Investigating the Complexity of Organizational Digitization and Firm Performance: A Set-Theoretic Configurational Approach

Full papers

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Abstract

This study investigates the causal complexity and diversity of the relationship between organizational digitization and firm performance. Digitization – defined as the penetration of IT in the organization – is a complex organizational phenomenon in that it involves changes in organizational strategy, business processes, organizational knowledge and eventually the whole socio-technical organizational system, thus influencing organizational performance. We adopt a holistic configuration theory lens and a set-theoretic method, fuzzy-set qualitative comparative analysis (fsQCA) to explain how such interdependent relationships among digitization and organizational strategic elements result in high firm performance. We apply the set-theoretic method to a longitudinal field data set collected from 1816 Canadian firms. We found multiple equifinal configurations that result in high performance. By comparing the similarities and differences within and between the configurations, we could explain the multifaceted roles that digitization plays in achieving high performance together with organizational strategies.

Keywords

Digitization, firm performance, complexity, set-theoretic configurational approach, fuzzy-set Qualitative Comparative Analysis (fsQCA)

Introduction

Over the last few decades, there has been extensive research on "IT paradox" --- the complex relationship between IT investment and organizational performance, and the literature has shown that IT investments have a significant positive impact on organizational performance (e.g., Bharadwaj et al. 1999; Tafti et al. 2013). However, the IT influence on performance can vary depending on organizational specific strategies. Although, it is well accepted that IT-business strategic alignment supports to achieve competitive firm performance (Henderson and Venkatraman 1993; Chan et al. 1997), our understanding of the mechanisms that new IT implementation influences organizational performance still needs to be investigated (Aral and Weill 2007; Sharma and Yetton 2007).

Furthermore, organizational digitization, defined as the penetration of IT in the organization, is more complex than the traditional IT investment concept since digitization involves not only investment in new IT but also training employees of IT functions and actual IT usage (Burton-Jones and Gallivan 2007; Sharma and Yetton 2007). Thus, digitization is a complex organizational phenomenon in that it involves changes not only in IT but also in organizational strategy due to new IT implementation, business processes, organizational knowledge and eventually the whole socio-technical organizational system, thus eventually influencing organizational performance (Bharadwaj et al. 2013; El Sawy 2003; Orlikowski 2009; Yoo et al. 2012).

Studies on organizational digitization emphasize the importance of the impact of all the three key aspects of digitalization – IT spending, IT training and IT usage – on organizational performance (Wade and Hulland 2004; Jasperson et al. 2005; Sharma and Yetton 2007; Burton-Jones and Gallivan 2007). For example, two firms with the same amount of IT spending and capital can have different performance depending on their specific IT training and actual IT usage aligned with specific business strategy. However, there is a paucity of studies on how such elements of digitization can support efficiency or flexibility strategy to achieve competitive firm performance.

Due to the tight interdependencies between digitization, strategies and other organizational elements (Henderson and Venkatraman 1993; Chan et al. 1997; Bharadwaj et al. 2013), digitization elements by themselves may not fully explain the complex mechanisms that determine the ways that digitization impacts firm performance (Benbasat and Barki 2007, Schwarz and Chin 2007). Thus, we adopt a configurational theory perspective that posits how to combine digitization with strategies and other organizational elements can determine a certain level of performance (El Sawy et al. 2010; Fiss 2011).

The main objective of this study is to investigate the complex relationships between organizational digitization and strategies and firm performance and suggest configurations of digitization that produce high firm performance. We define three elements of digitization (i.e., IT spending, IT training, and IT usage) and four strategy elements (i.e., centralization, human resource (HR) flexibility, HR efficiency, and inter-firm collaboration), and suggest three hypotheses that explain how these IT and strategy elements systemically combine into configurations that produce competitive performance.

Using a fuzzy-set qualitative comparative analysis (fsQCA), which is best suited to explaining how all elements simultaneously combine into bundles to produce an outcome of interest (Ragin 2008; El Sawy et al. 2010; Fiss 2011; Park and El Sawy 2013), we analyze a longitudinal data set collected from 1816 Canadian firms. We found multiple equifinal configurations consisting of digitization and business strategy elements that produce high firm performance. Across the configurations, digitization plays different roles, either enabling or inhibiting. Organizations can achieve high performance either by building internally IT-intensive configurations or by building externally inter-firm collaboration.

