance has impact on Business-IT alignment.	p < 0.01	Supported
H2: There is difference in the impact of IT governance on Business-IT alignment between different industry types.	p < 0.01	Not supported
H3: There is difference in the impact of IT governance on Business-IT alignment between company sizes.	p < 0.01	Not supported

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CONCLUSIONS

- This research found that the mechanisms or practices of ITG (structures, processes, and relational mechanisms) have an impact on BITA, so a model was proposed to understand this impact.
- Due to the methodological application, results and the model evaluation show an adequate statistical adjustment of the proposed model, as well as the verification of the main hypothesis, which allows us to affirm that the model explains the relationship between ITG and BITA.
- The moderating effect of the industry type and company size variables, it can be shown that it is not significant. From this finding, it is inferred that, although BITA is affected by ITG, there are no differences when it comes to firms of different sizes and sectors of activity.
- The importance of jointly evaluating ITG mechanisms or practices is also noted, given their high correlation values and their contribution to the impact of ITG on BITA.

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RECOMMENDATIONS

- The results described here have practical implications for enterprises, suggesting that the implementation of better ITG practices will generate better degrees of BITA and therefore improve organizational performance indicators.
- Instead, the non-implementation of such ITG practices may be one of the factors why BITA may not be developed.
- Having demonstrated ITG impact on BITA, one might think that BITA would act as a mediator of ITG impact on other constructs, for example, a firm's innovation capacity.
- Future research should also include additional moderating or mediating effects, such as the type of ITG framework used by the company, the maturity of the company's IT department, whether multinational or not, and so on.
- Additional longitudinal research could also be conducted to analyze variation in ITG and BITA over time.

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