



An upper echelons perspective on information technology business value



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ABSTRACT

This paper argues that information technology (IT) outcomes are more valuable to companies when their top management team (TMT) moves from flirting with IT to marriage. Previous research has demonstrated an association between top management support (TMS) and IT value. We extend the concept of TMS with the imbrication metaphor to define the construct of TMT-IT imbrication, which allows us to account for a tighter and continuous entwining of the TMT and IT to create IT value. Our definition of the TMT-IT imbrication construct embraces four dimensions: involvement, participation, attention, and use. In addition, with the support of upper echelons (UE) theory, we explore certain managerial traits, competences, and team processes that may be antecedents of this imbrication. As a result, our work provides a variance model and various propositions rooted in the logic of UE that contribute to research on IT business value.

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1. Introduction

Although many information technology (IT) systems are tied to core processes and are therefore targeted at operational and control functions that normally do not receive direct top management team (TMT) attention, we consider how valuable it would be to have TMT members closely “wedded” to their IT applications and what manager characteristics would be right for standing so close to IT. Indeed, previous studies have argued that an IT advantage could be obtained through an organization’s dynamic capability to exploit IT functionality on a continuous basis (Henderson & Venkatraman, 1993), with the challenge for managers being to adapt continually organizational and technological capabilities to be in dynamic alignment with the chosen business strategy (Venkatraman, 1994).

The perpetual debate over the value of IT has evolved substantially over the years. We have long moved past the early debate over Solow’s productivity paradox (Solow, 1987) and the point of ubiquity and standardization (Carr, 2003). Rather, we know that it is not the IT itself that brings value but the manner in which it is combined with other organizational resources that enables a

business to gain an advantage through IT (Barua et al., 2010). In this sense, top management support (TMS) has been one of the organizational factors that researchers have emphasized for fully exploiting IT (Dong, Neufeld, & Higgins, 2009; Ifinedo, 2008; Young & Jordan, 2008). However, in our opinion, TMS lacks the continuous basis previously argued as being necessary to create IT value. Therefore, we revisit and extend the concept of TMS grounded in the imbrication metaphor (Leonardi, 2011). The imbrication perspective suggests that coordinated human agencies (i.e., social agency) and the actions that the materiality of a technology allows people to take (i.e., material agency) become interlocked in sequences that create infrastructure in the form of the routines and technologies that people use to perform their work (Leonardi, 2011). Grounded in the imbrication perspective, our first premise is that crucial social agency resides in the TMT as the powerful actors who can obtain the greatest benefits of IT. Our aim is to propose a framework that is useful for studying how and why top managers jump on the bandwagon of IT value. To achieve this objective, we rely on upper echelons (UE) theory (Hambrick & Mason, 1984). This theory maintains that organizational outcomes are a reflection of the characteristics of a firm’s top managers and that these managers make decisions based on their own characteristics (e.g., demographics, beliefs, values, attitudes, professional competencies, functional experiences, and educational background). Although research on

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UE theory has been extensive, its focus has typically been on the relationship among the characteristics, processes and structures of the TMT and the firm's performance or strategic decisions, including but not limited to internationalization, strategic renewal, and mergers and acquisitions (e.g. [Kwee, Van Den Bosch, & Volberda, 2011](#); [Mihalache, Jansen, Van Den Bosch, & Volberda, 2012](#); [Nielsen & Nielsen, 2013](#); [Wang, Holmes, Oh, & Zhu, 2016](#); [Wong, Ormiston, & Tetlock, 2011](#)). However, the analysis of IT value from a UE perspective has received little attention (e.g. [Awa, Eze, Urieto, & Inyang, 2011](#); [Chuang, Nakatani, & Zhou, 2009](#)).

In summary, we revisit and extend the concept of TMS in view of the fact that IT is an integral part of every organizational activity ([Orlikowski, 2010](#)). Moreover, we propose an association between the traits, competences and processes of top managers and IT value but mediated with the TMT-IT imbrication multidimensional construct to propose that obtaining IT value is enhanced by a durable and continuous relationship between top managers and IT, a type of entwining that goes beyond support or commitment. As a result, a framework for IT value and various propositions have been developed, aiming to contribute to the nexus of TMT and IT business value research.

