IT CAPABILITIES – QUO VADIS?

Research-in-Progress

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Abstract

The successful management of IT capabilities and their complex interdependencies with other organizational capabilities constitutes an important source of competitive advantage for many organizations today. The role of IT capabilities in enabling competitive actions is well-researched. By reviewing a large number of IT capabilities-focused research articles, the authors seek to answer the questions, "What have we learned? What do we still need to learn?" This research-in-progress article presents key findings regarding IT capabilities, highlighting current research limitations, and providing propositions and recommendations regarding future research.

Keywords: IS/IT capabilities, competences, fusion, turbulence, competitive advantage

Introduction

The use of information systems (IS) in organizations for the development of competitive actions is complex and pervasive (Vannoy and Salam 2010). In this article, we focus on research related to information technology (IT) capabilities, including "value capabilities" such as infrastructure, "competitive capabilities" that enable firms to quickly respond to environmental threats and opportunities, and dynamic capabilities such as organizational learning (Bhatt and Grover 2005). We summarize key takeaways and future research opportunities.

IT capabilities enable the firm to acquire, deploy, combine, and reconfigure IT resources to support and enhance business strategies and processes (Sambamurthy and Zmud 1997). Bharadwaj (2000, p.171) describes these capabilities as the "firm's ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities". (See Table 1 for other definitions.) IT capabilities create value and improve performance. Commonly discussed IT capabilities include IT flexibility or architecture modularity (Dong et al. 2009; Ngai et al. 2011; Tallon and Pinsonneault 2011; Tiwana et al. 2010), IT integration (Rai and Tang 2010) and IT leveraging capability, or the effective use of specific IS to support business activities (Pavlou and El Sawy 2006, 2010).

Studies on IT capabilities use different perspectives and methods, and occasionally conflict. To explain the variation and highlight generally agreed on conclusions, we conducted a review of IS articles in the ABI/ProQuest database, focusing on articles published in the Senior Scholars' Basket of Journals (AIS 2013) since 1990, using key words such as IS/IT strategy, capabilities, dynamic capabilities, innovation and performance. (To limit the number of articles reviewed, we did not include search terms such as IT maturity, governance, and competitive advantage.) This focused search returned more than 1,300 articles. After a first scan of all titles and abstracts, 274 articles were retained. More in-depth examination allowed us to further restrict the number of articles to 80. One author read and coded these articles (see Tables 1-4 and the list of references for a subset of these articles), while the second author reviewed the articles and codes. Codes were discussed until there was agreement.

We found two basic underlying researcher assumptions that explained much of the difference in models and findings: 1) assuming a static world versus a turbulent one, and 2) assuming a world where business and IT are connected versus fused (El Sawy 2003). Below, we review our findings, and then suggest future avenues for research.

Table 1. Selected Definitions of IT Capability	
Citation	Definition of IT capability (or related construct)
Coltman et al. (2007)	IT competency: "(1) Technical knowledge about IT systems; (2) the extent to which the firm uses IT; and (3) the number of IT-related artifacts (Tippins and Sohi, 2003)" (p.89)
Mithas et al. (2011)	Information management capability: "Ability to (1) provide data and information to users with the appropriate levels of accuracy, timeliness, reliability, security, and confidentiality; (2) provide universal connectivity and access with adequate reach and range; and (3) tailor the infrastructure to emerging business needs and directions" (p.240)
Nevo et al. (2007)	Internal IT capabilities: "Accumulated, firm-specific IT knowledge and experience" (p.10)
Sambamurthy & Zmud (2000)	IT capability: "Combinations of IT-based assets and routines that support business conduct in value-adding ways" (p.108)
Sambamurthy et al. (2003)	IT competence: "The organizational base of IT resources and capabilities; a firm's capacity for IT-based innovation and the ability to convert IT resources into strategic applications" (p. 244)
Tallon & Pinsonneault (2011)	IT infrastructure flexibility: "The extent to which key IT resources can scale and adapt for different purposes (Byrd and Turner 2000)" (p.465)

Findings

The Importance of the Environment

Business strategy, dynamic capabilities, and environment are linked (Eisenhardt and Martin 2000). However, conceptualizations of the relationship between business strategy and information technology often do not explicitly consider the challenges of environmental dynamism. They do not characterize value creation differently in competitive and stable environments. Recent research has suggested that organizations following certain strategies (e.g., an IS innovator strategy) are not affected by environmental uncertainty as much as other organizations; they perform as well in stable or uncertain environments (Leidner et al. 2011). However, this may not be true of firms with other strategies (e.g., IS conservatives) that experience declining performance in environments characterized by market uncertainty (Leidner et al. 2011).

