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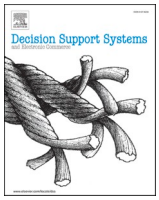

Impact of IT governance process capability on business performance: Theory and empirical evidence

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ABSTRACT

In the digital economy, firms' IT resource investments represent a significant portion of their capital investments. IT governance processes are critical for companies to decide what and how to deploy IT resources and measure and achieve the expected business benefits. This study introduces and measures the concept of *IT governance process capability*, which is defined as the firm's ability to identify, design, implement and leverage the following IT governance processes: IT decision-making, IT planning, IT infrastructure modernization, IT services delivery, and IT monitoring. We propose that IT governance process capability can improve IT performance, which in turn can improve business performance. Using a unique dataset from 881 global companies, we found support for the proposed research model. This paper contributes to the Information Systems (IS) literature on business value of IT by conceptualizing, evaluating, and introducing the construct of *IT governance process capability* and theorizing and proving how this core IT capability positively affects IT performance to enhance business performance.

1. Introduction

Firms' information technology (IT) resource investments represent a significant portion of firms' capital investments, and IT resources' investment may represent 50% of the firms' budget on executing digital transformation strategies [20,25,49], which generates pressure among firms and executives to measure and generate business benefits from IT investments [39]. This leads to an increased focus on establishing effective processes and mechanisms to decide what IT resources and initiatives should be implemented and how and who should make and contribute to these decisions [47]. As a result, IT governance emerges as a key enabler of IT and firm success and a major priority for senior IT and business executives [15,48].

Prior Information Systems (IS) research has conceptualized IT governance as the framework for decision rights and accountabilities that encourages an effective behavior in the use of IT and ensures that the organization's IT sustains and extends the firm's business strategy [28,48]. IT governance refers to the design and implementation of IT decision-making structures (i.e., who makes each IT decision, who has input to an IT decision) and involves the organizational structures and processes to ensure that the firm's IT supports and extends the firm's business strategy [2,27]. Governance of firms' strategic assets (e.g., IT assets) occurs via a set of governance mechanisms such as structures, processes, and relational mechanisms [50]. These structures, processes, and relational mechanisms are considered key governance mechanisms to enable IT and business executives to perform their decision-making and monitoring activities to support IT-business alignment, contributing to an effective IT governance performance [47]. IT governance processes refer to "the formalization and institutionalization of strategic IT decision-making and IT monitoring procedure, to ensure that daily behaviors are consistent with policies and provide input back to decisions" ([16], p. 3).

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The importance of effective IT governance as an enabler of firms' IT business value can be observed in an increasing amount of existing IS research. A leading line of research in IT governance literature has focused on the design of IT governance structures [43] in governance archetypes.[1] In this sense, there is a broad research stream emphasizing the structural forms of IT governance based on the allocation of decision rights (i.e., centralized, decentralized, or hybrid) [48,52,53] and its impact on different aspects such as IT strategic agility [44], social alignment [40], or strategic alignment [10,23,50]. While this literature advances our understanding of the impact of IT governance on firms, it is limited in examining how firms implement *IT governance processes* to improve IT performance and organizational performance. Few exceptions have explored IT governance from a process perspective. Xue et al. [51] employed a process-centric view and examined the IT investment decision process as a multistage process. However, no study analyzes the IT procedural governance-performance relationship [10]. Our study tries to cover this research gap in IS literature.

Drawn upon this prior IS research on IT governance, we propose and introduce the concept of *IT governance process capability* that refers to the firm's ability to identify, design, implement and leverage the following IT governance processes to select the IT resource allocation and IT metrics: IT decision-making, IT planning, IT infrastructure modernization, IT services delivery, and IT monitoring. Our research takes a process-centric view to examine a comprehensive portfolio of IT governance processes, shaping an IT governance process capability. We theorize and propose a research model (Fig. 1) that suggests that IT governance process capability may improve IT performance, enhancing business performance and allowing firms to create value from IT investments. The proposed research model was tested with a unique survey dataset from 881 global firms collected in collaboration with the Information Systems Audit and Control Association (ISACA). We find strong support for the proposed research model.

This paper has the potential to contribute to IS research in two significant ways. First, differently from prior IT governance literature that predominantly focuses on IT governance structures, we propose and operationalize the concept of *IT governance process capability*. Second, based on the IT-enabled organizational capabilities perspective and prior IT governance IS literature, we contribute to the IS literature on the business value of IT by theoretically explaining and empirically finding evidence for a positive relationship between IT governance process capability and IT performance and a positive relationship between IT performance and business performance.

2. Theoretical foundations, conceptualization of constructs, and hypotheses development

2.1. Theoretical foundations

The theoretical foundations of this paper are based on the IT-enabled organizational capabilities perspective and prior IT governance research. First, the IT-enabled organizational capabilities perspective is grounded on the resource-based view [1] and the organizational capabilities theory [19] and has been extensively used in IT business value IS research [18]. This perspective suggests that firms' IT resource investments create business value by developing unique IT capabilities that help firms improve operational, marketing, and financial performance by developing organizational (i.e., business, non-IT) capabilities [33]. We draw on this perspective to argue the role of IT governance process capability and IT performance in improving business performance by developing organizational capabilities.

Second, we draw on prior IT governance research to theoretically introduce and develop the concept of *IT governance process capability*. Firms organize and orchestrate IT governance mechanisms to guide and coordinate IT-related decisions supporting their business strategy [50]. IT governance can be deployed via a mix of structures, processes, and relational mechanisms [15]. Structures refer to clearly defined roles and responsibilities, including committees that enable coordination between IT and business teams (e.g., [23]). IT governance processes refer to all the policies, processes, and procedures that guarantee IT initiatives contribute and support business needs [37]. Finally, relational mechanisms include IT-business collaboration and communication and shared knowledge of appropriate IT-related behaviors [50]. We draw on this prior IT governance literature that considers that IT governance can be deployed via a mix of structures, processes, and relational mechanisms [50] to take a process-centric view and propose IT governance process capability as a key IT capability that helps firms to improve the business value of IT investments.

2.2. Conceptualization of key constructs

The key constructs of this study are IT governance process capability, IT performance, and business performance. Table 1 presents their conceptualization and informing source.