2. Development of the model

Because IT value manifests itself on many levels (e.g., individual, group, firm, or industry), we focus on IT business value as “*the organizational performance impacts of information technology at both the intermediate process level and the organization-wide level, and comprising both efficiency impacts and competitive impacts*” ([Melville, Kraemer, & Gurbaxani, 2004](#):287). Previous research has highlighted that IT factors and non-IT factors must be integrated to achieve business goals, thus broadly accepting the complementarity argument ([Melville et al., 2004](#); [Wade & Hulland, 2004](#)). This view is supported by the sociomaterial perspective ([Orlikowski, 2007, 2010](#); [Orlikowski & Scott, 2008](#)). In summary, “IT with its complementary resources can create value manifested at different levels and, while causality is elusive, we can understand how to create differential value by extending our knowledge of complementary and mediating factors in the value creation process” ([Kohli & Grover, 2008](#):27). The complexity and multidimensionality of the process of IT value creation entail a great challenge for researchers. We address this issue by adopting the imbrication perspective ([Leonardi, 2011](#)) and by framing it in a more global UE view, thus turning on the role of top managers as the crucial social agency and key complementary resource for the IT value creation process.

2.1. Sociomateriality and the imbrication perspective

Early IT implementation studies assume that IT is an exogenous and relatively autonomous driver that exerts significant and predictable impacts on organizations, thus causing changes in organizational culture, norms, structure, performance, and other business attributes in a deterministic manner ([Gallivan & Srite, 2005](#); [Orlikowski, 2010](#)). Later researchers focus on the human aspect of technology, viewing it as the outcome of strategic choice or social action. Demonstrating emergence and unpredictability seems to have become the explicit goal of this generation of researchers, and this constructivist posture suggests that technologies themselves are irrelevant to the manner in which people work but that people's interpretations of the technology matter greatly ([Leonardi, 2012](#)). However, these previous conceptualizations have been criticized as too simplistic because they do not allow for user agency or, conversely, because they minimize the role of technology ([Markus & Robey, 1988](#); [Orlikowski, 1992, 2010](#)). To solve this problem, some scholars have highlighted the need to renew the focus

on new technology's actual features and which of these features permit or inhibit people from accomplishing their goals ([Griffith, 1999](#); [Monteiro & Hanseth, 1995](#); [Poole & Desanctis, 1990](#)). At this point, the term “materiality” comes into play. The materiality of technology is the particular arrangements of physical and/or digital materials, which endure across differences in place and time and are stable, at least for some short period of time; such materials are also available to everyone in the same manner but are important to users in different ways ([Leonardi, 2012](#)). Hence, technology has a materiality that makes some actions possible and others difficult or impossible ([Faraj & Azad, 2012](#)).

From a sociomaterial perspective ([Orlikowski, 2007](#); [Orlikowski & Scott, 2008](#)), ITs are not viewed as objects that impact organizations but instead are relational effects that are continually enacted in practice. Every action performed by an organization is no more or less social than it is material (for a more detailed discussion see, [Leonardi, 2013](#)). However, the understanding of sociomateriality may be constructed on either an agential realist ([Orlikowski, 2007](#)) or a critical realist foundation ([Mutch, 2013](#)). The “inseparability” stance taken by [Orlikowski and Scott \(2008\)](#), in particular, stands in contrast to the “separable-but-intertwined” stance underlying [Leonardi's \(2011\)](#) use of imbrication. Leonardi advocates the metaphor of imbrication as the gradual overlapping and interlocking of distinct elements into a durable infrastructure, which he considers to be a useful way of thinking about the process by which the social and the material become the sociomaterial in a critical realist foundation.

Hence, Leonardi's theory concerns how the social and the material become entangled, suggesting that coordinated human agencies – social agency – and the things that the materiality of a technology allows people to do – material agency – become interlocked in sequences that produce the empirical phenomena called “organizations” and “technologies”, respectively. Human agency is typically defined as the ability to form and realize one's goals ([Giddens, 1984](#)), and this perspective suggests that people's work is not determined by the technologies that they employ. Even using the most seemingly constraining technologies, human agents can exercise a great amount of discretion in shaping the effect of technology on their work ([Boudreau & Robey, 2005](#)). Material agency is defined as the capacity for nonhuman entities to act without human intervention. IT artifacts exercise agency through their performativity, i.e., through the things that they do that users cannot completely or directly control ([Robey, Raymond, & Anderson, 2012](#)). Both coordinated human (social) and material agencies represent capacities for action, but they differ with respect to intentionality. As noted by [Leonardi \(2012\)](#), the term “sociomaterial” is a bold reminder that social practices shape the materiality of a technology and its effects, and people often enact their human agency in response to technology's material agency. Given this important difference with respect to intentionality, social and material agencies may be equally important in shaping practice but in different qualitative ways. Thus, people have intentionality, and technological artifacts have materiality. Consequently, materiality exists separately from people, but affordances and constraints do not. People perceive technology as affording distinct possibilities for action or goal-oriented action ([Markus & Silver, 2008](#)). These perceptions of affordance or constraint can change across different contexts, though materiality does not. People's perceptions of what a technology can or cannot do exert an influence over the formulation of their goals, just as their perceptions are also shaped by goals. Depending on whether they perceive a technology as affording or constraining their goals, people make choices about how they will imbricate social and material agencies ([Leonardi, 2012](#)).