In turbulent settings, IT dynamic capabilities become even more important. These processes and routines facilitate learning and transform firm asset/resource positions (Butler and Murphy 2008). Dynamic capabilities are described as "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (Teece et al. 1997, p.516). "The term 'dynamic' indicates that organizations must continually monitor and renew functional competencies in response to the rapidly changing competitive context" (Baker et al. 2011, p.303). In other words, dynamic capabilities are "capability-building mechanisms" (Sambamurthy et al. 2003, p.240).

Some of the most recent theorizing on the complex relationships between IT dynamic capabilities and firm outcomes positions IT systems as a necessary "third hand," tightly integrated with dynamic capabilities and environmental turbulence (El Sawy et al. 2010; Tanriverdi et al. 2010). Together, they are positioned as an unfolding ecosystem. The development of a superior strategy that anticipates and addresses changes in the environment can be viewed as the result of a dynamic strategic alignment capability, where IS and business strategies are not only aligned, but allowed to co-evolve (Baker et al. 2011; Kim et al. 2011).

The empirical studies we reviewed examine environmental dynamism (in the form of competitiveness, turbulence, unpredictability or uncertainty) as a potential moderator. IT capabilities were shown to directly or indirectly contribute to organizational outcomes in stable or turbulent environments, but their effects were generally stronger in highly turbulent or competitive environments (Dong et al. 2009; Pavlou and El Sawy 2006, 2010; Tallon and Pinsonneault 2011). In addition, the indirect role played by IT in improving performance was mediated by two types of dynamic capabilities: process capabilities like new product development capabilities (Dong et al. 2009; Pavlou and El Sawy 2006, 2010; Rai and Tang 2010), and organizational agility in terms of the ability to sense and respond (Dong et al. 2009; Ngai et al. 2011; Overby et al. 2006; Tallon and Pinsonneault 2011; Tiwana et al. 2010). One study (Coltman et al. 2007) drew a direct link between extensive IT capabilities and e-business performance in highly turbulent environments. Table 2 highlights key related findings.

Table 2. Selection of Articles Emphasizing the Importance of the Environment		
Citation	Theories; Research Methods	Key Findings
Coltman et al. (2007)	Strategic decision making; Surveys, case	E-business performance improves when organizations evolve in highly turbulent environments, have extensive IT capabilities, and have managers who believe in e-business value. Managerial beliefs act as a mediator between environmental pressures and performance.
Dong et al. (2009)	Transaction cost economics (TCE) & Resource-based view (RBV); Survey	Digitally enabled supply chain management drives value at the process level and enhances organizational performance. Additionally, in highly competitive environments, backend integration and managerial skills are more important to value creation than in less competitive settings.

Overby et al. (2006)	Agility, Capabilities, Digital options	Agility becomes more important as environmental turbulence increases. IT enables agility both directly by sensing changes and indirectly through digital options.
Pavlou & El Sawy (2006)	Dynamic capabilities; Survey	IT leveraging competence has an indirect effect on competitive advantage through new product capabilities. In highly turbulent environments, IT leveraging competence has a stronger indirect effect on competitive advantage.
Sambamur-thy & Zmud (2000)	Capabilities	With environmental dynamism, organizations should organize their IT activities following a platform logic, that allows for flexibility internally and externally, and is built on three core components: IT capabilities, relational architectures and integration architectures.
Tallon & Pinsonneault (2011)	IT alignment; Survey	In stable environments, organizational agility fully mediates the impact of IT alignment on performance. In volatile environments, agility partially mediates the effect of alignment on performance, while IT flexibility enhances the positive effects of agility.

A perspective of perpetual change has consequences on how we see IS strategy and alignment, because it recognizes the continuous need to reinvent and realign IS and business strategies at individual (e.g., top management team), operational, and market levels (Benbya and McKelvey 2006). Co-evolution between IS and business strategies also calls for a reconceptualization of IT within and outside the constantly evolving boundaries of the firm (Tanriverdi et al. 2010). In this complex, holistic approach, the temporary nature of competitive advantages derived from IT capabilities is emphasized (Tanriverdi et al. 2010).