This study contributes to the literature of the strategic influence of digitization by opening the black box of IT-strategy configurations and shedding light on the complex relationships between digitization and strategy elements that produce high firm performance. Practically, our findings demonstrate multiple equifinal paths to competitive advantage, meaning that organizations do not need to follow a single pathway, but instead they can choose one of multiple alternative pathways to high performance, which best fits their idiosyncratic context and can be achievable with most affordable costs and efforts.

Theory Development

Strategic Elements in Digitized Environments - Efficiency and Flexibility

The strategic management literature has extensively discussed "the paradox of administration", a dispute about achieving two seemingly opposite strategic objectives of flexibility and efficiency (Adler et al. 1999; Eisenhardt et al. 2010). Studies on managing the tension between efficiency and flexibility have adopted multiple approaches and concepts to explain how organizations can achieve flexibility and adaptability while keeping efficiency (March 1991; Levinthal and March 1993; Tushman and O'Reilly 1996; Eisenhardt and Martin 2000). For example, organizations exploit extant resources and solutions to achieve short-term performance but at the same time they should explore new alternative resources and innovations for long-term survival (March 1991; Tushman and O'Reilly 1996). Studies show that organizations can resolve

the tension by oscillating between formal, centralized structure for efficient exploitation and loosely coupled structure for flexible exploration (Adler et al. 1999; Benner and Tushman 2003). Structure defines actions and rules, so more structures can improve the reliability and speed of formal tasks, while loosely coupled structure enables organizations to flexibly cope with unpredictable business events (Gibson and Birkinshaw 2004).

Digitized environments are changing faster and more unpredictably, explicated from rapid change in customer preferences, more frequent emergencies of new technologies, shortened product life cycles, and increasingly competitive globalized rivalry (D'Aveni 1994; Wiggins and Ruefli 2005; Yoo et al. 2012). Organizations operating in such dynamic environments should equip with more flexibility to effectively cope with rapid and unpredictable changes (Eisenhardt et al. 2010). Further, organizations tend to favor a routine structure for achieving higher efficiency as they grow and age (Sorensen and Stuart 2000). Thus, organizational capability to quickly sense and flexibly respond to environmental changes should play a pivotal role for sustaining competitive advantage especially in dynamic environments, while centralized control mechanisms should be embedded in organizational structure to maintain some level of efficiency in business operations (Eisenhardt and Martine 2000; Sambamurthy et al. 2003; Eisenhardt et al. 2010). Thus, both flexibility and efficiency are important strategic elements in digitized business environments for firms to achieve competitive performance.

Digitization for Organizational Flexibility and Efficiency

IS scholars have studied how IT supports organizational flexibility and efficiency by adopting a variety of perspectives and approaches, including business strategy-IT alignment (e.g., Henderson and Venkatraman 1993; Chan et al. 1997; Reynolds and Yetton 2013), IT-enabled dynamic capabilities (e.g., Pavlou and El Sawy 2006), and IT assets as resources for competitive advantage (e.g., Bharadwaj 2000; Wade and Hulland 2004).

Early scholarly research on the productivity impact of IT at the individual, firm, and industry levels focuses on the potential of IT to automate repetitive business processes and thus improve efficiency (Bradley and Nolan 1998). In addition, the ability of IT to stimulate managerial decision-making, or to improve communication and coordination within a firm and between firms (Afuah 2003; Hitt 1999), increases organizational efficiency and flexibility and results in market share increase (Baldwin et al. 2001) and competitive advantage (Bharadwaj 2000). These studies in common point out that organizations need to implement new IT in a way that supports organizational strategy of efficiency and flexibility to enhance firm performance.

A new IT implementation is fraught with uncertainties about its influence on organizational change and eventual performance due to its complex interactions with strategies and organizational factors. Managers making IT investment decisions face the challenge of achieving synergy with all of the factors such as IT implementation costs, employee training of new IT, and adaptation to and appropriation of new IT, eventually impacting on the whole organizational system (Sharma and Yetton 2007; DeSantis and Poole 1994). Whether an organization's aim is to achieve longer-term competitiveness through rapid innovations or to achieve efficiency for short-term sustainability, decision makers need to understand the dynamic interactions between digitization and strategy elements so that they can configure new IT implementation to align business strategy and eventually can achieve competitive firm performance.

