

Volarić, Sanel

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The Impact of Digital Investments on Firm's Competitiveness

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Sanel Volarić
University in Split, Faculty of Economics
sanel.volaric@gmail.com

The Impact of Digital Investments On Firm's Competitiveness

Abstract

The initial significant technological investments in business automation during 60-ies and 70-ties were very soon followed by focus of both scholars and business community in defining models that depict the influence of information and communication technological (ICT) investments on different aspects of firm's performance. The foundations of the scholar approach in the area were set up by Porter (1985.) when he challenged established and unquestioned positive influence of ICT investments on firm's competitiveness. He stressed that such investments are not necessarily "strategically beneficial" and may erode competitiveness of firms and industries. As well, a decade before dawn of digital revolution, alignment of ICT/digital strategy with overall strategic plans was proved to be the main driver of positive influence of ICT investments on firm's performance and competitiveness. The fact was iteratively proved in many later papers while need of "alignment" gradually evolved in "integration" of digital strategy in firm's comprehensive digital business strategy.

Variety of models and nomological networks have been developed to define and depict the influence of investments in digital resources (IT infrastructure, HR resources, alignment with business strategy, etc.) on firm's key performance indicators. For example, Sambamurthy et al. (2003.) argue that information technology investments and capabilities influence firm performance through three significant organizational capabilities (agility, digital options, and entrepreneurial alertness) and strategic processes (capability-building, entrepreneurial action, and co-evolutionary adaptation). Mithas et al. (2011.) developed a conceptual model linking IT-enabled information management capability and firm's performance mediated by three organizational capabilities (customer, process and performance management capabilities). These and other papers emphasize the strategic role of ICT competences that are an antecedent of successful competitive actions and financial prosperity in moderate to fast-paced business environments. The influence is mediated by developing different dimensions of agility (customer, partnering and operational agility) and competitive actions characteristics (number of competitive actions, complexity of the action repertoire).

In digital era established companies will be continuously exposed to digital disruptions initiated by both start-up companies and incumbents that have already successfully passed through digital transformation process. This turbulent competitive landscape, characterized by hyper-competition, increased time-to-market pressures, regulatory changes and rapidly evolving customer demands, can mean both - either an opportunity or a threat depending on firm's capabilities to adopt the new paradigm and develop digitally enabled enterprise agility

– ability to persistently detect and seize market opportunities with speed and surprise. The prerequisite for this is an efficient implementation of comprehensive digital business strategy: digital strategy fully integrated in firm's strategic plan.

Keywords: Agility, Competitiveness, Corporate entrepreneurship, Digital disruption, Digital era, Digital transformation, Firm performance, Information technologies (IT), Innovativeness, Strategic management

Track: Entrepreneurship

Word count: 5.225

Introduction

The current competitive landscape is increasingly turbulent, characterized by hyper-competition, availability of technologies, increased time-to-market pressures, regulatory changes and rapidly evolving customer demands (Barrenechea, 2016; Bughin et al., 2017; Garcia et al., 2016). In such environment established companies will be continuously exposed to digital disruptions initiated by both start-up companies and digitally transformed incumbents. It's obvious that digital era is the age of temporary competitive advantages (D'Aveni et al., 2010) and most of the companies are in constant process of detecting and seizing market opportunities. Innovative approach, proactive stance and risk-taking attitude are required to implement such opportunities with speed and surprise for competition in order to insure business sustainability (Zahra, 1993; Corbet et al., 2013; Hitt et al., 2011). Since the pioneering work in the field published by Porter (1985.), many papers and researches have committed the strategic and inevitable role of ICT investments in the process of developing new competitive advantages and strategic renewal, supporting successful firm performance development. Not questioning „if” IT investments are needed to stay competitive, scholars and practitioners have been focused on: „how” to align and deploy them to insure enduring competitiveness and „what” capabilities and processes moderate the influence of IT competences and capabilities on firm's performance.