The Influence of Connection and Fusion Perspectives

In what can be described as the connection view of IS, IS/IT is a distinct construct, an artifact connected with the business, that can be studied separately and distinctively from other organizational factors (El Sawy 2003). IS/IT are tools that help individuals with their tasks and organizations with their objectives. An example of this view is the net-enabled business innovation cycle (NEBIC) model (Wheeler 2002). In the NEBIC model, technology is regarded as the driver of business models, and organizational performance and growth. It is possible to distinguish IT from other organizational factors and, to some extent, examine its direct or indirect impacts on organizational outcomes. In contrast, in El Sawy's (2003) fusion perspective, IT is indistinguishable from the business. Where one stops and the other starts cannot be precisely determined. A growing research stream, as illustrated by the selection of articles in Table 3, seeks to understand the roles that IT plays in enhancing organizational performance, in the context of the increasing fusion of IT with the business and its environment (El Sawy 2003). Some of this research embraces a holistic system perspective, complementing more traditional variance and process approaches (Fink 2011). IS strategy is understood and examined from a systemic perspective, where IT, dynamic capabilities and the environment are interdependent in a dynamic digital ecosystem (El Sawy et al. 2010). This perspective is consistent with co-evolutionary perspectives of IT, organizational processes, capabilities and markets (Hackney et al. 2004; Sambamurthy et al. 2003).

Table 3. Selection of Articles Highlighting the Fusion Perspective		
Citation	Theories; Research Methods	Key Findings
El Sawy (2003)	N/A	The connection view sees IT as a support tool for users. In the immersion view, IT is inseparable from the work environment. In the fusion view, IT is so intertwined with the organizational environment that its study is challenging and requires new theoretical and measurement approaches.

El Sawy et al. (2010)	Configur-ational theory	IS strategy should be studied from a holistic perspective to embrace the interrelatedness and co-evolution of environmental turbulence, dynamic capabilities and IT.
Fink (2011)	RBV, Configur-ational theory; Survey	Direct/mediation models adopted in reductionist approaches and holistic models provide complementary views of IS strategic value.
Hackney et al. (2004)	Co-evolutionary analysis; Organization review	eMarkets call for a new approach to strategic analysis using co-evolution. Organizations work through partners and alliances in their ecosystems.
Leonardi (2010)	Actor-network theory, Affordances; Ethnography	"Imbrication" of human and material agencies creates infrastructure in the form of routines and technologies that people use to carry out their work.
Nevo & Wade (2010)	Systems theory, RBV	Compatibility between IT assets and organizational resources that is reinforced by managerial integration efforts can facilitate synergies and the creation of competitive advantages.
Tanriverdi et al. (2010)	Complexity science	Research should focus on IS and business strategies co-evolution, reconfiguration of IT internally and externally, and the non-durability of competitive advantages for complex adaptive business systems.

The Variety and Complexity of IT Capabilities and their Impacts

Early research on IT capabilities sought to establish the need to examine IT capabilities as potential influencers of organizational performance (Peppard and Ward 2004; Sambamurthy and Zmud 2000), and to understand whether their impacts were direct or indirect. A study by Bharadwaj (2000) was one of the first to show a *direct* link between IT capabilities and improved financial performance. Bharadwaj's (2000) findings were confirmed by other studies (Bharadwaj et al. 2007; Santhaman and Hartono 2007). Another stream of research shows IT capabilities as playing *indirect* roles in increasing organizational performance. A number of mediators link IT capabilities to performance, such as process-oriented dynamic capabilities (Kim et al. 2011) and new product capabilities (Pavlou and El Sawy 2006).

Studies have demonstrated that IT capabilities are more likely to complement other capabilities and strongly impact organizational performance in highly turbulent environments (Coltman et al. 2007). They influence e-commerce capabilities (Zhu 2004) in small and medium (Coltman et al. 2007; Zhang et al. 2008) and large (Coltman et al. 2007; Zhu 2004) organizations, as well as coordination capabilities between other functional areas, such as marketing-manufacturing and manufacturing-supply chain coordination (Bharadwaj et al. 2007). There are other contingent effects of IT capabilities. In dense network structures, strong IT-enabled capabilities are needed to improve organizational performance, while they are not as critical in sparse networks (Chi et al. 2010). Also, different supply chain strategic configurations call for the use of different IT-enabled capabilities (Barua et al. 2004).