In this paper, we assign crucial social agency to the TMT. Here, the term TMT refers to an organization's highest management level: the CEO and his or her immediate subordinates responsible for

corporate strategy. [Leonardi \(2012\)](#) has defined social agency as the coordinated human intentionality formed in partial response to perceptions of a technology's material agency. Thus, we study the antecedents of intentionality and the processes that guarantee the coordination of the members of a TMT. For this purpose, UE theory is very useful.

2.2. Upper echelons theory

From the UE perspective, an organization is a reflection of its top managers ([Hambrick & Mason, 1984](#)). This theory states that organizational outcomes – strategic choices and performance – are partially predicted by managerial background characteristics, i.e., the values of managers and the cognitive basis for these values. This theory has its roots in the behavioral theory of the firm ([Cyert & March, 1963](#)), which suggests that managers do not typically make decisions in a rational manner because they are restricted by their natural limitations as human beings. Otherwise, managers are confronted with huge information overloads, sometimes ambiguous and complex, and they will appeal to their experiences, preferences, and other biases to address these overloads ([Cho & Hambrick, 2006](#)). Executive characteristics serve to filter and distort the abundant information that confronts executives ([Ocasio, 1997](#)). In other words, behavioral factors, including but not limited to bounded rationality, attention to multiple and conflicting objectives, and various aspiration levels, hypothetically influence the strategic decisions of managers ([Nielsen, 2010](#)). According to [March and Simon \(1958\)](#), each manager brings to an administrative situation his or her own set of assumptions, which reflect his or her cognitive base and values. The theory proposed by Hambrick and Mason emphasizes a number of observable indicators to estimate this set of assumptions or psychological constructs of a manager's personality, which are difficult to access and reliably measure ([Pfeffer, 1983](#)). These demographic indicators include age, tenure, functional background, education, socioeconomic roots, and financial position, among others. Accordingly, UE theory states that organizational outcomes in general are partially predicted by the observable characteristics of certain top executives. Therefore, the three fundamental principles underlying UE theory are the following: (i) strategic decisions are a reflection of the values and cognitive bases of powerful actors; (ii) such values and knowledge bases conform to certain observable characteristics such as training or experience; and therefore, (iii) the results are associated with the observable characteristics of these actors ([Carpenter, Geletkanycz, & Sanders, 2004](#)). Since UE theory was first proposed, numerous empirical studies have demonstrated its validity ([Bantel & Jackson, 1989](#); [D'aveni, 1990](#); [Finkelstein & Hambrick, 1990](#); [Haleblian & Finkelstein, 1993](#); [Smith, Grimm, Gannon, & Chen, 1991](#)). The UE perspective has been shown to affect various outcomes such as management accounting and control systems ([Hiebl, 2014](#)) as well as finance or product innovation ([Carpenter et al., 2004](#); [Plöckinger, Aschauer, Hiebl, & Rohatschek, 2016](#)), and it has also been found to apply to explaining the outcomes in the family business context ([Tretbar, Reimer, & Schäffer, 2016](#)). This theory is also relevant to the particular domain of this paper, i.e., IT research, and there are numerous recent papers that apply UE theory to IT choices (e.g., [Hiebl, Gärtner, & Duller, 2017](#); [Lim, Stratopoulos, & Wirjanto, 2013](#); [Wei et al., 2014](#)).

Additionally, many researchers believe that the hypothesized relationship between the composition of a management team and its decisions and outcomes is mediated or moderated by certain social and psychological processes at the team level ([Jackson, 1992](#); [Lawrence, 1997](#); [Pettigrew, 1992](#); [Priem, Lyon, & Dess, 1999](#)). As noted by [Cho and Hambrick \(2006\)](#), one particularly noteworthy gap is the lack of understanding of how the characteristics of executives affect how they notice and attend to the stimuli around

them and, in turn, how these interpretations are manifested in their choices. It is reasonable to think that managers both pay attention to IT materiality to identify some potential affordances or constraints to accomplish their goals and make choices about how they will imbricate social and material agencies. In line with UE theory, one of the general propositions of this paper is that precisely what an organization is able to do with IT is also partially predictable as a result of certain characteristics of its managers. The features that have been considered include TMT demography, the TMT's IT competence, and other processes at the team level appearing in the literature review that are significant in this context, such as participatory decision-making and a shared IT vision.