2.3. Hypotheses development and the proposed research model

2.3.1. Impact of IT governance process capability on IT performance

We theorize that IT governance process capability can improve IT performance, which in turn can enhance business performance. The firm's ability to identify, design, implement and leverage IT governance processes to select the IT resource allocation and the IT metrics can enhance IT performance. A clear and well-defined process to engage board's members in IT decision rights for IT budget and IT initiatives prioritization can improve the accomplishment of internal, customer, and financial IT goals [46,47], thus improving IT performance [38]. A plausible way to engage board members in IT decision rights is by implementing and maintaining an IT governance framework [28]. An IT governance framework will ensure appropriate control and optimization over IT resources (i.e., internal IT goals), the delivery of IT services in line with business requirements (i.e., customer IT goals), and will commit executive management for making IT-related decisions (i.e., financial IT goals) [15], thus enhancing IT performance. Selecting the best IT strategy and planning the IT strategic implementation (i.e., IT planning process) can facilitate the systems and business processes integration and IT projects delivered on time and within budget (i.e., internal IT goals) and fulfilling the accomplishment of customer IT goals and enabling IT-business strategic alignment (i.e., financial IT goals) [15,36].

Leveraging IT infrastructure modernization and IT services delivery processes can also improve firms' IT performance. The IT infrastructure modernization process refers to updating the IT infrastructure-enabled shared IT services that provide the foundation for the firm's IT capability [31,52]. The processes that help firms govern decisions on updating and providing modern IT infrastructure services can improve IT agility, IT innovation, and the management of IT risks and benefits [17,52], thus improving IT performance. The IT service delivery process refers to all the operational practices that ensure IT value and services [15,16,31]. Managing incidents, problems, or security services is key to deliver value to customers (i.e., customer IT goals) and realizing the benefits from IT-enabled investments (i.e., financial IT goals), thus improving IT performance. Finally, effective IT governance processes should address how the decisions are monitored and measured [47]. IT monitoring processes allow IT and business executives to evaluate and make sure that IT decisions are consistent with the internal and external control requirements, reducing IT inefficiencies and avoiding IT failures that affect business activities. Operational IT failures result from

[1] Governance archetypes refer to different types of IT governance structure according to the different combinations of people who have either decision rights or input rights to IT decisions (i.e., business monarchy, IT monarchy, feudal, federal, IT duopoly, and anarchy) [47].

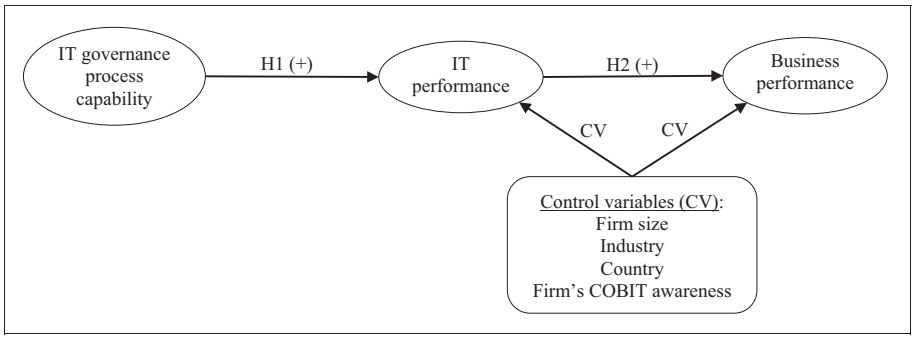

Fig. 1. The proposed research model.

inadequate board monitoring of IT matters [2]. IT metrics monitoring and usage can also avoid ineffective IT investments because it can improve IT organization credibility, IT and business relationships, and the IT strategic impact on business activities [35], thus improving IT performance. Based on the above arguments, we propose the following hypothesis:

Hypothesis 1 (H1). There is a positive relationship between IT governance process capability and IT performance.

2.3.2. The relationship between IT performance and business performance

We also propose that IT performance can positively and directly affect business performance. Meeting IT goals is one of the pathways to achieving enterprise goals. This argument is consistent with the emerging perspective on IT-enabled organizational capabilities [8]. Internal IT goals include IT agility, information security, systems and business processes integration, or IT projects delivered on time and within budget [26,32]. If these goals are accomplished, the firm can offer a portfolio of competitive products and services to create business value [35]. As a key internal IT objective, IT agility has been shown to enable rapid and flexible business processes and agile responses to a changing business environment [17]. Thus, IT can improve product cycle time, allows cross-functional processes and cross-selling opportunities [5], it can make other organizational resources more easily accessible and shareable, facilitating firms to share information across products, services, and locations, store data in a standardized format, and exploiting business opportunities and generating synergies across business units [13].

Learning and growth IT goals include a competent and motivated IT workforce and the knowledge, expertise, and initiatives for business innovation. Although competent human IT assets are considered a rare and firm-specific asset to serve as sources of sustained competitive advantage, human IT assets are also critical to managing knowledge (i.e., integrate, transfer and apply knowledge) and transform it into business gains [7,41]. Firms with a competent IT workforce can integrate IT and business processes more efficiently, develop reliable and cost-effective applications that support the business strategy, work with business units more closely, and anticipate business needs [5], thus improving business performance. For example, Castillo et al. [8] found that business analytics talent is key to explore and exploit unstructured knowledge in social media.

Customer IT goals refer to those IT activities that contribute to the mission of delivering value to customers. IT is a factor to achieve high levels of customer interaction and satisfaction. IT enables the firm to track and predict changing customer preferences and choices and creates new business models advantageous for both customers and service providers (e.g., ride-hailing services) [29]. Customer IT goals also include delivering IT services in line with business requirements, which optimizes costs because the firm ensures IT services meet business needs. IT has also been demonstrated to improve customer service, product quality, and increased market responsiveness [5], thus enhancing business performance.

Finally, financial IT goals concern IT-business strategic alignment, managerial engagement in IT decision-making, and IT risks and benefits management [26,32]. IT-business alignment is crucial to improve the effectiveness of firms' operations. The achievement of IT-business alignment avoids redundant IT projects or systems failing to meet business needs while optimizing business process costs and increase user satisfaction [11,42]. Managerial engagement in IT decision-making and effective IT risks and benefits management can enhance stakeholder value of business investments and improve business risks and benefits management and financial transparency, thus improving business performance. In summary, the firm's accomplishment of internal IT goals, learning and growth IT goals, customer IT goals, and financial IT goals (i.e., IT performance) can enable the accomplishment of internal enterprise goals, learning, and growth enterprise goals, customer enterprise goals and financial enterprise goals (i.e., business performance). Therefore, based on these arguments, we propose the following hypothesis:

Hypothesis 2 (H1). There is a positive relationship between IT performance and business performance.