Research has examined different types of IT capabilities. IT skill capabilities, such as managerial IT skills (Dehning and Stratopoulos 2003), or collaborative skills (Tarafdar and Gordon 2007), are essential to the development of competitive advantages. Some capabilities are considered core over time (e.g., relationship skills) while others may become redundant (e.g., IS planning and IS operations management; Butler and Murphy 2008), highlighting the constant evolution of capability needs in organizations. A few studies have examined complementarity between IT capabilities that are internal and external to the business in supporting strategy (Duhan et al. 2001; Rivard et al. 2006). Nazir and Pinsonneault (2012) demonstrate that electronic integration (internal and external) may affect organizational agility in different ways. Furthermore, the use of external IT expertise or outsourcing may improve productivity (Nevo et al. 2007) or facilitate IT alignment (Valorinta 2011). Finally, in certain settings, some IT-specific

capabilities, such as IT infrastructure capability, can have no impact (Bhatt and Grover 2005), or even a negative effect (Rettig 2007; van Oosterhout et al. 2006; Zhang et al. 2008), on competitive advantage.

Partial Understanding of IT Capability Mechanisms

More research is required to fully uncover the mechanisms by which IT capabilities are developed. A pool of resources and lower-level capabilities contribute to their development. Resources include IT infrastructure and human IT skills and expertise (Bulchand-Gidumal and Melian-Gonzalez 2011; Kim et al. 2011; Ravichandran and Lertwongsatien 2005), whereas lower-level capabilities include IT management and collaboration skills (Bulchand-Gidumal and Melian-Gonzalez 2011; Kim et al. 2011; Ravichandran and Lertwongsatien 2005), and functional capabilities such as IS planning, IS development and IS operations (Ravichandran and Lertwongsatien 2005). Some researchers argue that resources support the development of lower-level capabilities (Ravichandran and Lertwong-satien 2005). Others suggest that IT management capabilities precede (Bulchand-Gidumal and Melian-Gonzalez 2011) or mediate relationships between resources and lower-level capabilities (Kim et al. 2011).

A number of articles reviewed (see Table 4 for selected key findings) focus on information and knowledge-based capabilities, as well as organizational agility. Researchers argue that IT contributes to the development of learning capabilities (Andreu and Ciborra 1996). IT enables the development of information-related capabilities, believed to indirectly influence organizational performance through higher-level processes (Li et al. 2009) and management capabilities (Mithas et al. 2011). IT-enabled knowledge capabilities generally contribute to organizational innovation (Joshi et al. 2010; Tanriverdi 2005; Tarafdar and Gordon 2007), but one study (Prieto and Easterby-Smith 2006) demonstrates that formal IT-based knowledge capabilities can hinder the development of dynamic capabilities affecting performance. Research has empirically validated the critical role of IT-enabled absorptive capacity (another learning-related dynamic capability) in improving organizational outcomes, such as competitive advantage (Francalanci and Morabito 2008; Zahra and George 2002) and innovation (Joshi et al. 2010).

Organizational agility is another well-studied area linking IT and organizational outcomes (Sambamurthy et al. 2003). The IT factors that have been linked to improved agility include IT capabilities related to infrastructure, boundary spanning and having a proactive stance (Lu and Ramamurthy 2010), electronic integration (Nazir and Pinsonneault 2012), IT architecture modularity and IT governance (Tiwana et al. 2010). The literature also suggests that the effects of IT on agility may be direct through IT flexibility (Tallon and Pinsonneault 2011) and indirect through digital options (Overby et al. 2006; Sambamurthy et al. 2003). A recent study (Tallon and Pinsonneault 2011) empirically validates agility (sensing and responding) as a mediator between IT alignment and performance, especially in turbulent environments.

Table 4. Selection of Articles on the Variety, Nature and Importance of IT Capabilities		
Citation	Theories; Research Methods	Key Findings
Andreu & Ciborra (1996)	RBV	IT contributes to the development of the learning aspect of capability development through 3 loops: The routinization learning loop, the capability learning loop and the strategic learning loop.
Baker et al. (2011)	Dynamic capabilities	Assesses IT dynamic strategic alignment competency in terms of alignment at a point in time, the firm's history of alignment, and the maturity of business processes.
Barua et al. (2004)	RBV; Survey	Process alignment of value chain partners positively impacts information capabilities (IC). Supplier and customer IC directly affect customer and supplier-side digitization and indirectly financial performance.
Bharadwaj (2000)	RBV; Secondary data	High IT capability derived from IT resources (tangible, intangible, human) leads to better performance in terms of financial ratios.