In summary, this paper proposes that when the TMT is well entwined with IT, the organization's IT outcomes will be more valuable. However, what does it mean to be well entwined? Specifically, here it means "to imbricate", i.e., to be gradually overlapped and interlocked with IT. What then is needed for managers to imbricate with IT? According to UE theory, a TMT's characteristics and composition are relevant to the specific attitude toward and behavior with respect to IT. Moreover, some variables related to TMT processes at the team level are likely to moderate the relationship between a TMT's characteristics and the imbrications of the TMT with IT. Following [Markus and Robey \(1988\)](#), the three dimensions of the causal structure of our theoretical model are the following: (i) the nature of causality or causal agency relies on the TMT, which is coherent with the strategic choice view and the subsequent UE perspective; (ii) with respect to the logical structure or hypothesized relationships between antecedents and outcomes, a variance model is proposed in which causes have an invariant, necessary, and sufficient relationship with outcomes, a model that can subsequently be validated by a positivist approach and statistical analysis; and (iii) the necessary level of analysis is the TMT (see [Fig. 1](#)).

3. Development of propositions

3.1. TMT-IT imbrication

TMS is often prescribed as critical among the organizational factors that have been theorized for fully exploiting IT ([Dong et al., 2009](#); [Ifinedo, 2008](#); [Young & Jordan, 2008](#)). [Jarvenpaa and Ives \(1991\)](#) decompose management support using two constructs and suggest that executive *involvement* – a subjective psychological state that reflects the importance and personal relevance of an object or event ([Barki & Hartwick, 1989](#)) – is more strongly related to a firm's progressive use of IT than executive *participation* – i.e., an executive participates when he or she participates or makes a contribution ([Vroom & Jago, 1988](#)) – in IT activities. Moreover, they find that executive involvement is influenced by the participation and functional backgrounds of CEOs. However, they recommend extending the study of management support to the entire TMT. More recently, [Boonstra \(2013\)](#) has decomposed the content of the top management's supportive behavior into a multidimensional construct that consists of a set of inter-related behavioral categories that includes resource provision, structural arrangements, communication, expertise, and power. The metastructuring actions of top managers ([Orlikowski, Yates, Okamura, & Fujimoto, 1995](#)) are directed at creating a receptive environment for the new system and changing both the organization and the system to create a good fit.

Thus, why is imbrication not equivalent to support? What is new? [Boonstra \(2013\)](#) has conceptualized TMS as a scarce resource in terms of finance, people, communication, attention, expertise, and time that must be rationally and dynamically distributed between current organizational activities and new IT initiatives. However, from an imbrication perspective, the TMT and IT become

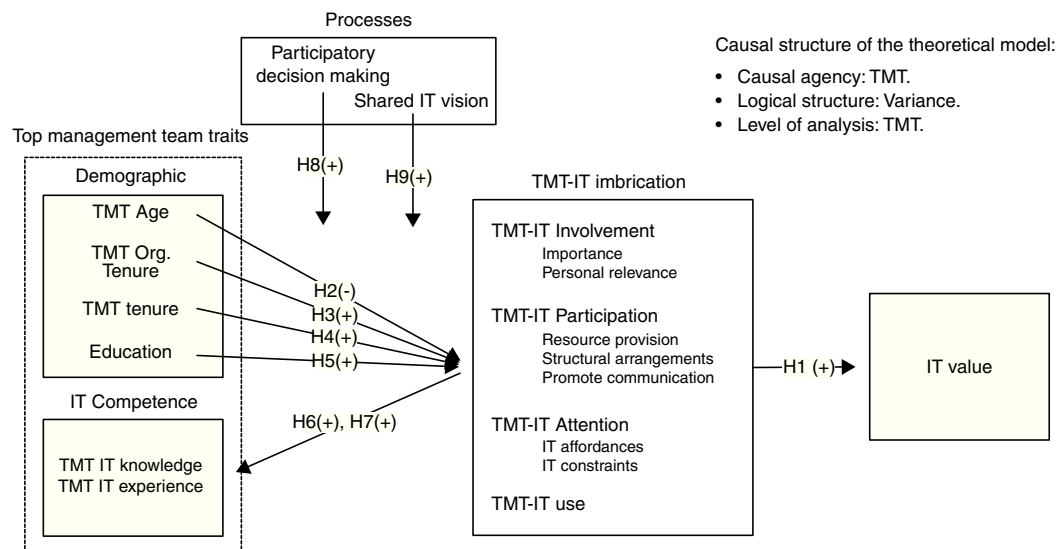


Fig. 1. The TMT-IT imbrication model.