1. Models defining impact of IT investments and firm performance

Since the mid-nineties, the rise of the internet era has prompted most of the contemporary organizations to reconsider their strategic plans and the role of information technologies in the processes of strategic planning. It had already been confirmed that strategically aligned IT investments positively influenced firm's key performance indicators (Porter, 1985. 2001.). But there was a need to develop a theoretical perspectives and models to broaden understanding how IT investments and capabilities were linked to business performance and to depict main mediators and moderating factors that influence the links. Market environment in digital era are increasingly volatile and contemporary firms are in the constant process of detecting and seizing market opportunities in order to achieve and sustain profitable

competitive advantages. The ability to be successful in the process is enabled by strategically aligned IT investments that are a key strategic factor for ensuring sustainability. Because of that impact of IT investments in firm performance and mediating capabilities in that link are in contact focus of scholars and practitioners.

1.1. Information Management Capability and Firm Performance

Mithas et al. (2011.) developed a conceptual model that describe influence of IT investments on firm performance through linking IT-enabled information management capability with three important organizational capabilities:

- Customer management capability
- Process management capability
- Performance management capability.

These capabilities mediate influence of information management capability on firm performance. The researchers find that information management capability plays an important role in developing these three firm capabilities for customer management, process management, and performance management that, in turn, positively influence customer, financial, human resources, and organizational effectiveness indicators of firm performance.

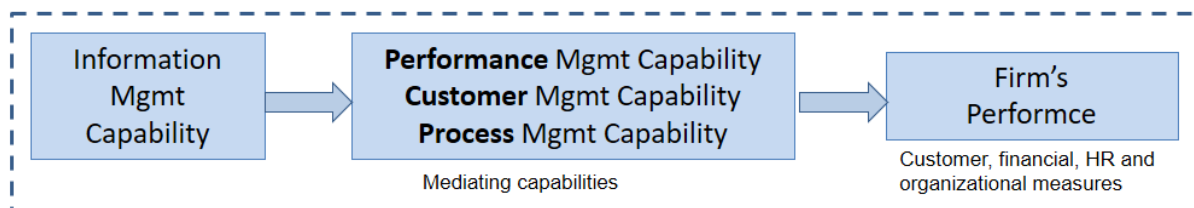


Figure 1: Information Management Capability and Firm performance (Mithas et al., 2011.)

As described by the model, information management capability is “the ability to provide data and information to users with the appropriate levels of accuracy, timeliness, reliability, security, confidentiality, connectivity, and access and the ability to tailor these in response to changing business needs and directions”. The model recognizes three significant organizational capabilities that mediate influence of information management capability and firm performance:

Organizational capability	Description
Performance management capability	The ability of a firm to develop appropriate monitoring, evaluation, and control systems to observe business performance and guide managerial actions
Customer management capability	The ability to develop significant customer relationships and nurture customers both as consumers and as innovation partners in new product development
Process management capability	The ability to develop processes with appropriate reach and richness for supporting the main business activities.

Table 1: Three Significant Organizational Capabilities (Mithas et al., 2011.)

With the remained uncertainties and concerns about how to value investments in IT, the research suggests that well-developed IT infrastructures that give rise to superior information management capability play a role in facilitating development of important customer management, process management, and performance management capabilities and, in turn, superior firm performance. The definition of customer management capability is similar to the “customer” strategic domain of Rogers’ model for developing digital strategy. As well, the definition of abilities related to performance, customer and process management capabilities in this model corresponds with the definition of three components of organizational agility in the model developed by Sambamurthy et al. (2003.). In addition, the definition of process management capability in the model covers also definition of digital options in the model of Sambamurthy et al. Therefore two main differences between the two models are:

- The first model doesn’t recognize competitive actions as the mediator between the main capabilities and firm performance
- The first model neglect entrepreneurial aspect that is moderating factor in the second one playing significant role in activating capabilities and affecting firm performance.

1.2. Strategic Information Technology Alignment and Firm Performance

Since Porter (1985.) emphasized the alignment between information technology investments and business strategy as the main prerequisite for positive influence of these investments on firm performance, many researches supported the findings. It positioned strategic IT alignment, which is the extent of fit between information technology and business strategy, as the main focal point of scholars and practitioners in the area.

