Towards a Viable System Model-based Organizing Logic for IT Governance

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Towards a Viable System Model-based Organizing Logic for IT Governance

Short Paper

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Abstract

A growing importance of IT for organizations results in a growing need for effective IT governance, which effectuates appropriate control over an organization's current and future IT use. The ultimate goal of this is to enable both IT business value creation and protection. However, the research domain of IT governance is somewhat hampered by a lack of theoretical underpinnings for IT governance and its implementation, which makes it difficult to explain from a theoretical perspective how effective IT governance should be organized, and why. In response, the present research aims to articulate a Viable System Model (VSM)-based organizing logic for IT governance, by drawing theoretical parallels between the VSM and IT governance.

Keywords: IT governance, Viable System Model (VSM), Management Cybernetics

Introduction

In contemporary business, information technology (IT) is increasingly being leveraged for strategic purposes, in alignment with fundamentally renewed (digital) business strategies (Bharadwaj et al. 2013). Resulting from such growing importance of IT, management is increasingly confronted with IT-related decision-making (Wu et al. 2015). The disciplines of IT management and IT governance have been developed to assist management with IT-related decision-making at the operational, tactical, and strategic levels, and thereby ultimately ensuring appropriate control over the organization's current and future IT use (Wilkin and Chenhall 2019).

Existing research is in agreement that good IT governance is a major enabler of IT business value (De Haes et al. 2020). In the words of Weill and Ross (2004, pp. 3-4): *"[...] effective IT governance is the single most important predictor of the value an organization generates from IT."* Furthermore, nonexistent or inappropriate IT governance can have negative consequences (Ali and Green 2012), like information security breaches (Raghupathi 2007). In short, IT governance has the potential to enable both the creation and the protection of IT business value (Benaroch and Chernobai 2017). As such, an effective IT governance approach is of indisputable importance for organizations operating in a digitizing business environment.

Gregor (2006) argued that drawing on powerful general theories (or "grand theories") might be highly relevant for IS research. Still, within the specific research domain of IT governance, studies that leverage such theoretical lenses are rare. Albeit many descriptive IT governance studies have surfaced over time (e.g. De Haes and Van Grembergen (2009); Ali and Green (2012); Prasad et al. (2012) etc.), such studies often merely draw on an established typology of IT governance mechanisms (De Haes et al. 2020). The fact that a strong theoretical lens for IT governance (and its implementation) is lacking makes it difficult to explain from a theoretical viewpoint *how* IT governance should be organized for it to be effective and *why*. As such, progress of the knowledge base is hampered.

Addressing this research gap, the present research investigates the concept of IT governance through Beer's (1979; 1981; 1985) Viable System Model (VSM), which is grounded in the theory of management cybernetics, or, in other words, the theory of effective organization (Beer 1985). While traditionally being used to model organizations, IS researchers have applied the VSM to study a variety of IS-related systems (Richter and Basten 2014), including IT governance. Peppard (2005) was the first to explore the applicability of the VSM in the context of IT governance, and discussed that the VSM can be used (1) to describe, (2) to diagnose, and (3) to design IT governance. In other research, Lewis and Millar (2009) presented a conceptual discussion of board-level IT governance while referring to specific aspects and parts of the VSM.

The overall aim of the present research is to articulate a VSM-based organizing logic[1] for IT governance, by drawing theoretical parallels between the VSM and IT governance. While the above-mentioned prior studies have merely implied the application potential of the VSM in the context of IT governance, or focused on a specific and limited scope, the present research takes a step further in rigorously drawing on the VSM to develop a more concrete understanding of IT governance, grounded in strong interdisciplinary theory. As such, the question is answered *why* IT governance can continue to fulfil its general purpose of creating and protecting IT business value. In addition, drawing on the VSM provides theoretical underpinnings for the necessary and sufficient structural functions of a viable IT governance implementation, which provides rigorous levers for practice regarding *how* to organize effective IT governance.

Theoretical Background

IT Governance

The term 'IT governance' first appeared in academic literature in the early 1990s (Webb et al. 2006). The initial development of the research domain was driven by two research streams that unfolded in parallel. The first stream focused on IT governance structural forms and dealt with topics like the distribution of the authority to make IT-related decisions, and the types of decisions to be made. The second stream focused on IT governance contingency analysis and was aimed at understanding the contextual factors that may influence the choice for a certain structural form of IT governance. Together, these research streams provided the foundation for much of the subsequent IT governance research (Brown and Grant 2005).