Extant studies on IT business value have shown that IT spending intensity is an important construct to explain the influence of digitalization on organizational productivity. Although how much spend is certainly important, how to actually use IT also plays a critical role in determining productivity (DeLone and McLean 1992; Devaraj and Kohli 2003). For people to effectively use IT, training is necessary. IT training imparted to employees following new IT is critical in a post-implementation stage to achieve a positive impact on firm performance (Bharadwaj 2000; Sharma and Yetton 2007). IT training augments either the business skills of IT staffs or the IT skills of functional staffs, which in turn facilitates greater usage of new IT (Robey et al. 2002). The goal of IT training is thus to help adapt the existing routines and practices that have congealed around an older application to a new technology. Thus, the knowledge imparted during training complements existing knowledge in different ways. Thus, IT training habituates users to new behaviors by helping them recombine explicit knowledge of new technology features with their implicit knowledge of the current business context, of older technologies and provides them with

new insights of their functional interdependence with other work units (Alavi and Leidner 2001; Kang and Santhanam 2003).

IT training and particularly, formal training also exposes future users to the system knowledge held and acquired by other users and thus facilitates interaction between them, which results in the exchange of richer information about the technology (Santhanam et al. 2007). IT training develops critical initial knowledge in individuals that enables them to seek quick assistance when problems arise with performing tasks on the new technology (Argote 2005). It helps them to better adapt the technology to varying business conditions. Since both, the functional users as well as the IT staff are involved in software implementations the training content for both types of users naturally differs and is designed so as to complement their existing knowledge as described above.

When it comes to IT training and IT usage, we argue that when the number of employees trained is low, the usage is equivalently low. However, as the number of employees trained increases, this generates externalities by positively disposing other untrained employees to the new technology. This leads the untrained employees as well to be receptive towards the new technology. As more number of employees are trained this creates an informal norm with respect to using the new technology (Leonard-Barton and Deschamps 1988). Institutional explanations of organizational digitization (Liang et al. 2007) often refer to the effect of workplace culture that positively disposes employees towards new technologies (Gallivan et al. 2005). As expertise gained through training becomes widespread this provides better access to untrained employees to seek help in using the new technology (Attewell 1992).

A stream of research espouses the benefits of IT usage on various firm performance metrics such as revenue and patient mortality in the hospital industry (Devaraj and Kohli 2003), procurement process performance (Mishra et al. 2007), new product launches (Barczak et al. 2007) and perceived efficiency gains during procurement (Wu et al. 2007).

To summarize, new IT implementation initiates more IT training, which enables organizations to equip their human resource with broaden and deeper knowledge of both technologies and businesses, and to make employees to use more information technologies. More effective and more often use of technologies enabled by new IT and IT training can enhance employee's flexibility to do new unexpected tasks as well as efficiency in doing existing tasks, and eventually enhancing organizational performance. Thus, we suggest:

> *H1. Digitization enhances organizational HR flexibility to compose a flexibility-oriented configuration that achieves high organizational performance.*
>
> *H2. Digitization enhances organizational HR efficiency to compose an efficiency-oriented configuration that achieves high organizational performance.*

Organizational dynamic capability is an organizational ability to reconfigure resources to introduce innovations to the market and thus enables organizations to achieve competitive advantage in turbulent environments (Eisenhardt and Martin 2000). Digitization can provide appropriate functions that enable organizations to develop such dynamic capabilities to more effectively develop new products that reflect changing environments (Pavlou and El Sawy 2006; Sambamurthy et al. 2003; Tallon and Pinsonneault 2011; Nambisan 2003).

However, firms often are constrained in developing dynamic capabilities due to organizational inertia, path dependence, and large-scale tight alignment of business with traditional technologies (Cyert and March 1963; Cohen and Levinthal 1990). Firms with such constraints cannot develop new technologies in house for developing new products in a timely fashion, but instead can choose an alternative option, that is, inter-firm collaboration to access new technologies and knowledge that alliance firms possess (Eisenhardt et al. 2010; Sahaym et al. 2007). Some empirical studies have demonstrated that inter-firm alliances enable firms to develop new innovative products as well as to enhance efficiency through joint R&D, production, and marketing (Lavie et al. 2011; Rothaermel and Deeds 2004). So, we suggest:

> *H3. Organizations can choose to build inter-firm collaboration configurations that rely on external IT and knowledge and thus do not require a high level of internal digitization, HR efficiency and flexibility to achieve high performance.*

Methods

Data

We use a longitudinal data set collected from the Workplace and Employee Survey (WES) conducted by Statistics Canada from 2003 to 2006. The sample frame of WES was generated based on Statistics Canada's Business Register. Each workplace was sent a copy of the survey instrument by Statistics Canada to inform the respondents ahead of time: as the questionnaires were lengthy and required reference to company records, the intent was to allow respondents time to locate this information before being interviewed. Subsequently, one manager from each workplace completed the questionnaire during a personal interview conducted by a Statistics Canada staff member. The response rates for WES are above 86%, which largely reflect the extensive legal protections under the Statistics Act of Canada that ensure confidentiality of responses. From the full data, we selected firm-level workplaces that were present in the panel in the four years from 2003 to 2006 and implemented new information technologies. The final number of firms we used for analysis was 1816.