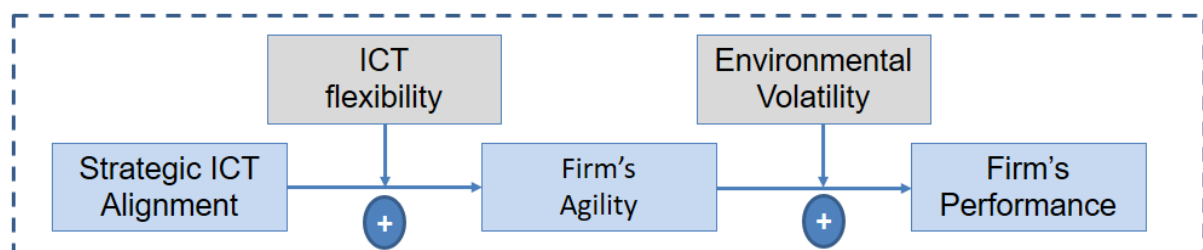


Figure 2: Strategic IT Alignment and Firm Performance (Tallon and Pinsonneault, 2011.)

The related survey of IT and business executives from 241 firms uncovered that there is a positive and significant link between:

- strategic IT alignment and agility (applies to all to all firms regardless of market volatility) and
- between agility and firm performance.

As well, the results have showed that (1) the effect of alignment on performance is fully mediated by agility, (2) that environmental volatility positively moderates the link between agility and firm performance, and (3) that agility has a greater impact on firm performance in

more volatile markets. The results also indicate that IT flexibility provides an additional boost to agility in volatile environments. In such environment the direct effect of agility on firm performance is also higher.

1.3. IT competences and Firm Performance

Sambamurthy et al. (2003.) developed a model representing influence of IT investments and capabilities on firm performance through:

- three significant *organizational capabilities* (agility, digital options, and entrepreneurial alertness) and
- three *strategic processes* (capability building, entrepreneurial action, and coevolutionary adaptation).

The model is based upon recent thinking in the strategy, entrepreneurship, and IT management concepts. This model for the first time introduce corporate entrepreneurship as the key moderating factor of influence of IT competences on firm success. The link is extremely important in digital age when innovativeness, proactiveness and risk-taking attitude are key organizational capabilities for strategic renewal and successful launch of corporate ventures.

The model also propose that these dynamic capabilities and strategic processes impact the ability of firms to launch many and varied competitive actions and that, in turn, these competitive actions are a significant antecedent of firm performance. It emphasize a significant role of IT as a digital options generator that improve organizational agility capability and, as the final result, improve performance of contemporary firms.

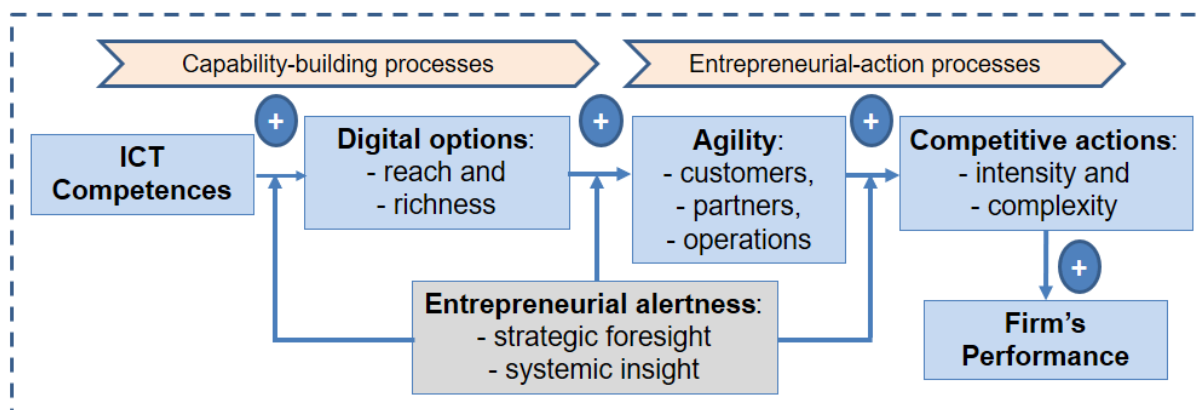


Figure 3: Impact of IT competences on firm performance through competitive actions (Sambamurthy et al., 2003.)