3. Research methodology

3.1. Sample and data collection

The dataset was collected through an online survey between July 24th and September 1st, 2014. The data collection was performed in a unique collaboration between the author team and ISACA (https://www.isaca.org/). We targeted global companies and their top IT and business executives. The sample respondents are composed of top business executives (59, 6.7%), top IT executives (394, 44.7%), IT audit or compliance representatives (414, 47%), and other qualified respondents (14, 1.6%) from global companies. In total, 896 firms completed the survey, of which 881 were accepted as complete responses for the final analysis. Fifteen observations were dropped because of suspicious response patterns or because the number of missing values for that observation exceeded 15%. Thus, the final sample is composed of 881 firms from 19 different industries: financial (228), government and military (120), IT services and consulting (98), manufacturing and engineering (57), insurance (44), healthcare (38), retail and wholesale (38), education (33), mining and construction (30), utilities (24), transportation (22), pharmaceutical (17), telecommunications (16), public accounting (13), aerospace (8), advertising and media industry (7), legal, law and real estate (6), agriculture (3), and other industries (74). Non-response bias was assessed by verifying that early (in the first 3 weeks) and late respondents did not vary in their responses. *t*-test comparisons between the means of these two groups yielded non-significant differences. Respondents averaged 20 years of working experience.

The questionnaire was designed combining scales and measurements

Table 1
Conceptualization of key constructs.

Construct/indicator	Conceptualization	Informing source
IT governance process capability: Firm's ability to identify, design, implement and leverage the following IT governance processes to select the IT resource allocation and the IT metrics: IT decision-making, IT planning, IT infrastructure modernization, IT services delivery, and IT monitoring.		
IT decision-making process	It reflects the board's responsibilities in IT. It mainly covers decision rights concerning how much the firm invests in IT and the IT initiatives' priorities.	Weill and Ross [47] and De Haes et al. [15]
IT planning process	It refers to the steps intended to reach IT goals, including determining the IT planning processes and objectives, analyzing the current environment and IT strategic choices, selecting the best IT strategy, and planning the IT strategy implementation.	Huang et al. [24] and De Haes et al. [15]
IT infrastructure modernization process	It refers to the process of updating the IT infrastructure-enabled shared IT services that provide the foundation for its IT capability. It includes decisions on what infrastructure services are most critical to achieving business objectives, which should be implemented firmwide or outsourced, or how to keep these underlying technologies up-to-date.	Weill and Ross [48], Xue et al. [52], Kerr and Murthy [31], and De Haes et al. [15]
IT service delivery process	It refers to the process of delivering IT value and services, concentrating on optimizing expenses and proving the value of IT.	Kerr and Murthy [31], and De Haes et al. [15,16]
IT monitoring process	It refers to the activities responsible for assessing and monitoring IT initiatives and IT resources investments. It involves establishing key performance indicators, IT metrics, and business metrics.	Hillman and Thomas [22], Huang et al. [24], and ISACA [26]
IT performance: Firm's degree of accomplishment of the predefined IT goals in terms of internal IT goals, learning and growth IT goals, customer IT goals, and financial IT goals.		Lee et al. [32], and De Haes et al. [15]
Internal IT goals	They include IT goals regarding internal operations such as IT agility, information security, systems and business processes integration, or IT projects delivered on time and within budget.	ISACA [26], and Lee et al. [32]
Learning and growth IT goals	They refer to IT personnel motivation and IT readiness for innovation.	De Haes et al. [15]
Customer IT goals	They refer to how a company performs from the customer perspective and involve IT resources that deliver value to customers.	Kaplan and Norton [30], and ISACA [26]
Financial IT goals	They refer to IT-business strategic alignment, managerial engagement in IT decision-making, and IT risks and benefits management.	ISACA [26], and Lee et al. [32]
Business performance: Overall firm performance, assessed as the firm's degree of accomplishment of the predefined enterprise goals in terms of internal enterprise goals, learning and growth enterprise goals, customer enterprise goals, and financial enterprise goals.		Kaplan and Norton [30], and Creamer and Freund [14]
Internal enterprise goals	They cover the optimization and costs of business processes and operational productivity.	Creamer and Freund [14]
Learning and growth enterprise goals	They mainly refer to business personnel motivation and readiness for innovation.	De Haes et al. [15]
Customer enterprise goals	They refer to all business resources that contribute to deliver value to customers (e.g., customer-centric culture, business agility, and delivery optimization).	Velcu [45] and Wu et al. [50]
Financial enterprise goals	They concern with offering stakeholder value of business investments, business risks and benefits management, and financial transparency.	Kaplan and Norton [30], Velcu [45], and Wu et al. [50]

previously used in IS research (e.g., [15,31]) and the Control Objectives for Information and Related Technology (COBIT) conceptual framework on IT management and IT governance [26]. Table A1 in the appendix includes all relevant sources used to design the questionnaire and assesses the key constructs included in this study. A pilot test was conducted between July 1st to July 21st, 2014, before the survey launch to ensure the validity of the survey and check additional ways to improve questions' clarity and readability. The respondents for the pilot survey were 18 Executive MBA students with significant expertise and experience in IT management and IT governance. The analysis of the pilot test was well balanced in terms of work experience, job functions, and industry representations to rule out any systematic bias in responses. We leveraged the feedback received during this pilot test by improving the readability and clarity of the survey. In this sense, our questionnaire included measurements for the constructs IT governance process capability, IT performance, business performance, firm size (control variable), industry (control variable), country (control variable), and firm's COBIT awareness (control variable).

3.2. Measures

3.2.1. Composite model

We assume that all the constructs included in the research model are operationalized as composite constructs. Composite constructs are the way to operationalize or model artifacts or composite constructs, that is, theoretical concepts that refer to "a combination of ingredients in which the indicators compose the constructs (not cause the artifact)" ([3], p. 4). Therefore, and in contrast to behavioral concepts, usually modeled as common factor (reflective) models, composite constructs are not assumed to exist in nature because they are human or firm-made creations (e.g., IT capability or IT ambidexterity) [4,7].

3.2.2. IT governance process capability, IT performance, and business performance

IT governance process capability is operationalized as a first-order composite construct whose five indicators are the average of the following ingredients: IT decision-making, IT planning, IT infrastructure modernization, IT services delivery, and IT monitoring [24,26]. IT performance is operationalized as a first-order composite construct whose four indicators are the average of the perceived achievement level of IT goals: internal IT goals, learning and growth IT goals, customer IT goals, and financial IT goals [15,32]. Similarly, business performance is operationalized as a first-order composite construct whose four indicators are the average of the perceived achievement level of enterprise goals: internal enterprise goals, learning and growth enterprise goals, customer enterprise goals, and financial enterprise

goals [14,30]. Our set of measurements was designed combining scales and measurements previously used in IS research (e.g., [15,31]) and the COBIT conceptual framework on IT management and IT governance [26]. Table A1 in the appendix includes all relevant sources used to design the questionnaire and assesses the key constructs included in this study.

