IT-Enabled Innovation and Improvisation in Canadian SMEs: A Qualitative Comparative Analysis

Full Paper

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Abstract

In this empirical paper, we investigate IT-enabled innovation and improvisation in SMEs that operate in turbulent market environments. Using the theoretical lens of the resource-based view of the firm and dynamic capabilities, we study IT resources, IT capabilities, and organizational agility in such SMEs. We conducted an online survey of Canadian SMEs and use an emerging analysis technique called Qualitative Comparative Analysis or QCA to provide rich insights into which configurations or combinations of IT systems, capabilities, and resources facilitate innovation and improvisation. We address the research question: What IT resource and capability configurations in IT-enabled SMEs result in high levels of innovation and improvisation? The results indicate how different combinations of organizational agility, IT leveraging capability, and IT resources can be used to achieve high levels of innovation and improvisation. Based on our findings, researchers and practitioners can gain insights about how to structure and configure IT systems, resources, and capabilities.

Keywords

IT-enabled, innovation, improvisation, IT agility, IT leveraging capability, IT resources, QCA, SMEs

Introduction

Small and medium-sized enterprises (SMEs) play an important role in economic development and considerably impact GDP growth, employment generation, global competitiveness, and the advancement of niche products and services (Government of Canada, 2010, 2011; Industry Canada, 2011). They often foster the next generation of technological innovation. SMEs, which are often young firms (Pickernell et al., 2013), operate under conditions that are very different from those experienced by large corporations. They typically experience resource shortages (Welsh and White, 1981) and possess lower tolerance levels for business uncertainty (Dandridge, 1979). However, certain IT-focused SMEs can quickly adapt to market and business challenges by strategically leveraging their IT resources and capabilities, and developing agile and responsive information systems. Such IT-enabled SMEs often are more innovative and perform better than their peers (Sambamurthy, Bharadwaj, and Grover, 2003). As globalization transforms the business environment, SMEs face higher rates of turbulence, competition and obsolescence. Traditional theories of business, IT strategy, and innovation, tend to be limited in their applicability due to underlying assumptions of stability and relatively low levels of market competition (Grundy, 2006). In rapidly evolving markets, SMEs compete by leveraging IT systems (D’aveni and Gunther, 1994) and can be studied appropriately using the lens of the resource-based view (RBV) of the firm, with a focus on IT-enabled capabilities and dynamic capabilities (Pavlou and El Sawy, 2010; Tallon, 2011; Wastell and McMaster, 2008) that can fuel innovation (Tanriverdi, Rai, and Venkatraman, 2010).

In this study, we investigate IT-enabled innovation and improvisation in SMEs that operate in turbulent market environments. Using the theoretical lens of the resource-based view (RBV) of the firm and dynamic capabilities, we examine IT resources, IT capabilities, and organizational agility. We conduct an
online survey of Canadian SMEs (N=137). We use an emerging analysis technique called Qualitative Comparative Analysis or QCA to provide rich insights into which configurations or combinations of IT systems, capabilities, and resources facilitate innovation and improvisation. We address the research question: What IT resource and capability configurations in IT-enabled SMEs result in high levels of innovation and improvisation? In the rest of this paper, we provide a brief conceptual framework, a synopsis of QCA, and our results. We then discuss limitations and research implications.

Theoretical Foundations

This paper uses the theoretical lenses of RBV and dynamic capabilities to examine innovation and improvisation in IT-enabled SMEs. Factors internal to the firm, such as resources and capabilities, are often perceived to provide competitive advantage (Barney, 1991; Brown and Eisenhardt, 1995). Importantly, this study goes beyond these factors and also examines factors external to the firm (Tarafdar & Gordon, 2007; Wheeler, 2002). Interactions among the internal and external entities are increasingly taking place via digital mechanisms. Integrated IT systems, digital product lifecycle management, fused supply chains, digital platforms, mobility, and real-time interaction with customers through cutting-edge Customer Relationship Management (CRM) systems and social media are blurring the traditional physical boundaries of the firm and digitally extending and personalizing the customer experience (El Sawy et al., 2010). As a result, firms are investing heavily in digitization, mobility, and strategic IT systems and capabilities.