As described by the model, IT competence is the organizational base of IT resources and capabilities and describes:

- a firm's capacity for IT-based innovation by virtue of the available IT resources and

- the ability to convert IT assets and services into strategic applications.

Important elements of IT competence include: (1) the level of IT investments, (2) the quality of the IT infrastructure (global connectivity and reliability), (3) IT human capital (appropriate technical and business skills), and (4) the nature of IS/business partnerships. The model drawn upon prior researches that found a significant and positive effect of IT investments on firm performance and defined the quality of IT capabilities has been found to have a significant positive impact on firm performance (Bharadwaj, 2000.). Extending these research findings, IT competence is defined as a critical antecedent for firms to generate more competitive actions and greater action repertoire complexity. The link is mediated by three significant dynamic capabilities: organizational agility, digital options and entrepreneurial alertness.

Similar to some other papers, the model defines agility as one of the main mediating capabilities and defines it as organizational ability to detect market opportunities for innovation and capture those opportunities for new competitive advantages by bringing together requisite assets, knowledge and relationships “with speed and surprise”. Agility covers firm’s capabilities related to interactions with customers, optimization of internal operations and maximizing benefits of its ecosystem of external partners.

Organizational agility	Description
Customer agility	The ability to engage customers for gaining market intelligence, detecting innovative market opportunities and collaborating in the processes of design, development and testing of new innovative products and services.
Partnering agility	The ability to leverage the assets, knowledge and competences of stakeholders for the ecosystem environment (suppliers, distributors, joint-venture partners, etc.). It enables companies to establish a set of strategic partnership in order to realize additional market opportunities and gain new competitive advantages.
Operational agility	The ability of a company to run its business processes with adequate speed, accuracy and cost-level. It ensures that the firm can rapidly redesign existing and create new processes for exploiting dynamic marketplace conditions.

Table 2: Three interrelated capabilities of organizational agility (Sambamurthy et al., 2003.)

If properly engaged, the customers are not only loyal to a brand, they also advocate for the brand connecting it with people in their network (Rogers, 2016; Bonchek, 2017; Rauser, 2016; Grover and Kohli, R, 2013; Leipzig et al, 2017). As Bonchek stated, a company need to develop and implement strategy to generate “a force of attraction” in order to pull additional customers into its orbit, and helping them to pull others in, too. Rogers (2017.) also emphasizes that (1) digital technologies are transforming the way how companies innovate by reducing related costs and increasing speed of design, production and testing, as well as (2) enabling companies to engage customers as co-creators of new products and services through digital platforms. The final goal of customer agility is to customize firm offering and make it adaptable to customers’ needs (Rogers, 2016.).

Additional mediating capability is digital options that are a set of IT-enabled capabilities in the form of digitized processes. Digitized process refers to the extent to which a firm deploys common, integrated and connected IT-enabled processes (Sambamurthy et al., 2003.). It is conceptualized along the dimensions of *reach* and *richness*.

Type of digital options	Definition	Examples
Digitized process <i>reach</i>	High-reach processes tie activities and information flows across departmental units, corporate functional units, geographical regions and value network partners.	ERP, CRM, product data management
Digitized process <i>richness</i>	(1) Quality of information collected about transactions in the process, (2) transparency of that information to other processes and systems that are linked to it, and (3) the ability to use that information to reengineer the process.	Analytics/Big-data, AI systems, etc

Table 3: Types of digital options (Sambamurthy et al., 2003.)

The model is specific and more comprehensive compared to others because it considers agility and digital options as important dynamic capabilities, but it also introduces entrepreneurial alertness as essential for their activation in continually developing competitive actions. The model defines entrepreneurial alertness as the capability of a firm to explore its marketplace, recognize new customer value-propositions and determine opportunities for additional competitive actions. Two specific capabilities describe entrepreneurial alertness: strategic foresight and systemic insight. Strategic foresight includes one of the key domains of Roger's model (2016.) related to competition. Digital era is characterized by very turbulent business environment, short time-to-market pressure and constant search for new competitive advantages ...