3.2.3. Control variables

We controlled IT performance and business performance for firm size, industry, country, and COBIT awareness. First, since larger firms have more experience and resources in deploying IT initiatives because they can afford specialized services and skilled people, firm size controls IT performance and business performance. Firm size was operationalized as a first-order composite construct as follows. We classified firms into five groups: small (< 150 employees), small-medium (150–499 employees), medium-large (500–1499 employees), large (1500–14,999 employees), and extra-large (> 14,999 employees). We identify the most important group as a reference group [7]. This group of reference was large. Then, we created for each observation four dummy indicators (excluding the reference group), assigning the value 0 if it does not belong to this firm size and 1 if it does [4]. We created a first-order composite construct with four indicators to measure firm size. The industry was also measured as a first-order composite with 19 indicators whose reference group is banking. Observations came from 93 different countries. We identify the most important country as the group of reference. In this case, the group of reference was the USA. Then, the country was operationalized as a single-indicator construct where 0 means that the observation does not belong to the group of reference (i.e., USA), and 1 means that this observation does belong to the group of reference.[2] Finally, the firm's COBIT awareness was also included as a control variable because firms aware of this framework can better leverage their IT resources, IT projects, and IT initiatives [28]. The firm's COBIT awareness was measured as a dichotomic variable (0: Not aware of COBIT framework, 1: Aware of COBIT framework).

4. Empirical analysis and results

We use partial least squares (PLS)-path modeling (PLS—PM) and the statistical software package ADANCO 2.2 Professional for Windows (http://www.composite-modeling.com/) to empirically test the proposed research model. PLS-PM has become a full-fledged estimator for structural equation modeling and the principal estimator in the field of IS [4,34]. PLS-PM is an appropriate method because it can test for exact overall model fit in both confirmatory and explanatory research, it is optimal to test composite models such as our proposed research model [4], and it allows the bootstrapping procedure to obtain the value of path coefficients and their level of significance.

4.1. Measurement and structural model evaluation

First, a confirmatory composite analysis was conducted to check the overall fit of the saturated model; that is, we assessed whether the measurement model properties are correct and supported by the data [4]. Table 2 shows the results of the confirmatory composite analysis.

[2] We opted for this operationalization for the country for the sake of parsimony. Given that country is a variable with 93 items, we opted for a simpler construct using a dummy variable. We have also run the model using continent as a control variable, operationalized as a composite variable with three indicators (Asia, Europe, North-America, Other, using North-America as a reference group because it was dominant in the sample). This alternative introduction of the control variable did not show significant differences compared to the proposed model. Thus, we opted for a simpler construct to operationalize the country in estimating the proposed model. We thank an anonymous reviewer for this input.

Table 2
Confirmatory composite analysis results.

Discrepancy	First-order level		
	Value	HI_{99}	Conclusion
SRMR	0.025	0.035	Supported
d_{ULS}	0.450	0.881	Supported
d_G	0.234	114.577	Supported

We evaluated the standardized root mean squared residual (SRMR), unweighted least squares (d_{ULS}), and geodesic distance (d_G), well-accepted measures of the discrepancy between the empirical correlation matrix and the model-implied correlation matrix [4,21]. The value of the discrepancies should not exceed the 99%-quantile (or 95%) of the bootstrap discrepancies to ensure a good fit of the saturated model [4]. Our confirmatory composite analysis indicates that our structure of measurements is correct with a 1% of probability.

After the confirmatory composite analysis, we assess the overall model fit for the structural model, the estimated model. We examine the SRMR, d_{ULS}, and d_G discrepancies of the estimated model. Table 3 shows that our research model should not be rejected based on an alpha level of 0.01. This result implies that the proposed research model is a good theory to explain how companies develop an IT governance process capability to improve IT and business performance. We performed a 4999 subsamples bootstrap analysis to test the hypothesized relationships to obtain the beta coefficients and their significance level. Also, R^2, adjusted R^2, and f^2 were assessed for the structural model. We estimate two models: 1) baseline model, which includes the hypothesized relationships and control variables; and 2) mediation model, which includes the direct effect between IT governance process capability and business performance keeping the control variables. Regarding the baseline model, we find support for the two main relationships H1 and H2, suggesting that IT governance process capability is positively related to IT performance (H1) ($\beta = 0.902$, $p_{one\text{-}tailed} < 0.001$), and that IT performance is positively related to business performance (H2) ($\beta = 0.843$, $p_{one\text{-}tailed} < 0.001$). Control variables did not significantly affect IT performance or business performance, but their inclusion is crucial to recheck H1 and H2 support after controlling these control variables.

R^2 values denote the explained variance of the endogenous variables. In this case, IT governance process capability, firm size, industry, country, and firm's COBIT awareness explain 82,3% of the variance of IT performance, while IT performance, firm size, industry, country, and firm's COBIT awareness explain the 70.6% of the variance of business performance in the baseline model. These high R^2 values provide additional excellent support to the proposed research model. f^2 values range from 0 to 4.432, indicating no effect to large effect sizes in the proposed research model [4]. Table 3 depicts the hypotheses test, and Table A2 (in the Appendix) shows the correlations matrix.

4.2. Mediation analysis

Weill and Ross [48] suggested that IT governance and business performance correlate quite well. We propose that this relationship is not direct but mediated by IT performance. We evaluate the indirect, direct, and total effect of the relationship between IT governance process capability and business performance and find a non-significant direct effect between them, but a positive and significant indirect effect ($\beta = 0.688$, $p_{one\text{-}tailed} < 0.001$). The relationship between IT governance process capability and business performance is mediated by IT performance. Table 4 shows the mediation analysis results. In addition, the support to all the hypothesized relationships is kept in the mediation model, which strengthens the results of the hypotheses test.

4.3. Post-hoc multi-group analysis: Industry's strategic role of IT

IT has been well-recognized as key to transforming organizations

Table 3
Results of the structural model evaluation.