Traditionally, resources have been defined as all assets, organizational processes, capabilities, information, knowledge, etc. controlled by the firm to conceive of and implement strategies that improve its efficiency and effectiveness (Barney 1991). Resources and capabilities are often coupled with each other (Wade & Hulland, 2004). However, in our study, we separate IT resources and capabilities. Resources are stocks of available factors that are owned or controlled by the organization, and capabilities are an organization’s capacity to deploy resources (Amit & Schoemaker, 1993). Using the RBV lens, previous studies have highlighted the important role of resources in enabling functional IT/IS capabilities, which in turn support core competencies of the firm and lead to higher levels of performance (Ravichandran and Lertwongsatien, 2005). IT resources act as the foundation for building capabilities in an evolutionary manner (Peppard and Ward 2004). Firms develop, mobilize and exploit IT resources to build IT competencies or routines (Feeny and Wilcocks, 1998) and further develop strategic capabilities through focused investment in and deployment of such competencies (Peppard and Ward, 2004).

IT Resources

In this paper, we focus on two categories of IT resources: IT infrastructure and IT human resources (Bharadwaj, 2000; Mata, Fuerst, and Barney, 1995). SMEs may not necessarily “own” their IT infrastructure. Smaller firms can more easily use cloud services (such as Amazon’s Elastic Compute Cloud or EC2, Microsoft’s Azure, and Google’s Cloud Platform) that provide highly efficient, cost-effective, and scalable IT infrastructure (Bharadwaj, El Sawy, Pavlou, and Venkatraman, 2013). IT infrastructure can be defined as the physical IT assets that form the core of a firm’s overall IT structure comprising computer and communication technologies and shareable technical platforms and databases (Bharadwaj, 2000). Past studies have also shown that the success or failure of IT projects depends on the technical and managerial skills of IT human resources (Chesbrough, 2007; Duhan, Levy and Powell, 2001; Ravichandran and Lertwongsatien, 2005), thereby underlining the fact that technical training, personnel development and harnessing managerial acumen of IT human resources can provide firms with competitive advantages. IT human resources consist of the organizational human resources related to IT and generally comprise IT-related training, experience, relationships, and insights of employees (Bharadwaj, 2000). IT human resources can be categorized as “technical skills” and “managerial skills”. Technical skills include programming, systems analysis and design, and competencies in emerging technologies, while managerial skills include effective management of IS functions, coordination and interaction with user communities, and project management and leadership skills. The possession of superior IT resources can lead to superior capabilities that result in improved product and service outcomes. Furthermore, effective management of these IT resources, combined with appropriate systems and processes, is likely to result in improved performance (Wang et al., 2012).
**IT Leveraging Capability**

Resources that possess VRIN (value, rarity, inimitability, and non-substitututability) attributes tend to provide the firm with better opportunities for competitive advantage (Eisenhardt & Martin, 2000; Mata, Fuerst & Barney, 1995). The firm must leverage IT tools and processes to manage and exploit IT resources for purposes of competitive advantage (Tippins & Sohi, 2003). To achieve this exploitation, the firm must develop IT capabilities, which are defined as the ability to translate the business strategy into long term information architectures, technology infrastructure and resourcing plans that enable the implementation of the strategy (Peppard & Ward, 2004). Previous research shows that IT capabilities are composed of IT infrastructure flexibility, IT personnel expertise, and IT management capability (Kim et al., 2011). IT leveraging capability (Pavlou & El Sawy, 2006, 2010) is defined as the ability to effectively use IT functionalities to support business activities and consists of systems that are deeply embedded within IT processes. Systems that provide IT leveraging capability include project/resource management systems, organizational memory systems, cooperative work systems, and business intelligence (BI) systems. Kim et al. (2011) suggest that human IT resources and IT infrastructure resources are drivers of IT capability and that this relationship is stronger in cases where there are also “management capabilities”. Pavlou and El Sawy (2006), in a new product development context, mention that firms must focus on how they can leverage IT functionalities to better reconfigure and execute business processes. They point towards leveraging IT systems for strategic purposes, especially in turbulent business environments.