Drawing upon empirical evidences that a greater number of competitive actions and broader repertoire complexity have a positive influence of firm performance, the model advocate that competitive actions mediate the relationship between firm's capabilities and business performance. These market-based moves challenge the status-quo of the market or industry through innovations in products, services or distribution channels. Sambamurthy et al. (2003.) focuses on two characteristics of competitive actions:

- the number of competitive actions (intensity)
- complexity of the action repertoire.

The model argues that IT competences through organizational capabilities like digital options and agility and entrepreneurial alertness that activate these capabilities, enable a firm to pursue more intense and complex set of competitive actions that positively influence the firm performance.

1.4. Information Technology Capability and Organizational Agility

As described, many models (Sambamurthy et al., 2003, Tallon and Pinsonneault, 2011) consider information technology as an enabler of a firm 's agility and bring a typical premise is that greater IT investment enables a firm to be more agile. However, it is not uncommon in

practice that IT hinder and sometimes even impede organizational agility. 2007). Businesses are often constrained by the limitations of inflexible legacy IT systems, rigid IT architectures, or complex weakly integrated technology silos so that IT becomes a disabler for agility (Lu and Ramamurthy, 2011.). Therefore, it is very important to consider some studies and researches like one developed by Lu and Ramamurthy (2011.) that propose and theorize the frequently observed understudied IT-agility contradiction by which IT may enable or impede agility. This paper argues that IT investments doesn't necessarily positively impact organizational agility and propose a key prerequisite for such impact: a firm need to develop superior firm-wide IT capability to successfully manage its IT resources to realize agility. In order to conceptualize and measure the construct of IT capability, Lu and Ramamurthy (2011.) define the concept in three dimensions:

- IT infrastructure capability,
- IT business spanning capability, and
- IT proactive stance

The authors also conceptualize two types of organizational agility:

- market capitalizing agility and
- operational adjustment agility.

The research results provide a number of useful implications for research and managerial practices and show a significant positive relationship between IT capability and the two types of organizational agility. also find a significant positive joint effect of IT capability and IT spending on operational adjustment agility but not on market capitalizing agility. The findings suggest a possible resolution to the contradictory effect IT on agility: while more IT spending does not lead to greater agility, spending it in such a way as to enhance and foster IT capabilities does. Our study provides initial empirical evidence to better understand essential IT capabilities and their relationship with organizational agility.

The model defines IT capability as “a firm's ability to acquire, deploy, combine, and reconfigure IT resources in support and enhancement of business strategies and work processes”. IT is confirmed to be a critical resource to develop business in contemporary environment by arguing that IT capability is critical for a firm to realize business value and sustain competitive advantage.

While Sambamurthy et al. (2003.) emphasize proactive dimension of organizational agility by defining it as “”, the model of Lu and Ramamurthy (2011.) defines organizational agility as a firm-wide capability to deal with changes that often arise unexpectedly in business environments via rapid and innovative responses that exploit changes as opportunities to grow and prosper. Two types of organizational agility are identified:

- market capitalizing agility and
- operational adjustment agility.

Market capitalizing agility refers to a firm's ability to quickly respond to and capitalize on changes through continuously monitoring and quickly improving product/service to address customers' needs. This agility emphasizes a dynamic, aggressively change-embracing, and growth-oriented entrepreneurial mind set about strategic direction, decision making, and judgment in uncertain conditions. *Operational adjustment agility* refers to a firm's ability in its internal business processes to physically and rapidly cope with market or demand changes. This agility highlights flexible and rapidly responding operations as a critical foundation for

enabling fast and fluid translation of innovative initiatives in the face of changes. Both types of agility entail a continual readiness to change, with the former focusing on entrepreneurial mind set and the latter emphasizing speedy execution/ implementation.