Beta coefficient	Baseline model		Mediation model	
IT governance process capability → IT performance (H1)	0.902*** (30.055) [0.837, 0.955]		0.901*** (29.717) [0.835, 0.954]	
IT governance process capability → Business performance			0.088 (0.454) [−0.299, 0.421]	
IT performance → Business performance (H2)	0.843*** (35.518) [0.789, 0.881]		0.764*** (3.961) [0.432, 1.140]	
Firm size → IT performance (control variable)	0.008 (0.421) [−0.035, 0.043]		0.008 (0.399) [−0.034, 0.044]	
Industry → IT performance (control variable)	−0.030 (−0.759) [−0.071, 0.066]		−0.031 (−0.776) [−0.072, 0.067]	
Country → IT performance (control variable)	0.008 (0.671) [−0.015, 0.033]		0.008 (0.622) [−0.016, 0.032]	
Firm's COBIT awareness → IT performance (control variable)	0.038 (0.858) [−0.019, 0.123]		0.032 (0.821) [−0.019, 0.121]	
Firm size → Business performance (control variable)	−0.008 (−0.373) [−0.042, 0.042]		−0.009 (−0.414) [−0.043, 0.044]	
Industry → Business performance (control variable)	0.015 (0.578) [−0.055, 0.049]		0.015 (0.582) [−0.053, 0.048]	
Country → Business performance (control variable)	0.014 (0.793) [−0.019, 0.051]		0.015 (0.822) [−0.019, 0.052]	
Firm's COBIT awareness → Business performance (control variable)	−0.033 (−1.865) [−0.069, 0.002]		−0.030† (−1.544) [−0.070, 0.008]	
R^2 values				
IT performance	0.823		0.821	
Business performance	0.706		0.708	
Overall model fit evaluation: Type of discrepancy	Value	HI_{99}	Value	HI_{99}
SRMR	0.025	0.036	0.025	0.035
d_{ULS}	0.452	0.890	0.447	0.877
d_G	0.236	115.321	0.235	114.584
f^2 values				
IT governance process capability → IT performance (H1)	4.432		4.382	
IT governance process capability → Business performance			0.005	
IT performance → Business performance (H2)	2.329		0.357	
Firm size → IT performance (control variable)	0.000		0.000	
Industry → IT performance (control variable)	0.005		0.005	
Country → IT performance (control variable)	0.000		0.000	
Firm's COBIT awareness → IT performance (control variable)	0.006		0.006	
Firm size → Business performance (control variable)	0.000		0.000	
Industry → Business performance (control variable)	0.000		0.001	
Country → Business performance (control variable)	0.001		0.001	
Firm's COBIT awareness → Business performance (control variable)	0.004		0.003	

Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001 (one-tailed test).

Table 4
Mediation analysis: indirect, direct, and total effects.

Relationship	Direct effect	Indirect effect	Total effect
IT governance process capability → Business performance	0.088 (0.454) [−0.299, 0.421]	0.688*** (3.645) [0.378, 1.073]	0.776*** (32.552) [0.725, 0.818]

Note: †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001 (one-tailed test).

[12] and industries [54]. Chatterjee et al. [9] advanced that industries can be classified into three groups according to the strategic role of IT. The strategic role of IT in different industries reflects the main function that IT plays for a firm's competition across industries. Based on Chatterjee et al.'s [9] work, we classify the sample firms into three categories regarding the strategic roles IT can perform in their main industry: automate, informate, and transform industries. In automate industries (19.3%), the ultimate objective of IT is to "replace human labor by automating business processes" (e.g., metal manufacturing). In informate industries (41.4%), IT provides key data and information to support control and coordination at higher levels while empowering employees with pertinent information at lower levels (e.g., food services). Finally, in transform industries (39.4%), the strategic role of IT is to "fundamentally alter traditional ways of doing business by redefining business processes and relationships" (e.g., airlines) ([9], p. 49). This classification provides a way to consider the industry context in a multi-group analysis. The IT strategic role within an industry could influence how the IT processes are governed and managed and how IT governance process capability contributes to achieving IT and enterprise goals. Thus, we compare each pair of groups as a post-hoc analysis.

Regarding the first multi-group analysis (automate vs. transform), we found a significant difference ($p < 0.10$) on the relationship between IT governance process capability and IT performance (H1) (0.983*** vs. 0.923***) and between IT performance and business performance (H2) (0.798*** vs. 0.866 ***, $p < 0.10$). It may be reasonable to think that companies belonging to industries whose strategic role of IT is transformational generate more business value by exploiting IT performance-enabled business transformation (H2, i.e., radical innovation or transformation). However, it seems counter-intuitive that companies belonging to industries whose strategic role of IT is to automate processes yield a superior beta coefficient than transformational companies regarding the effect of IT governance process capability on IT performance and that the difference between the two groups is significant. This result can be explained because the degree of maturity of an automate strategic role of IT is greater than for a transformative strategic role of IT in organizations.

Multi-group analysis 2 (automate vs. informate) yields a significant difference ($p < 0.10$) on the relationship between IT governance process capability and IT performance (0.983*** vs. 0.874***). Companies belonging to industries whose strategic role of IT is to automate processes obtain more IT value from the ability to govern IT processes than companies whose strategic role of IT is informative (i.e., using IT to collect, store, process, and disseminate information). Finally, multi-group analysis 3 (informate vs. transform) yields a significant difference ($p < 0.10$) on the effect of a firm's COBIT awareness on IT performance. Companies belonging to industries whose strategic role of IT is to transform business processes are more aware of the COBIT framework for governing and managing IT, enabling a better IT performance. We also found a significant difference ($p < 0.10$) in the effect of the country on business performance, which was greater for companies that use IT for transformation. This result suggests that the degree of maturity of the transformative role of IT and its return on business performance can be greater in U.S. organizations than firms from other countries.

4.4. Triangulation with secondary data of business performance

We triangulated our perceptual business performance measure by estimating a robustness model where business performance was measured with Tobin's q in 2014 with secondary data collected from the COMPUSTAT database. Tobin's q is a well-accepted measurement of long-term business performance [6,33]. The correlation between our perceptual measure of business performance and Tobin's q was 0.548***. This triangulation provides additional support to our business performance measurement. As the number of companies that reported their name in the questionnaire administration was very small, the

number of companies for which we could collect Tobin's q was also very small ($N = 30$), which precluded us from replacing our perceptual measure of business performance by Tobin's q in the main empirical analysis, because the cost (number of dropped observations) is larger than the benefit (i.e., combining perceptual and secondary data in the empirical analysis).[3]