Bharadwaj et al. (2007)	Coordination and complementarity; Survey	Integrated IS capability has both a direct and complementary influence on manufacturing performance. Integrated IS capability originates from the harmonization of IS and manufacturing.
Bhatt & Grover (2005)	RBV; Survey	IT infrastructure capability has no impact on competitive advantage, while both IT business experience and relationship infrastructure capabilities are linked to competitive advantage.
Butler & Murphy (2008)	Dynamic capabilities; Case study	Identifies 17 capabilities and 11 asset positions. Some capabilities remain core over time while others do not. Some intangible complementary assets, on which capabilities are based, are key resources.
Chi et al. (2010)	Competitive dynamics; Secondary data	The extent to which a firm's network structures are exploited depends on its IT-enabled capabilities. Performance is enhanced when IT-enabled capabilities complement a dense network structure. Limited IT-enabled capabilities suffice for a firm to benefit from a sparse network structure.
Dehning & Stra-topoulos (2003)	RBV; Secondary data	Companies with superior managerial IT skills will have a longer duration of sustained competitive advantage.
Francalanci & Morabito (2008)	Absorptive capacity; Survey	Organizational absorptive capacity plays a mediating role between IS integration (application and data integration with organizational resources) and competitive advantage.
Kim et al. (2011)	Dynamic capabilities; Survey	IT capabilities do not directly impact performance but rather are mediated by process-oriented dynamic capabilities. IT managers play a mediating role between IT expertise and IT infrastructure flexibility.
Lu & Ramamurthy (2010)	Agility; Survey	IT capability (infrastructure, boundary spanning, proactive stance) enhances agility and that there is a positive effect of IT capability and IT spending on operational adjustment agility only.
Mithas et al. (2011)	Capabilities; Secondary data	IT-enabled information management capability enhances performance management, process management and customer management capabilities, which in turn positively affect related performance.
Nazir & Pinsonneault (2012)	Agility	Internal and external electronic integration affect the link between IT and agility (sensing and responding capabilities). High external integration should lead to high sensing capabilities while high internal integration should lead to high responding capabilities.
Nevo et al. (2007)	RBV, Microeconomic theory, TCE; Secondary data	External IT capabilities, through the use of consultants, allow firms to increase IT productivity, by increasing the pool of IT expertise and skills. However, this positive impact may be neutralized when similar skills and expertise (internal IT capabilities) exist with the organization.
Ngai et al. (2011)	RBV; Case study	Supply chain integration and learning (operational competences) are more important for bigger organizations, while flexibility matters more for smaller organizations. IT competence plays a critical role.
Peppard & Ward (2004)	RBV	The continuous delivery of value through IT occurs through the development of IS competencies and capabilities that facilitate business operations. IT capabilities are at the core of the success of the alignment of IT strategy and services with business strategy and operations.