**Organizational Agility**

Firms that possess IT leveraging capability typically perform well in stable market conditions. In changing or turbulent environments, firms focus on development of capabilities to dynamically adapt IT strategy and resource usage with dynamic capabilities (Lu & Ramamurthy, 2011; Overby, Bharadwaj & Sambamurthy, 2006; Sambamurthy, Bharadwaj & Grover, 2003; Teece et al. 1997, p.517). A dynamic capability is defined as the ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece et al. 1997). In the extant literature, dynamic capabilities are discussed using multiple perspectives such as the Net-Enabled Business Innovation Cycle (NEBIC) (Zahra & George, 2002), process innovation (Tarafdar & Gordon, 2007), knowledge capabilities (Joshi et al. 2010), and innovation via smart business networks (Busquets, 2010). For the purposes of this paper, we focus on organizational agility (El Sawy et al., 2010) as an important dynamic capability. Organizational agility is the ability to detect and respond to opportunities and threats with ease, speed, and dexterity (Tallon and Pinsonneault, 2011). Previous research also focuses on IT capability as an enabling factor for organizational agility (Overby et al., 2006; van Oosterhout et al., 2006; Nazir and Pinsonneault, 2012; Sambamurthy et al., 2003). There is evidence in the agility literature that IT capability is a valid antecedent of agility and innovation is a valid outcome. Levallet and Chan (2015) argue that improvisation is also an important outcome. Within the context of this paper, two types of agility are studied: 1) Acting, which is the firm’s ability to quickly modify business processes and systems in response to the market conditions (Eisenhardt and Martin 2000; Teece et al. 1997; Thomas et al. 1993); and 2) Sensing, which is the ability to sense changes in market dynamics, customer preferences, supplier options, etc. (Houghton et al. 2004; Daft et al. 1988).

**Innovation and Improvisation**

Previous research on agility and other dynamic capabilities has focused on firm performance as an outcome variable. As the business environment has grown more complex and as the focus for IT has shifted from a supporting role to an enabling role, innovation has emerged as an important outcome variable. According to Thomson (1965), innovation is the generation, acceptance, and implementation of new ideas, processes, products, or services. Innovation often involves commercialization mechanisms for products and services, thereby directly impacting the financial performance of a firm (Carayannis & Provance, 2008; Teece, 1997). In addition, in turbulent business environments, improvisation can be necessary for survival (Pavlou and El Sawy, 2006, 2010). Improvisation is a type of behavior that involves rapid creation of action outside current plans and routines (Miner, Bassof, & Moorman, 2001; Moorman & Miner, 1998). In our study, we examine both innovation and improvisation. Innovation is seen in conditions that allow strategic planning before execution. On the other hand, improvisation is seen in extremely turbulent conditions when there is little time to design a strategy (Levallet and Chan, 2015).
Improvisation tends to involve product or service flexibility, process flexibility and organizational learning (Miner et al. 2001; Moorman and Miner 1998).

**Firm Characteristics**

Firm characteristics such as size and age also affect the relationship between agility and innovation. In this study, we focus on SMEs (small and medium-sized enterprises) which Industry Canada (2013) defines as businesses with fewer than 500 employees. Firms with 500 or more employees are classified as "large" businesses. To identify firms in turbulent industries, we use industry-level classifications based on Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes (Industry Canada 2013). Figure 1 displays the full research model.

![Figure 1: Research Model](image)

**Methodology**

Using Qualtrics software, we conducted a web-based survey of SMEs in Canada, using pre-existing instruments when they were available and developing new scales for innovation and improvisation (see Table 1 for sample scales). These instruments are available from the authors but are not displayed here because of space constraints. SMEs were identified using publicly available databases such as InfoCanada and Hoovers. We identified SMEs in turbulent industries such as IT service providers, e-commerce, semiconductor manufacturers, and bio/nano/HiTech manufacturers. These industries typically experience external uncertainty or unpredictability because of changes in consumer preferences and technology developments (Pavlou & El Sawy, 2006). We sent out targeted survey invitations over a 45-day period and received 137 completed responses. We wished to obtain 100 firms for our QCA data analyses. We tested the survey instruments for scale reliability and validity, and conducted tests such as chi-square tests for non-response bias as well as independent sample T-tests for early vs. late respondents, and satisfactorily passed all these tests. Composite reliabilities were greater than 0.7 for all constructs, indicating internal consistency. All standardized item loadings were greater than 0.7 and loaded on their corresponding factors. Thus, constructs had discriminant and convergent validity (Fornell & Larcker, 1981). Our data also satisfactorily passed the common method bias test (Podsakoff & Organ, 1986).