In an effort to integrate these streams, Weill and Ross (2004) proposed their seminal IT governance framework. Besides mapping IT governance 'archetypes' (i.e. IT governance structural forms) against categories of IT decisions, several contingency factors were discussed in the context of this framework. Furthermore, they proposed a typology of components for implementing IT governance in practice, consisting of decision-making structures, alignment processes, and communication approaches. Building on these insights, De Haes and Van Grembergen (2009) proposed that an IT governance implementation should consist of structures, processes, and relational mechanisms, and proposed an extensive list of specific IT governance mechanisms that can be used by organizations to implement IT governance. Numerous scholars have later leveraged such typologies to provide additional insights related to the implementation of IT governance (e.g. Joachim et al. (2013); Tallon et al. (2013) etc.)

After 2010, scholars increasingly focused on more specific issues that were deemed relevant in practice, such as: the governance of cloud computing (Vithayathil 2018), information governance (Tallon et al. 2013), SOA governance (Joachim et al. 2013), and board-level IT governance (Benaroch and Chernobai 2017). Combining all of these fragmented research efforts, scholars ultimately provided a more inclusive view of IT governance over time. However, this trend of fragmentation also implies that individual studies tend to provide only a partial understanding of IT governance and its mechanisms, leading to calls for more holistic approaches (Bradley et al. 2012).

There is no universally agreed-upon definition of IT governance, resulting in a lack of clarity regarding the concept's meaning (Brown and Grant 2005; Webb et al. 2006). Despite the fact that a number of often-cited definitions for IT governance exist, similarities can be identified that are shared by multiple definitions or conceptualizations. First, IT governance is said to be an integral part of corporate governance (De Haes

[1] Organizing logic can be defined as *"the managerial rationale for designing and evolving specific organizational arrangements"* (Sambamurthy and Zmud 2000, p. 107).

and Van Grembergen 2009; Weill and Ross 2004). Second, IT business value (i.e. the impact of IT on organizational performance) is considered the main outcome of IT governance (Buchwald et al. 2014) and business/IT alignment is considered to mediate this relationship (De Haes and Van Grembergen 2009; Wu et al. 2015). Finally, contemporary research shows broad consensus that IT governance can be implemented as a set of structures, processes, and relational mechanisms (or communication approaches) (De Haes and Van Grembergen 2009; Tallon et al. 2013; Weill and Ross 2004). A (recently updated) definition of IT governance that accurately reflects these commonly accepted views is provided by De Haes et al. (2020, p. 3): *"[IT governance] is an integral part of corporate governance for which, as such, the board is accountable. It involves the definition and implementation of processes, structures, and relational mechanisms that enable both business and IT stakeholders to execute their responsibilities in support of business/IT alignment, and the creation and protection of IT business value."*

Systems Thinking and the Viable System Model

The Viable System Model (VSM), developed by Beer (1979; 1981; 1985), is the visual representation of a systems thinking approach that emphasizes active learning, self-questioning, adaptation, and control. As such, the VSM is particularly useful to investigate systems that are operating in uncertain environments (Mingers and White 2010).

Figure 1 illustrates the essence of a viable system. The viable system exists within an environment (which is made up of all those things that interact with the system). The environment exposes the viable system to a certain (level of) complexity. Through implementing its purpose (i.e. operation), and controlling this implementation (i.e. management), the viable system seeks to establish requisite variety. Requisite variety is a state that is achieved when environmental, operational, and managerial complexities equate. Only when these complexities are balanced, management will be able to effectively control operation, and operation will be sustainable in the environment. Since environmental complexity > operational complexity > managerial complexity, and these complexities can change over time, establishing and maintaining requisite variety requires variety engineering. If requisite variety is maintained, the system will remain viable (i.e. have the capacity to continue fulfilling its purpose) (Beer 1979; Beer 1981; Beer 1985). As such, Ashby's *law of requisite variety* (which implies that the variety of the controlling element should be at least as great as the variety of the element that is to be controlled) is the fundamental underlying principle of the VSM (Beer 1985).