Prieto & Easterby-Smith (2006)	Dynamic capabilities; Case study	Organizational knowledge may facilitate the emergence of dynamic capabilities, especially when knowledge exchange occurs informally. Formal, IT-based knowledge exchange may hinder dynamic capabilities.
Rai & Tang (2010)	Capabilities, Resource dependence theory; Survey	Three competitive process capabilities (process alignment, partnering flexibility and offering flexibility) are needed for interorganizational relationship management. Process alignment complements partnering and offering flexibility to improve overall competitive performance.
Ravichandran & Lertwongsatien (2005)	RBV; Survey	IS resources are key to IS functional capabilities that support effective IT use, which in turn support core competencies and enhance performance.
Rivard et al. (2006)	RBV, Porter's competitive strategy framework; Survey	Roles played internally by IT to support firm assets and IT's external role as support for strategy are complementary and lead to better market performance and profit.
Sambamurthy et al. (2003)	Capabilities, Dynamic capabilities, Digital options, Agility	Through the strategic processes of capability building, entrepreneurial action and coevolution, IT competences facilitate the development of three capabilities - digital options, organizational agility and entrepreneurial alertness - to increase the number of competitive actions and firm performance.
Santhanam & Hartono (2003)	RBV; Secondary data	Replicates Bharadwaj (2000) study and confirms that IT capability impacts business performance in a sustainable fashion. However, demonstrates that studies of IT capability effects on firm performance need to account for halo effects and past financial performance.
Tanriverdi (2005)	Capabilities; Survey	Cross unit knowledge management capability mediates the relationship between IT relatedness (the use of common IT infrastructure and various IT processes) and firm performance.
Tarafdar & Gordon (2007)	RBV; Case study	Six interdependent IS competencies (knowledge management, collaboration, project management, ambidexterity, IT/innovation governance, business-IS linkages) facilitate process innovations.
Vannoy & Salam (2010)	Grounded theory; Case study	Roles that managers assign to IS for the development of competitive actions are complex and pervasive.
Wheeler (2002)	Dynamic capabilities	Firm performance is improved by the joint effects of e-commerce capability and IT infrastructure. Both play complementary roles.
Zhang et al. (2008)	Capabilities; Survey	Value creation results from the interplay between entrepreneurship, IT and competitive advantage. Absorptive capacity is a dynamic capability.
Zhu (2004)	RBV; Secondary data	In SMEs, IT capability dimensions of business partnerships, external linkages, business strategic thinking, business process integration and management all lead to higher organizational performance.

Conclusions

As we have seen by examining recent IS literature, the study of IT capabilities has provided important insights into the changing nature of IT-enabled business, in the context of complex and evolving technology and business environments. While much of this examination has been fruitful, there have been limitations. The literature reviewed reveals a dominant perspective of primarily stable business contexts with distinguishable business and IT dimensions. In most IT capabilities studies, researchers have not explicitly stated their assumptions; this, no doubt, has contributed to seeming contradictions in the literature. Not only do we call for more explicit discussion of underlying perspectives, we suggest that, in today's business environment:

Proposition 1: Studies that examine IT capabilities using holistic perspectives, in which IT and business processes are essentially fused, will provide greater insights, all other things being equal.

We have noted that research contexts (e.g., industry, firm size, environmental turbulence) influence IT capability outcomes (Eisenhardt and Martin 2000). While a range of industries have been examined in previous studies, and there are a number of studies involving both large and small firms, relatively few studies have been carried out in highly turbulent environments. We suggest that, in today's business environment:

Proposition 2: Studies that examine IT in highly turbulent and hyper-competitive environments will provide greater insights, all other things being equal.

Proposition 3: Research models that include environmental turbulence as a moderator or mediator will provide greater explanatory power, all other things being equal.

Meta-analyses of past research findings on IT capabilities are needed to clarify and enhance our understanding of how IT capabilities function in different business settings. In addition, the opportunity exists to clarify and create order in the range and variety of IT capabilities. Some of the contradiction in the existing literature simply results from our use of the single term "capabilities" to refer to very different processes and routines (see Table 1). Also, some researchers blur distinctions between capabilities, resources and competences; others between capabilities and processes; and still others between capabilities, dynamic capabilities and improvisational capabilities which can be observed in highly turbulent environments. It is to be expected that, as a field of study matures, researchers will focus on fine distinctions and investigate narrow aspects of phenomena such as IT capabilities. However, we may have "gotten ahead of ourselves" so to speak. We still need to clarify and consolidate the foundation of research in this area, and explain the mechanisms by which IT capabilities influence firm assets, processes and performance. We therefore suggest:

Proposition 4: Additional concept definition and theorizing will do more to solidify the research foundation and our understanding of IT capabilities than additional narrow empirical investigations, at the current time.

Finally, although several IT capabilities studies make theoretical contributions that assist with analyzing and predicting, few focus on explaining, and even fewer provide theory for design and action (Gregor 2006). Most of the articles reviewed utilize cross-sectional (e.g., survey) research designs or secondary data. Some utilize case studies. (See Tables 2-4.) However, other approaches, that support explanation and action, are rare. We therefore suggest:

Proposition 5: IT capabilities studies that utilize under-represented methodologies, such as field experiments, longitudinal studies and action research, will provide greater insights, all other things being equal.

As Lynn (2013) sang, "We've come a long way." However, with IT capabilities research, we still have a long way to go.

Acknowledgments

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