<table>
<thead>
<tr>
<th>Construct (#of items)</th>
<th>Sample (limited to one per construct due to space constraints)</th>
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<tbody>
<tr>
<td>IT Resources (11)</td>
<td>Your IT platform/network and IT infrastructure in general are reliable, secure and scalable? (Adapted from Bharadwaj, 2000)</td>
</tr>
<tr>
<td>IT Leveraging Capability (10)</td>
<td>Your firm utilizes systems to gather info. about changes in customer and competitor technologies from diverse sources? (Park and El Sawy, 2013)</td>
</tr>
<tr>
<td>Agility (14)</td>
<td>Your firm is fast to detect changes in competitors’ moves (e.g., new promotions, products/services, and prices)? (Park and El Sawy, 2013)</td>
</tr>
<tr>
<td>Innovation (9)</td>
<td>Your company regularly seeks new ways to do things (Carayannis &amp; Provance, 2008)</td>
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<tr>
<td>Improvisation (7)</td>
<td>Your firm rapidly develops enhancements to new products/services without following a fixed methodology (Moorman and Miner, 1998)</td>
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**Table 1: Sample Items for Measurement of Constructs**

**Qualitative Comparative Analyses**

QCA analysis is particularly important for IT/IS studies because insights into the utility, value, and benefits of systems and capabilities are not fully visible using linear analysis approaches such as regression and structural equation modeling (SEM; Pavlou and El Sawy, 2010). With these approaches,
we cannot make recommendations as to which combinations of systems, capabilities, and environmental factors have superior outcomes. Moreover, we cannot determine when factors should essentially be “absent” for superior performance. Using QCA, we can not only achieve this but also obtain new insights regarding how IT/IS resources and capabilities act collectively rather than in isolation. For example, Rivard and Lapointe (2012) showed, using QCA, how implementers’ responses may affect the antecedents that earlier research found to be associated with user resistance behaviors. Similarly, Park and El Sawy (2013) discuss the value of the fsQCA approach for studying digital business strategy.

QCA is based on set-theoretic methods which allow for the identification of commonalities in the relationships between causal conditions and an outcome (e.g., innovation) across cases (Ragin, 2008). The term causal condition refers to “an aspect of a case that is relevant in some way to the ... explanation of some outcome” (Ragin 2008, p. 18; Rivard and Lapointe, 2012). Traditional, variance-based methods such as SEM and regression, use sequential relationships, where the effect of each variable on the outcome can be detected. We are trying to understand how multiple IT resources and capabilities interact in a complementary manner, resulting in superior firm performance. In contrast, QCA is especially helpful in providing holistic views on “how information technologies, organizational dynamic capabilities, and environmental turbulence simultaneously and systemically combine to produce competitive firm performance” (Park and El Sawy, 2013). QCA also accommodates complex inter-connectedness of multiple elements, nonlinearities, and discontinuities (Meyer et. al., 1993). The approach is applicable to “small-N” situations (from as few as 2 cases up to 15 cases) as well as “intermediate-N” (up to 100 cases) and “large-N” research designs (Ragin, 2008). QCA can accommodate equifinality with a flexible analytical frame (variance theories only allow unifinality with a fixed analytical frame) where a different set of elements can produce the same outcome (Fiss, 2007; Ragin & Amoroso, 2011). In this paper we use a newer, more powerful version of QCA called fuzzy-set QCA or fsQCA, which goes beyond simply identifying a configuration and allows for more fine-grained understanding of complex causality (Park and El Sawy, 2013). We note that while QCA can be used for hypothesis testing, we are using it in this study in an exploratory mode focused on identifying emergent configurations rather than confirming our preconceived expectations outside of the constructs of interest suggested by extant theory and literature.

Findings with fsQCA

Using fsQCA software, we calibrate an interval scale to a fuzzy membership score ranging from 0.0 to 1.0. Calibration is a process of transforming interval scale values to fuzzy set membership scores based on three qualitative anchors: full membership, full non-membership, and the crossover point of maximum ambiguity regarding membership in the set of interest (Ragin, 2008). This study uses a 7-point Likert scale and defines the interval scale 2 as the anchor for full non-membership, 4 as the crossover point, and 6 for the full membership anchor for the set of high level of innovation and improvisation. We study the outcome variables of innovation and improvisation in IT-enabled SMEs separately, in order to understand in greater detail how IT resources and capabilities affect both innovation and improvisation. Previous studies on IT adaptability (Tallon, 2008) and IT flexibility (Tallon, 2008) have examined the role of IT infrastructure flexibility and other IT resources in developing and maintaining a responsive and alert organization. This study helps to clarify the role of IT resources, systems, and capabilities in innovation and improvisation.