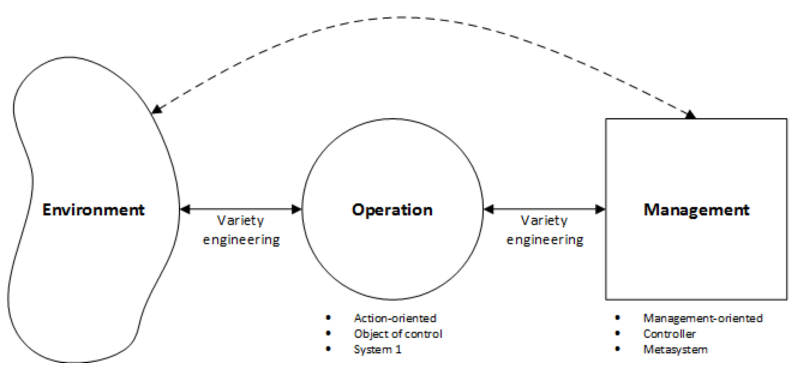

Figure 1. Variety engineering between environmental, operational, and managerial complexities (based on Beer (1985))

The VSM's underlying theory is called 'management cybernetics', which is simply defined as *"[…] the science of effective organization"* (Beer 1985, p. ix). The VSM puts forward five functions (i.e. System 1, System 2, System 3 and 3*, System 4, and System 5). The core idea of management cybernetics is that these five functions are the necessary and sufficient structural preconditions for system viability (Beer 1979). As such, the essential elements of 'organization' are identified, rather than the specific organizational structures or roles through which this act of 'organization' can be realized or implemented. These five functions are interconnected through 'variety loops' (or communication channels), resulting in a holistic viable system that has the capacity to be effective over time (Beer 1979; Beer 1985).

Research Design and Approach (Preliminary)

The research approach employed to achieve the overall aim of the present research is to draw theoretical parallels between the VSM and IT governance. As such, an organizing logic for IT governance is articulated that is rooted in interdisciplinary theory, and informed through extant IT governance literature. This theorizing process builds on an extensive literature search related to the IT governance concept. As a first step, the scope of this literature search was limited to surveying the senior scholars' basket of journals. The rationale behind this choice was to keep the scope of the literature search under control, while simultaneously ensuring a focus on high-quality research. As such, an initial set of high-quality IT governance research was obtained to inform the VSM-based organizing logic for IT governance. Based on this initial set, forward and backward search strategies are employed (i.e. to retrieve additional studies, published in the senior scholars' basket or elsewhere). This approach is currently ongoing and ensures further enrichment of the VSM-based organizing logic for IT governance.

A VSM-based Organizing Logic for IT Governance

Motivating the suitability of the VSM

Richter and Basten (2014) provided an overview of published IS research that leveraged the VSM. Identifying 13 relevant articles and analysing them in terms of study object, purpose, quality focus, viewpoint of the study's recipients, and study's context; they concluded that *"IS research is in need of approaches to deal with complex real-world systems. Relying on systemic approaches like the VSM is a viable and advisable strategy."* (Richter and Basten 2014, p. 4597). As stated in the introduction, a few prior conceptual studies exist that explicitly make the link between the VSM and IT governance. However, these studies are rather limited in their arguments related to the applicability of the VSM as a theoretical lens for studying IT governance. Peppard (2005) argued that the objectives of the VSM and IT governance are similar and that there seems to be a shared vocabulary between the VSM and IT governance literature. In another study, Lewis and Millar (2009) stated that cybernetics and IT governance are both concerned with control and that, since the VSM is grounded in cybernetics, the VSM *"[…] may prove a useful starting point for formulating a comprehensive model of IT governance"* (Lewis and Millar 2009, p. 3). Below, arguments in favor of applying the VSM as a theoretical lens for studying IT governance are extended.

Contemporary IT governance research recognizes that the earlier '(de)centralization of IT-related decision-making authority'-debate, as part of the research stream on IT governance structural forms, was too simplistic. There is now consensus that reality is more complex, acknowledging that an IT governance implementation should consist of a powerful whole of interconnected IT governance mechanisms (De Haes and Van Grembergen 2009; Wu et al. 2015). The complexity of the underlying system, and the need for a holistic approach to manage that complexity, is a first valid reason for applying the VSM (Shaw et al. 2004).

Digitization is a major change enabler in contemporary business (Westerman et al. 2014). Environmental change (and the related threats and opportunities) needs to be detected and readily responded to (i.e. adaptation) (Overby et al. 2006). The clock speed of many industries (e.g. financial services) is increasing because of digitization, which requires faster reactions to changing circumstances (El Sawy and Pavlou 2008). The VSM is particularly useful for systems that are operating in highly dynamic and uncertain environments (Mingers and White 2010). The VSM's five necessary and sufficient structural functions for viability are interconnected through variety loops (or communication channels), providing the viable system with the capacity of adaptation (Beer, 1979). The fact that a system is dealing with a dynamic environment is therefore a second valid reason for applying the VSM, as it provides an answer of 'organization' to deal with the challenges arising from operating in such environments (Hobbs and Scheepers 2009).