Measures

To take advantage of the longitudinal data, IT and strategy variables were measured and averaged across 2003 to 2005, while organizational performance was measured by averaging across 2004 to 2006 in order to reflect the lagged impact of new IT implementation on performance.

Organizational performance is measured to capture the performance relative to competitors in terms of productivity, sales growth and profitability in each year. The responses were captured on a 5 point scale (1=much worse, 5=much better). A summated scale was created from these items averaged across three years (2004 to 2006).

IT implementation element: three variables were created. First, the total cost for at most two implementations per year as a percentage of the total number of employees (*IT Spending*). Second, two variables were used to compute the degree of usage of the new IT (*IT Use*) i) the employee categories that use the new IT, where categories were Managers, Professionals, Technical/Trades, Marketing/Sales, Clerical/Administrative, Production workers with no trade/certification. The number of employee categories which use the new IT was standardized for each year. ii) The ratio of the number of employees using the new IT as a percentage of the total number of employees, was standardized. These two measures were summed to create IT Use. Third, two variables were used to measure *IT Training*. i) The total number of employees trained for both, the most recent and the second-most recent IT implementations as a percentage of the total number of employees and ii) The total duration of training across the implementations for each year. Both measures were standardized across the three years. They were then summed to compute IT Training.

Human Resource (HR) Efficiency: Three binary measures capture the organizational changes regarding HR efficiency made at a workplace during each year. The items refer to increase in overtime hours, greater reliance on part-time workers and greater reliance on temporary workers.

HR Flexibility: Two binary measures capturing the organizational changes regarding HR flexibility during the year pertain to greater reliance on job rotation, multi-skilling (Y/N) and adoption of flexible working hours (Y/N).

Centralization: Three binary measures capture the organizational changes regarding centralization made at a workplace during each year. The items refer to integration among different functional areas, the degree of centralization and decentralization.

Inter-Firm Collaboration: The two binary measures refer to organizational change in terms of greater reliance on external suppliers of products/services (outsourcing) (Y/N) and greater inter-firm collaboration in R&D, production or marketing (Y/N). *Organizational size* is measured using an ordinal indicator referring to employee size (1-20, 21-99, 100-499, and >=500).

Data Analysis with fuzzy-set Qualitative Comparative Analysis (fsQCA)

We use fsQCA, a set-theoretic configurational methodology, which is best suited to explaining how all elements simultaneously and systemically combine to configurations that produce an outcome of interest (Ragin 2008). Unlike traditional correlation-based methods such as regression, fsQCA does not seek an average net-effect of individual independent variables on the outcome variable. Instead, this method finds multiple configurations producing the same outcome and explains the role of each element of the configuration in creating the outcome (Ragin 2008; Fiss 2011). FsQCA can explain the interconnected dynamics of a complex system in which the impact of one element on the outcome of interest is dependent on other elements in the same system. The results of fsQCA in this study are multiple configurations consisting of IT and strategy elements that produce high firm performance. By examining each configuration and comparing the similarities and differences between the multiple equifinal configurations, we extract patterns that enable us to test our proposed hypotheses.

First, we calibrate all variables using a direct method in fsQCA software[1]. Calibration calculates the membership of a case in sets, which explains the extent to which each case has membership in the set of, for example, high-performing organizations (Ragin 2008, Fiss 2011). The membership of a case can range from 0 to 1. In our example, if an organization has a membership score 1 for performance, it has a full membership in high performance. The fsQCA software uses the direct method of calibration, which transforms an interval scale value to a fuzzy-set membership score using the distance of the element value from the crossover point of maximum ambiguity regarding membership in the set of interest, with the values of full membership and full non-membership as the upper and lower bounds. Researchers define these three anchors based on both theoretical knowledge of the context and empirical insights on cases (Ragin 2008). For example, we define that an organization with at least 500 employees has a full membership in a large organization, an organization with less than 20 has a full non-membership in a large organization (i.e., small organization), and 100 as a crossover point between large and small. Then, using the truth-table algorithm in fsQCA, we made configurations consisting of all elements that produce high organizational performance.

Results

Figure 1 shows fsQCA results, seven configurations consisting of IT and strategy elements that produce high organizational performance. In this figure, each configuration is a subset of high performance, meaning that each configuration sufficiently produces high performance (Ragin 2008).