interwoven in the first place and continue interlocking in ways that produce the infrastructures that people use to complete their work. Therefore, the metaphor of imbrication as the gradual overlapping and interlocking of distinct elements into a durable infrastructure expresses the idea of a tighter and more continuous relationship between the TMT and IT, a relationship that goes beyond mere support. The separate concepts of “social” and “material” become the “sociomaterial” and persist in this fashion over time (Leonardi, 2012, 2013).

Moreover, affordances are unique to the particular ways in which a TMT perceives what IT does, but what an object affords us is what we normally pay attention to (Gibson, 1986). Attention has been defined as “the noticing, encoding, interpreting, and focusing of time and effort by organizational decision-makers on both (a) issues: the available repertoire of categories for making sense of the environment: problems, opportunities, and threats; and (b) answers: the available repertoire of action alternatives: proposals, routines, projects, programs, and procedures” (Ocasio, 1997:189). We adopt this definition of attention to conceptualize the interpreting activities and actions of top managers in the imbrication process.

In particular, we describe TMT-IT imbrication in terms of the types and richness of the behavioral experiences of managers and in terms of the choices made by top managers – according to Markus and Mao’s (2004) updated theoretical conceptualization of participation. This entwining is the result of the union of TMT-IT involvement, TMT-IT participation, TMT-IT attention, and TMT-IT use in the imbrication process of reshaping the organizational context or adapting technology, depending on the perceived affordances or constraints resulting from IT materiality. Other aspects of management support, such as resource provision, structural arrangements, and the promotion of communication (Boonstra, 2013), are considered in our definition of TMT-IT participation. Moreover, we propose that the existing participation perspective on IT activities be augmented with a practice orientation that specifically focuses on the examination of emergence, improvisation, and change over time as the TMT reconfigure its IT or alter its habits of IT use. According to previous structural models such as the duality of technology model (Orlikowski, 1992) or the practice lens (Orlikowski, 2000), people’s technology use constitutes the micro-level actions out of which macro-level organizational structures are assembled; i.e., technology use becomes

a constitutive feature of the organizational structure. In our view, technology affordances are action possibilities and opportunities that emerge from the TMT’s engagement with a focal IT.

Notably, following Hartwick and Barki (1994), user participation and user involvement represent two distinct but related constructs, with participation leading to involvement and involvement mediating the relationship between participation and system use. However, Markus and Mao (2004) have revealed this explanation’s unresolved issue in its actual context, showing that it is likely that not all intended users can participate. Consider complex systems (e.g., ERPs) or web applications designed for crowds. Hence, and particularly in the case of managers, we can consider the case of a manager who considers IT to be important and personally relevant but who does not participate, does not use, and does not pay attention to the available repertoire of IT opportunities and the subsequent IT action alternatives. Therefore, although the literature shows a pattern of dependence between these dimensions of our construct, we claim the prevalence of independence in many cases. This proposal is consistent with Fishbein and Ajzen (1974), who have argued and empirically shown that attitudes toward objects do not strongly predict specific behaviors toward those objects. In our case, this argument suggests that manager attitudes toward IT are weakly related to manager IT use. The IS literature supports this contention (e.g. Davis, 1989). Additionally, arguing for this independence, Hartwick and Barki (1994) find that involvement seems to have little effect on levels of participation.

With respect to linking TMT-IT imbrication with IT value, Barki and Hartwick (1994a, 1994b) have argued that systems that are considered to be both important and personally relevant are likely to engender positive affective or evaluative feelings. In addition, Swanson (1974) notes that managers who engage in system development activities become more appreciative of these systems. Therefore, these dimensions of the TMT-IT imbrication – involvement and participation – are positive in relation to perceived IT value. Moreover, Cho and Hambrick (2006) argue that attention is the conduit by which TMT characteristics are converted into strategic outcomes. In addition, Venkatraman (1994) maintains that the potential benefits of IT are directly related to the degree of change in organizational routines and to managers’ view of IT capabilities as a source of opportunity for redefining their strategies instead of as a threat to the status quo.