5. Discussion and conclusion

5.1. Summary of findings and discussion of results

Effective IT governance is critical to business success because it assures effective use of IT in a context where many firms invest in digital transformation programs and where IT risks have become crucial [16]. IT governance studies have found that firms that develop a mature IT governance scheme can outperform their competitors [48,51]. This is one of the reasons IT governance models and frameworks have been proposed to help companies govern IT resources and initiatives and realize business value from IT [28]. Consistent with prior IT governance literature that proposes that IT governance encompasses a mix of structures, formal processes, and relational mechanisms as key governance mechanisms [50], we take a process-centric view to focus on the underexplored field of IT governance processes. IT governance processes are critical for companies to decide the appropriate degree of IT resources deployment and successfully achieve the expected business benefits. Drawn upon the IT-enabled organizational capabilities perspective and prior IT governance IS literature, we examine the impact of IT governance process capability on business performance. We argue that firms with the ability to identify, design, implement, and leverage the following IT governance processes: IT decision-making, IT planning, IT infrastructure modernization, IT service delivery, and IT monitoring, or in other words, firms with an IT governance process capability, can improve IT performance, ultimately enhancing business performance. We empirically test the proposed research model on a unique survey dataset of 881 global companies. The empirical analysis supports the proposed research model. First, we found a positive and highly significant relationship between IT governance process capability and IT performance. The implementation of clear and well-defined IT decision-making processes engages and commits board members in IT decisions such as how much to invest (i.e., IT budget) or where to allocate IT investments (i.e., IT initiatives prioritization), crucial decisions that improve the accomplishment of the internal, customer and financial IT goals (i.e., IT performance). Similarly, selecting and planning the best IT strategic choice ensures that IT projects are delivered on time and within budget (i.e., a key internal IT goal) while delivering value to customers and enabling IT-business strategic alignment. Leveraging IT infrastructure modernization and IT services delivery processes are also key to improve firms' IT performance. An updated and modern IT infrastructure is a source of IT agility and the basis to introduce IT innovations faster than competitors. The IT service delivery process concerns the delivery of IT value and services, concentrating on optimizing expenses and proving the value of IT, which is key to achieve customer IT goals and realize the benefits from IT-enabled investments (i.e., financial IT goals). Finally, IT monitoring processes are required to reduce IT inefficacies, avoid operational IT failures, improve IT organizational credibility, the IT and business relationship, and IT strategic impact on business activities, thus improving IT performance.

Second, we found a positive and highly significant relationship between IT performance and business performance. Our findings provide empirical support for the mediating role of IT performance in improving business performance through IT governance process capability. A higher capability to govern IT processes will improve business performance indirectly through the improvement of IT performance. IT agility (i.e., an internal IT goal) is the basis to enable rapid and flexible business processes and agile responses, which will allow the firm to optimize business processes costs (i.e., internal enterprise goal) and deliver a portfolio of competitive products and services (i.e., financial enterprise goal). Firms with a competent IT workforce can integrate IT and business processes more efficiently, develop reliable and cost-effective applications that support the business strategy, work with business units closely, and anticipate business needs, positively impacting business performance. IT is also important to achieve customer enterprise goals (i.e., business performance). IT performance enables predicting changing customer preferences, improving customer service, and achieving high customer interaction and satisfaction levels. Finally, financial IT goals such as IT-business strategic alignment are key to accomplish enterprise goals. The alignment between IT and business avoids redundant IT projects or systems failing to meet business needs while optimizing business process costs and increase user satisfaction, thus improving business performance.

We performed a post-hoc multi-group analysis to examine the potential differences in the proposed research model depending on the strategic role of IT (i.e., to automate, informate, or transform). We compared two of the groups in each of the three multi-group analyses. We found that companies belonging to industries whose strategic role of IT is transformational generate greater IT business value by exploiting IT performance-enabled business transformation (H2, i.e., radical innovation or transformation). We also found that companies belonging to industries whose strategic role of IT is to automate processes yield a superior beta coefficient than transformational companies regarding the effect of IT governance process capability on IT performance. We think the latter may be a counter-intuitive result that can be explained because firms belonging to industries where the strategic role of IT is to automate have a higher level of maturity in terms of governance processes than those firms whose strategic role of IT is mainly transformative. In a second multi-group analysis, we found that companies belonging to industries whose strategic role of IT is to automate processes obtain more IT value from the ability to govern IT processes than companies whose strategic role of IT is informative. Finally, in the last multi-group analysis, we found that companies belonging to industries whose strategic role of IT is to transform business processes are more aware of the COBIT framework for governing and managing IT, enabling a better IT performance and that the degree of maturity of the transformative role of IT and its return on business performance can be greater in U.S. organizations than firms from other countries. Drawing on these results, we encourage IS scholars to investigate this research topic as it seems very promising.

5.2. Incremental contributions to IS research

This paper has the potential to contribute to IS research in two significant ways. First, we draw upon the IT-enabled organizational capabilities perspective, IT capabilities, prior IS research on IT governance, and the COBIT conceptual framework to introduce, measure, and test the concept of *IT governance process capability*. Our comprehensive analysis of prior IS research on IT governance shows that this prior IS literature has primarily focused on the role IT governance structures play on firm outcomes. Differently, our construct IT governance process capability focuses on IT processes and the effects of core IT processes identification, design, implementation, and leveraging on IT performance and business performance. While this prior IS literature has advanced our understanding of the impact of IT governance on firms, our understanding and theoretical development on how firms implement *IT governance processes* to achieve IT performance and

[3] We very much appreciate an anonymous reviewer's comments on this regard. Besides, using Tobin's q as a proxy of business performance may suffer from potential problems of endogeneity and it would require adding additional control variables. We encourage future IS scholars to examine the impact of IT governance process capability on Tobin's q including additional instrumental or control variables or delaying Tobin's q measurement.

organizational performance is limited [10]. IT governance process capability is defined as the firm's ability to identify, design, implement and leverage the following IT governance processes to select the IT resource allocation and the IT metrics: IT decision-making, IT planning, IT infrastructure modernization, IT services delivery, and IT monitoring. Several authors revealed that IT governance should be deployed via a set of structures, processes, and relational mechanisms [37,50], being IT governance processes an underexplored field [10]. We take a process-centric view of IT governance as processes are the building blocks of IT strategy and are considered a key mechanism to select the IT resource allocation and the IT metrics. The introduction and empirical testing of the construct are unique in the IS literature, not only by its operationalization and conceptualization but also because we propose IT governance processes as a key IT capability that helps firms create business value from IT investments.

Second, based on the IT-enabled organizational capabilities perspective and prior IT governance IS literature, we contribute to the IS literature on the business value of IT by theoretically explaining and empirically finding evidence for a positive relationship between IT governance process capability and IT performance and a positive relationship between IT performance and business performance. While prior IS research has proposed that IT governance may directly affect organizational performance [48,55], we argue and theorize that the relationship between IT governance process capability and business performance is mediated by IT performance. Our theorization received empirical support from the empirical analysis.