The configurations are presented using the notation system introduced by Fiss (2011). Darkly shaded circles indicate that an element must be present, while crossed-out circles indicate that an element must be absent. Large circles indicate causally core elements, and small circles indicate peripheral elements. Lastly, blank spaces indicate a "don't-care situation," meaning the causal element may be either present or absent.

In configuration 1, all IT elements (i.e., IT Spending, IT Training, IT use) and HR flexibility are core and should be present, meaning they play an important role for the configuration to produce high performance. As we hypothesized (H1), IT and HR flexibility together compose a high performing configuration. Further, organizational size is peripheral, meaning that organizational size does not play an important role in this configuration, and size is absent, meaning non-membership in large size (i.e., small or medium size organization).

Consistency here measures the degree to which each configuration consistently results in the outcome, a similar concept with the significant alpha level in a regression analysis, while *coverage* roughly means the extent to which each configuration covers the cases exhibiting the outcome and indicates empirical relevance of the solution, a similar concept with the coefficient of determination (R^2) in a regression analysis (Ragin 2008). In our results, all configurations produce high performance with a high

[1] More detailed explanation of the fsQCA steps can be found in Ragin (2008). Software is available at www.fsqca.com.

consistency, and all configurations together cover 63 percent of high performing cases[2]. Thus, hypothesis 1 is supported.

Configuration 2 shows all IT elements play a core role in achieving high organizational performance while inter-firm organization should be absent. On the other hand, configuration 3 shows inter-firm organization plays a core role while all IT elements should be absent (i.e., not-high level of IT). Thus, these two configurations together demonstrate that organizations can achieve high performance by inter-firm collaboration without intensive internal in house digitization. Thus, this finding supports our hypothesis (H3). Regarding the role of IT for inter-firm collaboration, it may mean that when organizations rely on inter-firm strategic alliance, they should not intensively rely on IT for explorative and exploitative activities. But, rather they may more use traditional ways of richer face-to-face communications (Daft and Langel 1986).

Configuration 4, 5, and 6 represent HR efficiency-oriented organizations that achieve high performance. Two configurations do not have a high level of IT, but only one configuration (6) does. Thus, our hypothesis (H2) is partly supported. We did not make a hypothesis representing the configuration 7, but it may show the firm size effect on performance (i.e., economies of scale).

Discussion

Main Findings

Our results demonstrate equifinality of configuring successful IT implementation, meaning that there are multiple digitization configurations that produce high firm performance by aligning to business strategy. The results also explain how digitization plays different roles over the multiple equifinal configurations in achieving high performance while interacting with business strategy of flexibility and efficiency. Digitization and HR flexibility and HR efficiency combine into configurations to produce the desired outcome. Such configurations imply that digitization can help organizations make flexibility-oriented or efficiency-oriented to achieve high performance. Further, we show that organizations can achieve high performance either by building in house digital-intensive configurations or externally inter-firm strategic collaboration configurations.

Implications for Research and Practice

This study contributes to the literature of the business value and strategic influence of organizational digitization by opening the black box of digitization-strategy configurations and shedding light on the complex relationships between digitization and strategy elements that produce high performance. We show that organizations need to implement new IT in a way that supports strategic flexibility and efficiency to achieve high performance. Further, our finding may imply that IT can help organizations balance flexibility and efficiency, thus tackling both IT paradox and the paradox of business administration. Practically, our findings demonstrate multiple equifinal solutions for achieving competitive advantage. Organizations do not need to follow the leaders via the industry best practice often delivered by consulting service, but instead they can choose one of multiple alternative configurations, which best fits their idiosyncratic context and enables them to achieve competitive advantage with most affordable costs and efforts. Thus, this study may show how firms can overcome the path-dependency trap.

This study is not free from limitations. Some recent studies argue that there can be a significant contingency effect on organizational efficiency and flexibility (e.g., Eisenhardt et al. 2010). For example, by considering industry types or environmental dynamism, the influence of IT on organizational flexibility, efficiency, and performance can be explained in more delicately (e.g., Sahaym et al. 2007; Sharma and Yetton 2007). Therefore, future research can investigate if, depending on environmental dynamism, there can be different configurations of the digitalization and strategy elements to produce competitive advantage.