Proposition 1. *TMT-IT imbrication is positively associated with IT value.*

3.2. TMT demographic characteristics

In this paper, a crucial emphasis is placed on observable TMT characteristics as indicators of the assumptions that managers bring to the process of imbrication to exert their human agency. Examples of such characteristics are age, organizational tenure, functional background, education, socioeconomic roots, and financial position (Hambrick & Mason, 1984). Previous research shows a number of important demographic characteristics related to IT adoption, such as age, gender, tenure, and education (Awa et al., 2011; Chuang, Nakatani, Chen, & Huang, 2007; Chuang, Rutherford, & Lin, 2007; Chuang et al., 2009; Dwivedi & Lal, 2007; Hameed & Counsell, 2012). For example, Chuang et al. (2009) show that the average age and education level of TMTs in small businesses are significant predictors of the extent of IT adoption. In addition, Awa et al. (2011) find that the age composition, experience, and gender sensitivity of the members of SME TMTs have great power in predicting the extent of IT adoption.

3.2.1. Age

Theoretically, older executives are expected to have a stronger psychological commitment to the organizational status quo (Stevens, Beyer, & Trice, 1978), to be less able to grasp new ideas and learn new behaviors (Chown, 1960), and to avoid risky actions (Vroom & Pahl, 1971). In general, older people are less comfortable with computers and perceive that they have less efficacy and control over them (Czaja & Sharit, 1998). Various researchers have shown that age is negatively associated with IT adoption (Awa et al., 2011; Chuang et al., 2009; Dwivedi & Lal, 2007) and usage (Morris & Venkatesh, 2000). Thus, although older managers may consider IT to be important and personally relevant, they will likely lag in IT participation, usage, and attention. Therefore, we propose the following:

Proposition 2. *The TMT average age is negatively associated with TMT-IT imbrication.*

3.2.2. Organizational tenure

Generally, it is expected that senior executives with a long organizational tenure have a stronger commitment to the status quo (Stevens et al., 1978), an increased understanding of organizational policies and procedures, and a possible reluctance to change organizational structures (Wiersema & Bantel, 1992). Finkelstein and Hambrick (1990) have proven that managers' organizational tenure is associated with increased rigidity and commitment to established policies and practices, decreased informational diversity, and risk aversion. In particular, long-tenured executives tend to have persistent and unchanging strategies, which conform and perform closely to industry averages. However, Geletkanycz (1997) has shown that tenure no longer predicts commitment to the status quo after accounting for cultural backgrounds. Challenging the argument that senior executive effectiveness reaches a relatively early peak (Hambrick & Fukutomi, 1991), Carpenter et al. (2004) have suggested that the knowledge of internal workings and established relationships of long-tenured executives are notably responsible for the success of their firms.

Additionally, from other perspectives, it is argued that managers' tenure is advantageous for the adoption of complex innovations (Damanpour & Schneider, 2009). Complex innovations require advanced management skills for the adoption process, including Orlikowski's (1995) so-called metastructuring actions, which we define as TMT-IT participation, i.e., creating an appropriate climate, integrating with existing organizational processes,

enabling successful implementation, overcoming resistance to innovation, and facilitating the use of IT by organizational members (Damanpour & Schneider, 2006). Manager tenure provides legitimacy and knowledge related to accomplishing tasks, managing political processes, and obtaining desired outcomes (Kimberly & Evanisko, 1981). Managers who are more seasoned have undertaken different assignments, have developed a greater breadth of contacts with peers and subordinates, are familiar with critical contingencies that may arise during the adoption process, and have the experience and skills to manage these contingencies (Finkelstein, 1992). A positive association for the relationship between manager tenure and IT adoption is widely held (Damanpour & Schneider, 2006). IT adoption is defined as using computer hardware and software applications to support operations, management, and decision-making in business (Davis & Olson, 1985). Thus, it is reasonable to think about a positive association between TMT organizational tenure and every dimension of TMT-IT imbrication. Thus, with respect to *organizational average tenure*, we propose the following:

Proposition 3. *The TMT average organizational tenure is positively associated with TMT-IT imbrication.*

3.2.3. TMT tenure

Because we consider that TMT members can be promoted from other internal positions and they are not always recruited as top managers, we consider their tenure in the TMT. With respect to *TMT average tenure*, Wiersema and Bantel (1992) have stated that the time of entry into a group is an important determinant of a person's communication patterns within the group. A long average group tenure results in decreasing levels of overall communication because group members feel that they can anticipate other members' perspectives. Therefore, a long team tenure may lead to increased isolation with respect to external sources of information, which may lead members to become less receptive to change and innovation. However, one of the tenets of the metaphor of imbrication in which past imbrications accumulate to help explain that what keeps human and material agencies in a continued sequence of imbrications is that people draw on the infrastructure created from past imbrications (i.e., routines or technologies) to construct perceptions of affordances and constraints (Leonardi, 2011). A manager who has been a TMT member for several years has most likely experienced previous imbrications and will likely have a different perspective, more experience, and a distinctive understanding of opportunities compared to someone who recently joined the TMT. Thus, we propose the following:

Proposition 4. *The TMT average tenure is positively associated with TMT-IT imbrication.*

3.2.4. TMT education

Previous studies have made use of the educational level of a TMT as an indicator of its members' cognitive abilities and skills (Bantel & Jackson, 1989; Wiersema & Bantel, 1992; Boeker, 1997). Higher levels of education have consistently been associated with a high degree of cognitive complexity (Ginsberg, 1990) and receptivity to innovation and change (Grimm & Smith, 1991; Hambrick & Mason, 1984; Rogers, 2003; Schoenecker, Daellenbach, & McCarthy, 1995; Wiersema & Bantel, 1992). Other studies have argued that a TMT with a high average level of education will develop greater tolerance for ambiguity, will be more receptive to ideas, and will possess the knowledge base and competencies that are necessary for seeking new opportunities and evaluating many options (Herrmann & Datta, 2005). Essentially, previous studies provide evidence that more highly educated managers possess greater cognitive complexity, which in turn provides a greater ability to grasp new ideas and enhance the likelihood of innovative IT usage (Li, Tan, Teo, &

Tan, 2006), i.e., IT attention and IT use. We do not consider any association between educational level and IT participation or IT involvement, and we do not find any support for it in the literature. Therefore, because we find an association with the other two dimensions, we make the following proposition:

Proposition 5. *The TMT average educational level is positively associated with TMT-IT imbrication.*

Carpenter et al. (2004) have recalled that the practice of using demographic proxies is only a methodological convenience to proxy for larger, complex, and difficult-to-reach constructs about cognitions, values, and perceptions that affect strategic choices. Consequently, they have suggested supplementing the measures of demographic profiles with richer measures of the mechanisms and processes that affect top management cognition, values, and perceptions and, consequently, strategic choices. In this sense, we consider IT competence traits, in addition to processes such as participatory decision-making and strategic consensus related to IT visions.

3.3. TMT's IT competence

Bassellier, Reich, and Benbasat (2001) deem competence as the potential that leads to an effective behavior, i.e., the capability that enables managers to effectively apply IT in their organizations. Managerial IT skills include the management's ability to conceive of, develop, and exploit IT applications to support and enhance other business functions. Moreover, these skills concern the ability to understand, collaborate, coordinate, and anticipate the business needs of other functional managers, suppliers, and customers.

Bassellier et al. (2001) define a business manager's IT competence as a set of IT-related explicit and tacit knowledge that allows him or her to exhibit IT leadership in his or her area of business. Explicit IT knowledge includes the manager's knowledge of technologies, applications, systems development, IT management, and external IT knowledge, i.e., knowing who knows what to leverage that knowledge. Tacit IT knowledge is conceptualized as a combination of experience and cognition. Experience is concerned with personal computing, IT projects, and overall IT management. Cognition is ascribed to the manager's process view and his or her vision of the IT role. Moreover, Boritz and Lim's (2007) findings provide evidentiary support to address IT knowledge deficits at top executive levels, and Devece (2013) proves that the IT competence of business managers affects the integration of IT into business processes. Thus, we assert the following:

Proposition 6. *The TMT's average IT competence has a positive impact on TMT-IT imbrication.*

Additionally, grounded in the tenets of the imbrication perspective, certain imbrications can produce changes in social structures (e.g., roles, status). Moreover, Aragón (2003) has suggested that the IT competencies of business managers evolve and adapt in response to managerial learning, changing business needs, and environments, thus emphasizing the dynamic of business managers' IT competence. Therefore, we assert the following:

Proposition 7. *TMT-IT imbrication has a positive impact on the TMT's IT competence.*

3.4. TMT processes

Hambrick (1994, 2007) persists in the idea of integrating team processes and composition to reveal the team conditions under which TMT composition makes a difference. He argues that the TMT's effects can only become visible when executives share resources, information, and decisions, i.e., when TMTs are

behaviorally integrated. Therefore, we focus on the moderating role of team processes that describe the extent to which TMT members engage in mutual and collective interaction. Thus, we consider team processes such as participatory decision-making and strategic consensus related to the IT vision.