Theoretical parallels between the VSM and IT governance

The VSM-based organizing logic for IT governance equates the 'viable system' to the 'organizational system of controlling the current and future use of IT'. In that context, IT governance represents the arrangement through which the current and future IT use is controlled[2], so that the general purpose of creating and protecting IT business value can be achieved[3]. Indeed, control is the act through which a system achieves its general purpose and specific goals, while continuously adapting to its (changing) environment (Espejo and Reyes 2011). As IT governance is the focus of the present research, the metasystem (or controller) of the viable system is especially relevant for articulating a VSM-based organizing logic for IT governance. As illustrated in Figure 2 (drawing on Figure 1), 'IT governance' serves as the controller (i.e. the metasystem in VSM terms – represented as the square) of an organizational system of controlling the current and future IT use. Accordingly, the 'current and future IT use' represents that which is controlled (i.e. system 1 in VSM terms – represented as the circle).

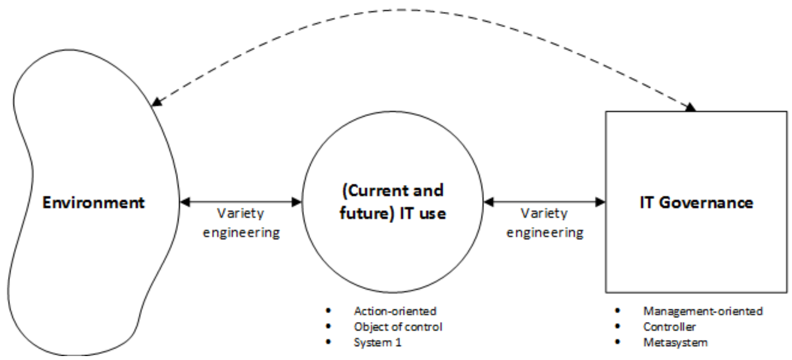

Figure 2. Variety engineering between the environment, the (current and future) IT use, and IT governance (based on Beer (1985))

Figure 2 illustrates the essence of a viable organizational system of controlling the current and future IT use (drawing on Figure 1). In many industries, the role of IT is increasingly becoming transformational (Buchwald et al. 2014). For an organizational system of controlling the current and future IT use (i.e. the viable system), this implies an increasing complexity of its environment. The system should seek 'requisite variety' by leveraging (represented by means of the circle) and controlling (represented by means of the square) its current and future IT appropriately. The state of requisite variety is reached when the complexity of the environment, the complexity of the (current and future) IT use, and the complexity of IT governance equate. This balance implies that (1) IT governance has an appropriate capacity to control the current and future use of IT effectively, and (2) the current and future use of IT has the capacity to be sustainable in the (changing) external environment. Achieving and maintaining this state of requisite variety ensures that the organizational system of controlling the current and future IT use has the capacity to continue fulfilling its general purpose of creating and protecting IT business value. In other words, it ensures its viability.

Besides acknowledging these underlying dynamics of complexity, the VSM puts forward five interconnected functions that are necessary and sufficient structural preconditions for system viability (i.e. referred to as systems 1 through 5). As such, for it to be viable, these so-called 'essential elements of organization' need to be accounted for in an organizational system of controlling the current and future IT use. It is important to note that these five interconnected systemic functions represent the key elements that allow a system to be effective over time, but do not prescribe specific roles or structures through which this act of 'organization' can be realized – which greatly accounts for the generality of the VSM (Beer 1979; Beer 1985). In the context of IT governance, a specific realization of the essential elements of 'organization' would translate to a specific IT governance implementation, consisting of specific IT governance mechanisms. However, acknowledging the VSM's underlying dynamics of complexity, such a specific implementation will ultimately depend on the complexity of the environment to which the system is exposed. As such, organizations should first and foremost understand the 'essential elements of organization' in the context of IT governance, before deciding on the IT governance mechanisms that *may* be used to realize a specific

[2] This argument is built on the definition of IT governance contained in ISO/IEC 38500 (2015): *"The system by which the current and future use of IT is directed and controlled."*

[3] This argument is built on the identification of the two general outcome-oriented sets of activities in the context of IT governance, respectively: (1) IT business value creation, and (2) IT business value protection (i.e. counteracting IT business value destruction) (Benaroch and Chernobai 2017).