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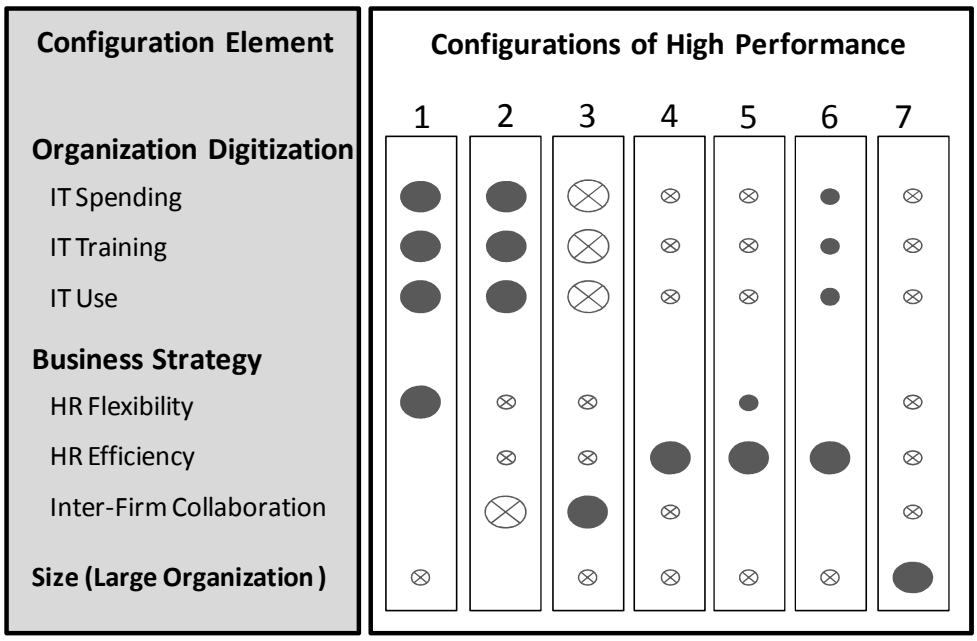
[2] More specifically, 63 percent of high performance membership is covered by these configurations.



	Consistency	0.97	0.95	0.99	0.97	0.96	0.98	0.97
	Raw Coverage	0.18	0.25	0.11	0.17	0.14	0.17	0.13
	Unique Coverage	0.03	0.01	0.01	0.02	0.01	0.01	0.02
Overall Solution Consistency				**0.90**				
Overall Solution Coverage				**0.63**				

Figure 1. IT Implementation Configurations of High Performance

REFERENCES

Adler, P. S., Goldoftas, B., and Levine ,D. I. 1999. "Flexibility versus Efficiency? A Case Study of Model Changeovers in the Toyota Production System," *Organization Science* (10:1), pp. 43–68.

Afuah, A. 2003. "Redefining Firm Boundaries in the Face of the Internet: Are Firms Really Shrinking?" *Academic Management Review* (28:1), pp. 34–53.

Alavi, M., and Leidner, D. 2001. "Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues," *MIS Quarterly* (25:1), pp. 107-136.

Aral, S., and Weill, P. 2007. "IT assets, organizational capabilities, and firm performance: How resource allocations and organizational differences explain performance variation," *Organization Science* (18:5), pp. 763-780.

Argote, L. 2005. *Organizational Learning: Creating, Retaining and Transferring Knowledge*. New York: Springer.

Attewell, P. 1992. "Technology Diffusion and Organizational Learning: The Case of Business Computing," *Organization Science* (3:1), p 1-19.

Barczak, G., Sultan, F., Hultink E. J. 2007. "Determinants of IT Usage and New Product Performance," *Journal of Product Innovation Management* (24:6), pp 600-613.

Benbasat, I., and Barki, H. 2007. "Quo Vadis, Tam?," *Journal of the Association for Information Systems* (8:4), pp. 211-218.

Benner, M. J., and Tushman, M. L. 2003. "Exploitation, Exploration, and Process Management: The Productivity Dilemma Revisted," *Academic Management Review* (28:2), pp. 238–256.

Bharadwaj, A., El Sawy, O., Pavlou, P., and Venkatraman, N. 2013. "Digital Business Strategy: Toward a Next Generation of Insights," *MIS Quarterly* (37:2), pp. 471-482.

Bharadwaj, A.S. 2000 "A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation," *MIS Quarterly* (24:1) 2000, pp 169-193.

Bharadwaj, A. S., Bharadwaj, S. G., and Konsynski, B. R. 1999. "Information Technology Effects on Firm Performance as Measured by Tobin's q," *Management Science* (45:7), pp. 1008-1024.

Bradley, S. P., and Nolan, R. L. 1998. "Capturing Value in the Network Era," in *Sense & Respond*, S.P. Bradley and R.L. Nolan (eds.), Harvard Business School Press Boston, Mass.