Figure 2 depicts configurations for achieving high innovation as indicated by the fsQCA results. The configurations are expressed using the notation systems from Ragin and Fiss (2008). The dark shaded circles indicate the presence of a factor or element, crossed-out circles indicate the absence of an element, large circles indicate core elements, and small circles indicate peripheral (less important) elements. Blank spaces indicate a “don’t care situation,” in which the causal element may be either present or absent. The reported “consistency” gauges the degree to which the cases sharing a given combination of conditions agree in displaying the outcome in question (Ragin, 2008). The reported “coverage”, by contrast, assesses the degree to which a cause or causal combination "accounts for instances of an outcome” (Ragin, 2008). When there are several paths to the same outcome, the coverage of a given cause may be small. This study set the minimum recommended frequency of cases for solutions at 3, and the lowest acceptable consistency cutoff at 0.85, which is above the minimum recommended threshold of 0.75 (Ragin, 2008). By comparing the six configurations shown in Figure 2, we find the following patterns:
Innovation & Improvisation in Canadian SMEs

Finding 1: Highly innovative SMEs are dependent upon the sensing aspect of agility and business intelligence systems (configs. 1A through 1E) in order to sense market directions and customer needs. This is the dominant form of highly innovative firms.

Finding 2: In the absence of BI systems (config. 2) and highly skilled technical staff, highly innovative SMEs depend on superior IT infrastructure as they sense market directions and customer needs.

A key insight from the configurations is the dominance of combining the sensing aspect of agility with BI tools. This core configuration withheld wide varieties of peripheral capabilities in both the acting aspect of agility and the absence or presence of KMS. This highlights that innovative SMEs are keenly aware of their environments and deploy systems that heighten these senses. Another key insight from the configurations in Figure 2 is that heavy investment in IT resources and highly skilled IT talent may not necessarily lead to innovation. IT resources are generally either peripheral or missing in five out of six configurations. This means that SMEs can be innovative without investing heavily in IT resources but instead developing strategic capabilities to effectively exploit the resources at their disposal. It is clear that by developing capabilities for leveraging IT systems effectively and focusing on agility for rapid, dynamic, sense-and-respond capabilities, SMEs can foster high levels of innovation. In Figure 3, we display the results for SMEs that are highly improvisational. We use a similar frequency cutoff (3), but a lower consistency threshold (0.80) in order to allow for greater coverage of cases.

Finding 3: In general, improvisational SMEs sense and react effectively to market changes through the application of BI tools and KMS in the absence of a well-developed IT infrastructure (configuration 1).

Finding 4: In the absence of either effective BI tools or KMS, improvisational SMEs sense and react effectively to the market changes through highly developed IT resources (configurations 2-3).

Contrary to what we learned for innovative SMEs, improvisational SMEs have expertise in both the acting and sensing aspects of agility, but are dominated by their ability to respond to market changes. In cases
where both BI and KMS are deployed, they are less dependent on maintaining superior IT resources. However, in cases where either IT system is absent, they are highly dependent on IT resources and IT human resources. This emphasizes the role of a flexible and scalable IT infrastructure as well as technically superior HR that can re-configure and exploit such technologies for competitive advantage if leveraging IT systems are not always present. Our findings also find a balanced view between traditional views of how flexible IT infrastructure and innovative supporting IT personnel can contribute to competitive advantage and the hype around investment in big data and business intelligence tools for improvisation; configuration 1 supports the latter while configurations 2 and 3 support the former. Thus, practitioners and SMEs that are looking towards purchase and deployment of BI and big data tools must be cautious regarding their goals with respect to these technologies and decide between available tools and the capability to evolve. Depending on their goals, they must be able to balance their investments in leading-edge systems and technologies with robust, foundational IT infrastructure and human resources.