3.4.1. Participatory decision-making

Closely linked to Hambrick's behavioral integration concept, Boone and Hendriks (2009) have found that a TMT's collaborative behavior and information exchange are necessary conditions to unleash the performance benefits of functional background diversity. Participatory decision-making or joint decision-making is a mutual and collective decision-making process in which TMT members inform their teammates of their actions and their impact on them, have an understanding of the needs and problems of other TMT members, and engage in frequent discussions about mutual and collective expectations of TMT members. In this context, participatory decision-making is a practice of sharing power among team members and empowering them to partake in strategic decision-making. Carmeli, Sheaffer, and Halevi (2009) have shown that participatory decision-making processes are an important relational mechanism that enables more realistic decisions and enhances firm performance. Participatory decision-making benefits executive involvement and metastructuring behaviors by top managers, thus creating a receptive environment for IT and changing the organization and system to create a good "fit", i.e., establishing the appropriate conditions for the imbrication process. Therefore, we assert the following:

Proposition 8. *A TMT's participatory decision-making reinforces (positively moderates) the relationship between TMT characteristics and TMT-IT imbrication.*

3.4.2. Shared strategic IT vision:

The strategic IT vision is defined as the shared, aspired future institutional state of the role that IT should play in an organization's strategies and activities (Armstrong & Sambamurthy, 1999; Zmud, 1988). Schein (1992) identifies four main types of strategic IT visions: automate, informate up, informate down, and transform. Furthermore, Scott Morton (1991) describes an evolutionary path on which organizations evolve their strategic IT vision in stages, from automate to informate and, finally, to transform. Subsequently, Venkatraman (1994) has decomposed IT-enabled transformations into five levels, with the range of potential benefits increasing from level one to five. The concept of strategic consensus refers to the extent to which intraorganizational perceptions converge on shared understandings of strategic priorities (Rapert, Velliquette, & Garretson, 2002). Strategic consensus is critical for resolving differences, promoting a unified management, and increasing strategic commitment (Dess & Priem, 1995). Therefore, we assert the following:

Proposition 9. *A TMT's shared strategic IT vision reinforces (positively moderates) the relationship between TMT characteristics and TMT-IT imbrication.*

4. Concluding remarks

In response to the call to extend our knowledge of complementary and mediating factors in the IT value creation process (Kohli & Grover, 2008), we focus on top managers as powerful actors who can obtain great benefits from IT. This paper emphasizes the idea of a tighter and more continuous entwining between the TMT and IT, a relationship that goes beyond mere support. In particular, we describe TMT-IT imbrication activities in terms of the type and richness of the behavioral experiences of managers

and in terms of the choices made by top managers. This description is coherent with the updated theoretical conceptualization of participation (Markus & Mao, 2004). This entwining is the result of the union of TMT-IT involvement, participation, attention, and use in the imbrication process. The TMT's demographic traits, the TMT's IT competence, and TMT processes such as participatory decision-making and strategic consensus are proposed as direct or moderate effects over the TMT-IT imbrication multidimensional construct.

Although the sociomaterial perspective on IT and organization research is unsuitable for studying the impact of IT (Scott & Orlikowski, 2013), through the construct of TMT-IT imbrication grounded in the imbrication metaphor (Leonardi, 2011), we link the study of technology-based organizational change to the IT business value literature. Prior studies have primarily focused on the effect of TMS, as a single construct, on IT project success (e.g. Boonstra, 2013). Our study primarily addresses the content of TMT-IT imbrication, reasoning that it consists of a set of inter-related behavioral categories exhibited during the imbrication process. Although these categories have been partially identified in previous studies, hitherto, they have not been depicted as a likely, consistent set of interrelated behaviors that can be identified and followed to create IT value.

The TMT's demographic and competence traits may explain why top managers jump onto the IT bandwagon. We suggest that middle-aged managers, with organizational and TMT tenure, high educational levels, and high IT competence levels, are most suitable to imbricate with IT and, therefore, to create more IT value for their organizations. Additionally, we suggest that participatory decision-making and a shared strategic IT vision reinforce the likelihood that TMTs will imbricate with IT. However, why do top managers play a role in obtaining IT value? This occurs because top managers perceive IT as affording distinct possibilities for action or goal-oriented action (Markus & Silver, 2008).

In summary, this paper offers practitioners a more complete and fine-grained framework for determining how to obtain value from IT: This framework attends to a functional combination of intertwined behaviors and actions. It can be used for discussing, planning, tuning, and evaluating the specific behaviors of top managers with respect to IT.

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