Burton-Jones, A., and Gallivan, M. J. "Toward a Deeper Understanding of System Usage in Organizations: A Multilevel Perspective," *MIS Quarterly* (31:4), pp. 657-680.

Chan, Y., et al. 1997. "Business strategic orientation, information systems strategic orientation, and strategic alignment," *Information systems research* (8:2), pp 125-150.

Cohen, W. M., D. A. Levinthal. 1990. "Absorptive Capacity: A New Perspective on Learning and Innovation," Administrative Science Quarterly (35:1), pp. 128–152.

Cyert, R. M., and March, J. G. 1963. *A Behavioral Theory of the Firm*. Englewood Cliffs, NJ: Prentice-Hall.

D'Aveni, R. A. 1994. *Hypercompetition: Managing the Dynamics of Strategic Maneuvering*. New York, NY: The Free Press.

Daft, R.L., and Lengel, R. H. 1986. "Organizational Information Requirements, Media Richness and Structural Design," *Management Science* (32:5), pp. 554–571.

DeLone, W.H., and McLean, E.R. 1992. "Information systems success: The quest for the dependent variable," *Information Systems Research* (3:1), pp 60-95.

DeSantis, G., and Poole M. S. 1994. "Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory," *Organization Scinece* (5:2) 121-147.

Devaraj, S., and Kohli, R. 2003. "Performance Impacts of Information Technology: Is Actual Usage the Missing Link?," *Management Science* (49:3), pp 273-289.

Eisenhardt, K.M., and Martin, J. 2000. "Dynamic Capabilities: What Are They?," Strategic Management Journal (21), pp. 1105-1121.

Eisenhardt, K.M, Furr, N. R., and Bingham, C. B. 2010. "CROSSROADS-Microfoundations of Performance: Balancing Efficiency and Flexibility in Dynamic Environments," Organization Science (21:6), pp. 1263-1273.

El Sawy, O. A. 2003. "The IS Core IX: The 3 Faces of IS Identity: Connection, Immersion, and Fusion," *Communication of the Association for Information Systems* (12:1), pp. 588-598.

El Sawy, O. A., Malhotra, A., Park, Y., and Pavlou, P. A. 2010. "Seeking the Configurations of Digital Ecodynamics: It Takes Three to Tango," *Information Systems Research* (21:4), pp. 835-848.

Fiss, P. 2011. "Building Better Causal Theories: A Fuzzy Set Approach to Typologies in Organization Research," *Academy of Management Journal*, 54, 393-420.

Gallivan, M.J., Spitler, V. K., and Koufaris, M. 2005. "Does Information Technology Training Really Matter? A Social Information Processing Analysis of Coworkers' Influence on IT Usage in the Workplace," *Journal of Management Information Systems* (22:1), pp 153-192.

Gibson, C. B., and Birkinshaw, J. 2004. "The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity," *Academic Management Journal* (47:2), pp. 209–226.

Henderson, J. C., and Venkatraman, N. 1993. "Strategic Alignment: Leveraging Information Technology for Transforming Organisations," *IBM Systems Journal* (32:1), pp 4-16.

Hitt, L. M. 1999. "Information Technology and Firm Boundaries: Evidence From Panel Data," *Information Systems Research* (10:2), pp. 134–150.

Jasperson, J., Carter, P.F., and Zmud, R.W. 2005. "A Comprehensive Conceptualization Of The Post-Adoptive Behaviors Associated With It-Enabled Work Systems," *MIS Quarterly* (29:3), pp. 525-558.

Kang, D., and Santhanam, R. 2003. "A longitudinal field study of training practices in a collaborative application environment," *Journal of Management Information Systems* (20:3), pp 257-281.

Lavie, D., J. Kang, L. Rosenkopf. 2011. "Balance within and across domains: The performance implications of exploration and exploitation in alliances," *Organization Science* (22:6), pp. 1517–1538.

Leonard-Barton, D., and Deschamps, I. 1988. "Managerial Influence in the Implementation of New Technology," *Management Science* (34:10), p 1252-1265.

Levinthal, D. A., and March, J. G. 1993. "The Myopia of Learning," *Strategic Management J*ournal (14), pp. 95–112.

Liang, H., Saraf, N, Hu, Q., and Xue, Y. 2007. "Assimilation of Enterprise Systems: The Effect of External Institutional Pressures and the Mediating Role of the Top Management," *MIS Quarterly* (31:1), pp 59-88.

March, J. G. 1991. "Exploration and Exploitation in Organizational Learning," *Organization Science* (2), pp. 71-87.