IT governance implementation, given a specific environmental complexity. The following subsections discuss parallels between the VSM and IT governance, related to these essential elements of organization.

System 1

The ISO/IEC 38500 standard identifies what is to be controlled through IT governance: (1) the current use of IT (i.e. IT operations), and (2) the future use of IT (i.e. IT projects) (ISO/IEC 2015). As such, to fulfil the general purpose of creating and protecting IT business value, an organization leverages current and future IT in a controlled way (Benaroch and Chernobai 2017; ISO/IEC 2015). Taken together, these two aspects of 'IT use' represent that which is controlled, while the other 'elements of organization' (i.e. the combination of systemic functions 2 through 5 – referred to as the metasystem) together represent the controller (which in this case is IT governance).

System 2

System 2 represents the auto-regulatory coordination (i.e. anticipating and avoiding problems, rather than solving them) in the context of controlling the current and future IT use (Beer 1985). The more the complexity of the current and future IT use, the higher the need for such auto-regulatory coordination will be (Espejo and Reyes 2011). IT-related standards (e.g. 'PRINCE2' for IT project management or 'ITIL' for IT service management) could serve as system 2 mechanisms, auto-regulating the current and future IT use. Informal, relational techniques have also been identified as useful means to establish coordinated action (Williams and Karahanna 2013). An example of such a technique is the co-location of business and IT stakeholders (De Haes and Van Grembergen 2009). McGinnis et al. (2004) suggested that coordination and collaboration (i.e. system 2) can be a viable approach to IT governance, besides imposing controls (i.e. system 3). System 2 mechanisms essentially provide a service, or (non-committal) advice. In other words, compliance with these mechanisms (and the advice they generate) is essentially voluntary. This clearly distinguishes system 2 mechanisms from system 3 mechanisms.

System 3 and 3*

System 3 is responsible for ensuring that the current and future use of IT achieves the general purpose of creating and protecting IT business value. In other words, it is responsible for ensuring cohesion at the level of system 1 (Beer 1985). To effectuate this, system 3 can use certain variety loops (or communication channels) that directly link it with the system 1 level: resources and performance targets negotiation, IT performance measurement, and enforcing IT-related policies (e.g. security policies). As such, it can 'engineer' the complexity of the current and future IT use (Beer 1985).

The involvement of business stakeholders in IT governance is a critical success factor, as IT business value will ultimately be realized at the business side (De Haes et al. 2020). Senior business executives (including the CEO) should therefore actively participate in IT strategic decision-making (Kearns and Lederer 2003). In the context of IT governance, the process of IT-related strategic decision-making maps to the variety loop (or communication channel) between the system 3 and system 4 functions. To be able to effectively take up this responsibility, executive management is required to have sufficient IT competence, allowing them to make quality IT-related decisions (Héroux and Fortin 2018). In VSM terms, such IT competence at the level of executive management is indicative of the managerial variety of the system 3 function in the context of IT governance. This variety can for instance be increased by allowing the CIO full membership of the executive committee (Bradley et al. 2012). Another option is to implement an executive-level 'IT steering committee' (composed of senior business and IT executives), to focus on priority setting in IT investments, resource allocation, and tracking IT projects (De Haes and Van Grembergen 2009).

System 3 should also establish system 3* mechanisms, which enable it to tap directly into (aspects of) the current and future IT use (Beer 1985; Espejo and Reyes 2011). As such, system 3* can for instance be used to ensure that the summarized overview obtained through 'IT performance measurement' is in line with the actual state of the (current and future) IT use. In this regard, IT-related audits (e.g. IT project audits) can be performed. As another example, system 3* could also be used to ensure that the current and future IT use is compliant with the IT-related policies formulated by system 3 (e.g. password requirements).

System 4

System 4 is responsible for gaining insights on (1) the current state of the environment, and (2) potential future states of the environment (e.g. market changes, technological advancements, regulatory or legal changes etc.). These insights can be obtained through dedicated variety loops that connect system 4 with the external environment (Beer 1985). System 4 then inputs this information into the variety loop between system 3 and system 4, which represents the process of IT-related strategic decision-making. For it to be effective, this process not only requires information about (potential) changes in the environment, but also information about the actual state at the system 1 level (i.e. the current and future use of IT) – which can be provided by system 3 (Espejo and Reyes 2011).