5.3. Limitations and avenues for future IS research

This paper also presents some limitations which may lead to future IS research opportunities. First, although we triangulate our perceptual measure of business performance with secondary data, future studies could measure business performance with archival data and examine if IT governance process capability affects long-term business performance. Also, the self-report data come from a single informant. Although the sample is very large, measures may have higher reliability when answered by two or more members of the same organization. Second, the dataset used in this research is not uniformly distributed over the categories of the control variables. Smaller organizations, automate industries, and business respondents are somewhat underrepresented compared to the other categories of these control variables. Nevertheless, this did not limit the ability to estimate the model in all data subsets created using these categories. Third, firms should consider that the COBIT framework for governing and managing IT does not simply represent a codified step-by-step manual but rather is highly context-dependent and should be tailored to the internal and external context of the organization. Although we control for firm size, industry, country, and firm's COBIT awareness, future IS research could include external factors such as environmental or technological uncertainty. We found interesting results regarding the multi-group analysis that may also guide future IS research. Specifically, we found a counter-intuitive result as firms belonging to industries where the strategic role of IT is to automate yielded a higher beta coefficient than transform industries in the first hypothesis, being this difference significant. Future IS research could examine why and how automated firms can better exploit IT resources and IT capabilities because of their ability to govern IT processes. A possible explanation could be that, differently from transformative industries where IT is used to completely alter the nature of business processes, in automate industries, processes are automated substituting labor by IT so that IT does not substantively change the range of tasks humans can perform and how they perform them [46]. In such cases, the ability to govern those automated processes may lead to a higher IT value creation. As we focus on IT processes, future IT research may also examine the strategic roles of IT at a process level. Finally, we propose a composite construct of *IT governance process capability*. We encourage IS scholars to rethink and retest the understanding and recipe of this construct and explore which other role IT governance process capability might play in organizations (e.g., reinforcing or amplifying role).

5.4. Lessons learned for IT and business executives

Our study presents three critical lessons learned for IT and business executives. First, we explain theoretically and develop the concept of *IT governance process capability*. We refer to IT governance process capability as the firm's ability to identify, design, implement and leverage the following IT governance processes to select the IT resource allocation and the IT metrics: IT decision-making, IT planning, IT infrastructure modernization, IT services delivery, and IT monitoring. The IT decision-making process reflects the board's responsibilities in IT. It refers to who holds the decision rights for how much the firm invests in IT (i.e., IT budget) and where to allocate IT investments (i.e., IT initiatives priorities). The IT planning process mainly concerns the selection of the IT strategy and the IT strategy implementation planning. IT infrastructure modernization involves decisions about what infrastructure services are most critical to achieving business objectives, which should be implemented firmwide or outsourced, or how to keep these underlying technologies up-to-date. The IT service delivery process refers to ensuring the proper delivery of IT value and services. Finally, the IT monitoring process refers to those policies and procedures to assess and monitor IT initiatives and IT investments. IT and business executives should work jointly to develop an IT governance process capability by identifying, designing, implementing, and leveraging a set of clear and well-defined IT decision-making processes that guide executives on how much to spend on IT and which business processes should receive what portion of the IT budget. This study also illustrates how IT and business executives select and implement an effective IT strategy and design IT processes to manage and identify the IT strategic role and which IT infrastructure services must be updated and modernized. Similarly, our arguments and findings suggest IT and business executives the IT processes to ensure consistent IT services delivery and implement key IT performance indicators or metrics, i.e., other IT governance process capability ingredients.

Second, our study encourages IT and business executives to exploit and leverage IT governance process capability to improve IT performance. Identifying, designing, implementing, and leveraging IT governance processes lead to greater IT goals achievement. For example, implementing a clear and well-defined IT governance framework ensures the appropriate control on IT resources and that the delivery of IT services is in line with business requirements and commits board members to strategic IT-related decisions. Implementing an IT planning process is equally necessary to deliver IT projects on time and within budget and fulfill customers' requirements. IT and business executives should also consider if the IT infrastructure is adequate. The processes that help firms govern decisions on updating and providing modern IT infrastructure services improve IT agility, IT innovation, and IT risks and benefits management. Moreover, IT and business executives need to establish the IT processes to deliver consistent IT value and services (e.g., managing problems or IT security issues) to achieve customer and financial IT goals. Finally, our study's findings suggest that implementing IT metrics to measure and monitor IT investments is key to avoiding IT failures and ensuring IT resource investments contribute to business needs.

Finally, our investigation suggests IT performance enhances business performance. IT and business executives should dance together to define IT goals, enabling them to accomplish enterprise goals. Suppose IT and business executives achieve IT goals such as IT agility, information security, or IT projects delivered on time and within budget. In that case, the firm will be better positioned to respond to market threats and offer a portfolio of competitive products and services. Similarly, it is equally important to maintain a competent and motivated IT workforce, including its knowledge, expertise, and abilities. In such a situation, the

firm will manage knowledge better and transform it into business insights, improving business performance. IT is also key to achieve higher levels of customer satisfaction and intimacy. In this sense, IT and business executives should deliver IT services in line with business and customer requirements while improving customer service. Finally, this research suggests to IT and business executives that IT-business strategic alignment and managerial engagement in IT decisions improve the stakeholder value of business investments and the effectiveness of the firm's operations. In this sense, our research explains and shows empirical evidence on how IT and business executives can create business value of IT from IT governance process capability. IT governance process capability does matter.

5.5. Core conclusions

Motivated by the underexplored relationship between IT governance processes and firm performance, this study examines the impact of IT governance process capability on IT performance and business performance. Theoretically, we draw upon the IT-enabled organizational capabilities perspective and prior IT governance research to introduce the concept of *IT governance process capability*. Next, we theorize that IT governance process capability can improve IT performance, which in turn can enhance business performance. Our central thesis was tested with a survey dataset from 881 firms and sheds light on how the business value of IT is created through a specific and underexplored IT governance mechanism: IT processes. We find that firms that identify, design, implement, and leverage IT decision-making, IT planning, IT infrastructure modernization, IT services delivery, and IT monitoring processes are in a better position to accomplish IT goals such as IT agility, IT innovation, or IT-business strategic alignment and that those firms are also able to meet internal enterprise goals better, such as learning and growth enterprise goals, customer enterprise goals and financial enterprise goals, thus improving their business performance.

Author statement

All authors equally contributed to the design and development of this research.

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Appendix

Table A1
Descriptive information on survey items.