Mishra, A.N., Konana, P., Barua, A. 2007. "Antecedents and Consequences of Internet Use in Procurement: An Empirical Investigation of U.S. Manufacturing Firms," *Information Systems Research* (18:1), pp 103-120.

Nambisan, S. 2003. "Information Systems as a Reference Discipline for New Product Development," *MIS Quarterly* (27:1), pp. 1-18.

Orlikowski, W. J. 2009. "The Sociomateriality of Organisational Life: Considering Technology in Management Research," *Cambridge Journal of Economics* (34:1), pp. 125-141.

Park, Y., and El Sawy, O. A. 2013. "The Value of Configurational Approaches for Studying Digital Business Strategy," *Research in the Sociology of Organizations* (38), pp. 205-224.

Pavlou, P. A, and El Sawy, O. A. 2006. "From IT Leveraging Competence to Competitive Advantage in Turbulent Environments: The Case of New Product Development," *Information Systems Research* (17:3), pp. 198-227.

Ragin, C. C. 2008. *Redesigning Social Inquiry: Fuzzy Set and Beyond*. Chicago, IL: University of Chicago Press.

Reynolds, P., and Yetton, P. 2013. "Aligning Business and IT Strategies in Multi-Business Organizations," *34th International Conference on Information Systems*. Milan, Italy.

Robey, D., Ross, J. W., and Boudreau, M. 2002. "Learning to Implement Enterprise Systems: An Exploratory Study of the Dialectics of Change," *Journal of Management Information Systems* (19:1), p 17-46..

Rothaermel, F. T., and Deeds, D. L. 2004. "Exploration and Exploitation Alliances in Biotechnology: A System of New Product Development," *Strategic Management Journal* (25:3), pp. 201–221.

Sahaym, A., Steensma, H. K., and Schilling M. A. 2007. "The Influence of Information Technology on the Use of Loosely Coupled Organizational Fomrs: An Industry-Level Analysis," *Organization Science* (18:5), pp. 865-880.

Sambamurthy, V., Bharadwaj, A., and Grover, V. 2003. "Shaping Agility through Digital Options: Reconceptualizing the Role of IT in Contemporary Firms," *MIS Quarterly* (27:2), pp. 237–263.

Santhanam, R., Seligman, L., and Kang, D. 2007. "Postimplementation Knowledge Transfers to Users and Information Technology Professionals," *Journal of Management Information Systems* (24:1), pp 171-199.

Schwarz, A., and Chin, W. 2007. "Looking Forward: Toward an Understanding of the Nature and Definition of It Acceptance," *Journal of the Association for Information Systems* (8:4), pp. 230-243.

Sharma, R., and Yetton, P. 2007. "The contingent effects of training, technical complexity, and task interdependence on successful information systems implementation," *MIS Quarterly* (31:2), pp 219-238.

Sørensen, J. B., and Stuart, T. E. 2000. "Aging, Obsolescence and Organizational Innovation," *Administrative Science Quarterly* (45:1), pp. 81–112.

Tallon, P. P, and Pinsonneault, A. 2011. "Competing Perspectives on the Link between Strategic Information Technology Alignment and Organizational Agility: Insights from a Mediating Model," *MIS Quarterly* (35:2), pp. 463-486.

Tafti, A., Mithas, S., and Krishnan, M.S. 2013. "The Effect of Information Technology- Enabled Flexibility on Formation and Market Value of Alliances," *Management Science* (59:1), pp. 207-225.

Tushman, M. L., and O'Reilly III, C. A. 1996. "The Ambidextrous Organization: Managing Evolutionary and Revolutionary Change," *California Management Review* (38:4), pp. 8–30.

Wade, M., and Hulland, J. 2004. "Review: The Resource-based View and Information Systems Research: Review, Extension, and Suggestions for Future Research," *MIS Quarterly* (24:1), pp. 107-142.

Wiggins, R. R., and Ruefli, T. W. 2005. "Schumpeter's Ghost: Is Hyper Competition Making the Best of Times Shorter?" *Strategic Management Journal* (26:10), pp. 887–911.

Wu, F., Zsidisin, G., and Ross, A. 2007. "Antecedents and Outcomes of e-Procurement Adoption: An Integrative Model," *IEEE Transactions on Engineering Management* (54:3), pp 576-587.

Yoo, Y., Boland, J. Jr., Lyytinen, K., and Majchrzak, A. 2012. "Organizing for innovation in digitized world," *Organization Science* **23**(5) 1398–1408.