The system 4 function thus has a crucial role in ensuring that the viable system has the capacity of adaptation (Espejo and Reyes 2011). This capacity can be related to 'agility', which is about *sensing* (and anticipating) change in the environment, and *responding* readily to this change (Overby et al. 2006). Using the VSM as a lens, *sensing* is effectuated through the variety loops that connect the system 4 function to the external environment, and *responding* starts by evaluating those insights through the variety loop between system 3 and system 4 (i.e. IT-related strategic decision-making), potentially followed by a move at the system 1 level (e.g. starting a new IT-enabled project). In the context of IT governance, the concept of 'IT strategic agility' deserves particular attention. IT strategic agility is the result of being on the constant lookout for, and capitalizing on, IT-related opportunities. It was found that differences in IT governance within organizations can help explain the existence of differences in IT strategic agility between them (Tiwana and Kim 2015).

System 5

System 5 expresses and represents the viable system's identity (i.e. its overall purpose), which it uses to effectively monitor the variety loop between system 3 and system 4 – which is about strategic decision-making (Beer 1985; Espejo and Reyes 2011). The overall purpose of an organizational system of controlling the current and future IT use is 'creating and protecting IT business value' (Benaroch and Chernobai 2017). As such, the system 5 function should use information about what the organization is seeking to achieve and seeking to avoid through its (current and future) IT use to effectively monitor IT-related strategic decision-making. The board of directors is mentioned as an appropriate structural body to represent system 5 in a corporate context, because of its key role in corporate governance (Beer 1985). As IT governance is a focus area of corporate governance, the board of directors should be involved herein as well (Jewer and McKay 2012; Nolan and McFarlan 2005). Indeed, boards should consider IT as a critical resource that must be governed to ensure overall organizational success (Weill and Ross 2004).

Extant research on board-level IT governance generally identifies two board functions: i.e. a monitoring function and a service function. First, the monitoring function is about preventing opportunistic management behavior (Turel and Bart 2014). To effectuate this, the board can for instance ask critical IT-related questions to executive management (e.g. regarding the business implications of the proposed IT strategy) (Nolan and McFarlan 2005). The IT governance literature clearly indicates that the board of directors should take up responsibility in monitoring IT-related strategic decision-making (Bradley et al. 2012). Second, the service function acknowledges that directors serving on a board often bring industry and governance experience to the table, which can provide the organization with potentially relevant knowledge (e.g. related to other organizations' IT use) (Benaroch and Chernobai 2017; Turel and Bart 2014). Such knowledge and experience is generally referred to as 'board capital' (Hillman and Dalziel 2003). From a VSM perspective, the service function can be considered as a means to increase the variety of IT governance (i.e. managerial variety), and the monitoring function is explicitly identified within the VSM as a crucial task of system 5 (i.e. monitoring the variety loop between system 3 and system 4).

Next Steps and Potential Contributions

The next research steps include the further drawing and discussing of theoretical parallels between the VSM and IT governance, thereby ensuring further enrichment of the VSM-based organizing logic for IT governance. At present, this short paper limits itself to discussing the VSM's 'essential elements of organization' in the context of IT governance. Moreover, to complement the theorizing, we plan to conduct a number of in-depth case studies. Each individual case study will focus on (1) describing and (2) diagnosing the organization's IT governance approach through the lens of the VSM. As such, we move beyond simply leveraging the VSM for descriptive purposes, by effectively performing a VSM-based diagnosis of the viability of an organization's IT governance approach. Furthermore, at least one of these case studies should take a longitudinal approach, by studying how the organization's IT governance approach adapts over time in response to a changing environment. This will provide valuable empirical insights about how unforecastable exogenous shocks can be mitigated through a VSM-based IT governance approach, enabling us to illustrate its effectiveness.

For academics, this research is expected to advance the theoretical discourse on IT governance. Drawing on the VSM, the question is answered *why* IT governance can continue to fulfil its general purpose of creating and protecting IT business value. In addition, theoretical underpinnings are provided for the necessary and sufficient structural functions of a viable IT governance implementation. For practice, the latter point also provides rigorous levers regarding *how* to organize effective IT governance. This research furthermore aims to provide practitioners with an integrative theoretically-based model that brings coherence and meaningfulness to what otherwise can appear as a haphazard collection of IT governance mechanisms. Finally, the VSM-based organizing logic for IT governance can provide rigor to IT governance-related practitioner frameworks and guidance, which often lack a theoretical base.

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