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<th>Agility</th>
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<tr>
<td>Responding to Market Changes</td>
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<tr>
<td>(Acting)</td>
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<tr>
<td>Sensing Market Direction &amp;</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Customer Needs (Sensing)</td>
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<tr>
<th>Leveraging IT Systems</th>
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<td>Business Intelligence Tools (BI)</td>
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<tr>
<td>Explicit IT-enabled Knowledge</td>
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<tr>
<td>Sharing (KMS)</td>
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<tr>
<th>IT Resources</th>
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<tr>
<td>Highly Skilled Technical IT Staff (HR)</td>
<td>●</td>
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<td>●</td>
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<tr>
<td>Superior IT Infrastructure (Infra)</td>
<td>●</td>
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Consistency: 0.839 0.815 0.856
Raw Coverage: 0.171 0.125 0.113
Unique Coverage: 0.092 0.043 0.041
Solution Coverage: 0.269
Solution Consistency: 0.811

Figure 3: Configurations for Improvisational SMEs

Conclusion

In this paper we have examined IT-enabled strategy and innovation in Canadian SMEs that operate in turbulent market environments. We built our conceptual research model based on the theoretical lenses of RBV and dynamic capabilities. We opted to use a powerful, set-theoretical, configurational analysis approach to study our data. We used fsQCA because we posited that IT resources, IT systems, and dynamic capabilities cannot be isolated individually as causal conditions for innovation.

Fuzzy-set qualitative comparative analysis (fsQCA) can effectively express such complex dynamics in a rich combinatorial way with core/peripheral and present/absent elements (Park and El Sawy, 2013). The same element that is core and present in some configurations can be peripheral and absent in other configurations, but effectively result in the same outcome. This principle of equifinality is central to studying how different firms use different combinations of IT resources, capabilities, and systems to drive innovation. We have highlighted this in our findings for both innovative and improvisational SMEs. In both cases, we found multiple configurations of IT systems, resources, and capabilities. Furthermore, by comparing multiple configurations, we can suggest how a configuration can move from one state to another by changing the structure of its elements (Park and El Sawy, 2013).
As with any study and analytical approach, using configurational approaches has its limitations. While configurational analyses provide a strong holistic view of how various combinations of elements can result in successful outcomes, this happens only as a snapshot in time and is not longitudinal in nature. Also, QCA is new and it will take some time for it to gain acceptance within academic and practitioner circles. Furthermore, a more detailed qualitative investigation can help to reveal how innovative SMEs develop the capabilities and configurations that we have highlighted.

Our study has both research and practical implications. It represents a move beyond traditional variance and process approaches, and examines multiple factors for innovation and improvisation such as IT infrastructure, IT human resources, organizational agility, and IT systems and tools. Existing theories that are based on linear, additive relationships between elements and assume equilibrium status cannot adequately explain dynamically changing and complex causal nature of IT-enabled firm performance (Meyer et al., 2005). Our approach provides unique insights that are not available through structural equation modeling or earlier (e.g., regression) approaches. This next generation (fsQCA) analytical tool enables us to study today's complex, deeply interlinked technological constructs. By holistically examining the essential IT and organizational factors that lead to innovation and improvisation, we have advanced the theoretical understanding of IT-enabled innovation in SMEs and built theory (Gregor, 2006). Our research is based on “theory for explaining or understanding” (Gregor, 2006) as it emphasizes on showing a different view of how SMEs use combinations of IT resources and capabilities for innovation and improvisation. We have also provided evidence to highlight that IT-enabled innovation studies must take into account important aspects such as equifinality, where multiple combinations of IT-focused factors can lead to innovation and improvisation. This is a step beyond traditional SEM approaches for studying IT-enabled firm innovation. Our focus on improvisation as an important outcome variable contributes towards extending the IT/IS literature which has largely been focused only on innovation.

Our study also provides important insights as to which IT resources, systems, and capabilities provide the foundations for innovation and improvisation. Managers can use these insights to target technology investments based on how they plan to gain competitive advantage in their given environments. We have also highlighted how IT-dependent SMEs can leverage existing IT infrastructure, IT human resources, and IT systems such as BI and KMS in conjunction with organizational agility, to foster improvisation and innovation. By using the principles of equifinality and causal recipes, we have given managers new insights into which resources, capabilities, and systems are more (or less) important for improvisation and innovation, and in what combinations. This represents a shift from recommendations arising from traditional IT/IS studies. Firms are able to see which patterns of resource investments will most likely increase their performance.

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