Construct/Indicator	Mean	S.D.	Relevant sources
IT governance process capability (scale ranges from 1 to 5 where 1: Not implemented, 2: Somewhat implemented, 3: Partly implemented, 4: Mainly implemented, 5: Fully implemented) (composite mode B)			
IT decision-making process	3.121		ISACA [26], Kerr and Murthy [31], De Haes et al. [15], and Joshi et al. [28]
Ensure governance framework setting and maintenance	3.102	1.184	
Ensure benefits delivery	3.030	1.113	
Ensure risk optimization	3.132	1.155	
Ensure resource optimization	3.154	1.063	
Ensure stakeholder transparency	3.189	1.145	
IT planning process	3.453		Huang et al. [24], ISACA [26], Kerr and Murthy [31], and De Haes et al. [15]
Manage the IT management framework	3.378	1.070	
Manage strategy	3.497	1.052	
Manage enterprise architecture	3.322	1.113	
Manage innovation	2.927	1.145	
Manage portfolio	3.270	1.085	
Manage budget and costs	3.861	1.001	
Manage human resources	3.638	1.011	
Manage relationships	3.406	1.063	
Manage service agreements	3.488	1.105	
Manage suppliers	3.613	1.027	
Manage quality	3.326	1.073	
Manage risk	3.393	1.074	
Manage security	3.776	1.012	
IT infrastructure modernization process	3.381		Huang et al. [24], ISACA [26], Kerr and Murthy [31], and De Haes et al. [15]
Manage programs and project	3.605	0.997	
Manage requirements definition	3.383	1.070	
Manage solutions identification and build	3.391	1.037	
Manage availability and capacity	3.509	1.031	
Manage organizational change enablement	3.168	1.128	
Manage changes	3.476	1.045	
Manage change acceptance and transitioning	3.340	1.070	
Manage knowledge	3.040	1.105	
Manage assets	3.498	1.055	
Manage configuration	3.401	1.083	
IT service delivery process	3.643		Huang et al. [24], ISACA [26], Kerr and Murthy [31], and De Haes et al. [15]
Manage operations	3.781	0.955	
Manage service requests and incidents	3.841	0.973	

(*continued on next page*)

Table A1 (*continued*)

Construct/Indicator	Mean	S.D.	Relevant sources
Manage problems	3.606	1.011	
Manage continuity	3.591	1.051	
Manage security services	3.697	1.019	
Manage business process controls	3.340	1.071	
IT monitoring process	3.377		Huang et al. [24], ISACA [26], Kerr and Murthy [31], and De Haes et al. [15]
Monitor, evaluate, and assess performance and conformance	3.261	1.108	
Monitor, evaluate, and assess the system of internal control	3.377	1.142	
Monitor, evaluate, and assess compliance with external requirements	3.492	1.111	
IT performance (scale ranges from 1 to 5 where 1: Not achieved, 2: Somewhat achieved 3: Partly achieved, 4: Mainly achieved, 5: Fully achieved) (composite mode B)			
Internal IT goals	3.351		Kaplan and Norton [30], ISACA [26], Lee et al. [32], and De Haes et al. [15]
IT agility	3.064	1.069	
Security of information, processing infrastructure, and applications	3.656	1.000	
Optimization of IT assets, resources, and capabilities	3.219	1.038	
Enablement and support of business processes by integrating applications and technology into business processes	3.306	0.977	
Delivery of programs delivering benefits, on time, on budget, and meeting requirements and quality standards	3.193	1.037	
Availability of reliable and useful information for decision making	3.325	1.000	
IT compliance with internal policies	3.696	1.001	
Learning and growth IT goals	3.372		Kaplan and Norton [30], ISACA [26], Lee et al. [32], and De Haes et al. [15]
Competent and motivated business and IT personnel	3.433	1.055	
Knowledge, expertise, and initiatives for business innovation	3.310	1.036	
Customer IT goals	3.501		Kaplan and Norton [30], ISACA [26], Lee et al. [32], and De Haes et al. [15]
Delivery of IT services in line with business requirements	3.531	0.945	
Adequate use of applications and IT solutions	3.471	0.967	
Financial IT goals	3.431		Kaplan and Norton [30], ISACA [26], Lee et al. [32], and De Haes et al. [15]
Alignment of IT and business strategy	3.424	1.006	
IT compliance and support for business compliance with external laws and regulations	3.748	0.981	
The commitment of executive management for making IT-related decisions	3.565	1.068	
Manage IT-related business risk	3.357	1030	
Realized benefits from IT-enabled investments and services portfolio	3.187	1.048	
Transparency of IT costs, benefits and risk	3.304	1.108	
Business performance (scale ranges from 1 to 5 where 1: Not achieved, 2: Somewhat achieved 3: Partly achieved, 4: Mainly achieved, 5: Fully achieved) (composite mode B)			
Internal enterprise goals	3.347		Kaplan and Norton [30], Creamer and Freund [14], Velcu [45], ISACA [26], De Haes et al. [15], and Wu et al. [50]
Optimization of business process functionality	3.218	0.999	
Optimization of business process costs	3.189	1.014	
Managed business change programs	3.240	0.996	
Operational and staff productivity	3.357	0.960	
Compliance with internal policies	3.729	0.975	
Learning and growth enterprise goals	3.334		Kaplan and Norton [30], Creamer and Freund [14], ISACA [26], and De Haes et al. [15]
Skilled and motivated people	3.417	1.013	
Product and business innovation culture	3.251	1.075	
Customer enterprise goals	3.392		Kaplan and Norton [30], Creamer and Freund [14], Velcu [45], ISACA [26], De Haes et al. [15], and Wu et al. [50]
Customer-oriented service culture	3.612	1.022	
Business service continuity and availability	3.592	1.031	
Agile responses to a changing business environment	3.218	1.048	
Information-based strategic decision making	3.306	1.033	
Optimization of service delivery costs	3.231	1.036	
Financial enterprise goals	3.619		Kaplan and Norton [30], Creamer and Freund [14], Velcu [45], ISACA [26], Wu et al. [50], and De Haes et al. [15]
Stakeholder value of business investments	3.414	1.028	
Portfolio of competitive products and services	3.435	1.038	
Managed business risk (safeguarding of strategic assets)	3.487	0.997	
Compliance with external laws and regulations	3.983	0.968	
Financial transparency	3.778	1.034	
Firm size (composite mode B)			
What is the size of your company? (1: Small <150, 2: Small-medium 150–499, 3: Medium-large 500–1499, 4: Large 1500–14,999, 5: Extra-large >15,000)	3.509	1.225	
Industry			
In which sector is your company active?	9.669	5.123	
Country	0.234	0.423	

Table A2
Correlation matrix.

Construct	1	2	3	4	5	6	7
1. IT governance process capability	1.000						
2. IT performance	0.906	1.000					
3. Business performance	0.775	0.839	1.000				
4. Firm size	0.092	0.092	0.070	1.000			
5. Industry	−0.160	−0.173	−0.130	−0.003	1.000		
6. Country	−0.030	−0.020	−0.003	0.072	0.091	1.000	
7. Firm's COBIT awareness	−0.029	0.008	−0.026	0.006	0.011	0.035	1.000

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