As Porter (1985.) stated that not all IT investments were “strategically beneficial”, the model developed by Lu and Ramamurthy (2011.) also warns that three IT capability dimensions may enable both forms of organizational agility but also may impede them:

IT capability	Enabling agility	Impeding agility
IT infrastructure capability	Superior IT infrastructure provides a globally integrated platform that enforces standardization and integration of data and processes. This level of integration makes possible timely and accurate information gathering and sharing that enable fast, efficient decision making.	A globally integrated IT infrastructure may lead to unintended rigidity in organizational changes because changes involving technology can be complex. Dramatic rise of information may lead to information overload and limit decision makers' ability to take timely actions. An overreliance on technology and formal analysis based on data and reports may paralyze managers' ability to see opportunities and take quick moves to capture them.
IT business spanning capability	Superior IT business spanning capability emphasizes IT-business partnership and synergy that leads to effective IT-business joint decision making, more strategic applications and greater buy-in. It also ensures speedy, effective, and efficient translation of innovative responses that usually require radical changes to and reengineering of business processes and information systems.	An overemphasis of IT strategic alignment may lead to tightly coupled IT and business. that could lead to group thinking and favour a reactive IT orientation to support and enable business initiatives while ignoring new opportunities in the face of disruptive IT innovation. As well, it could also lead to competency trap and unintended routine rigidity when radical process changes are necessary.
IT proactive stance	A firm with high IT proactive stance always searches for ways to explore or exploit its IT resources while detecting and capturing new market opportunities. It is able to identify the	An excessive emphasis of a proactive IT stance may result in directing too much resource to explore new IT-enabled opportunities while

	opportunities to reconfigure its IT resources to enable rapid execution of innovative actions.	ignoring necessary and beneficial exploitation. It can potentially harm the firm's agility because agile firms must be able to simultaneously achieve the seemingly conflicting goals of stability and flexibility, and efficiency and profitability.
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Table 4: Influence of three IT capability dimensions on agility (Lu and Ramamurthy, 2011.)

The main contribution of the model (Lu and Ramamurthy, 2011.) is that it returns attention back to the Porter's notion (1985.) that "not all IT investments are strategically beneficial" but it also goes a step further by emphasizing that IT strategic alignment is not a guarantee that IT investments will positively impact the firm performance. Lu and Ramamurthy (2011.) brings a strong message to researches and managers that strategic IT alignment may lead to "routine rigidity" in the contemporary market environment when firms are in constant strategic repositioning faced with necessary changes. Following the main issues of first-mover disadvantages (Porter, 1985.), Lu and Ramamurthy point that firms with excessive IT proactive stance:

- may find themselves constantly allured by emerging technologies but lack the capability to focus and turn these opportunities into profits,
- may also make mis-judgments on the timing of adoption and implementation that result in fragmented silos or bleeding edge technology choices.

The model is complement to and supports findings of the model developed by Sambamurthy et al. (2003):

- The definition of a superior IT infrastructure capability highly corresponds with the definition of highly digitized processes in terms of high reach and richness.
- IT infrastructure capability covers the first three IT competences from the second model: (1) level of IT investments, (2) the quality of IT infrastructure and (3) IT human capital.
- The definition of IT business spanning capability is very close to one of IT competences from the model of Sambamurthy et al. – the nature of IT-business partnership.
- Despite the first model defines two categories of organizational agility and emphasizes the reactive side (responding to market changes instead of proactive looking for and capturing new opportunities),

Through definitions of organizational agility dimensions and IT proactive stance, the model of Lu and Ramamurthy (2011.) also brings direct link between IT investments and corporate entrepreneurship, emphasizing proactiveness and innovativeness as the main prerequisites for strategically beneficial IT investments that will have positive impact on firm performance, through agility as mediating factor.

2. Discussion and Conclusion

Recent rise in environmental volatility urges firms to be more agile in identifying and responding to market-based threats and opportunities. Availability of technologies (Zhang et al., 2010; Wade, 2017; Raskino and Waller, 2015, Spil et al., 2017) and other drivers of digitization are increasing the influence on digitization processes giving additional strength to market volatility. Since Porter pointed the alignment between IT strategy and business strategy as the main prerequisite for strategically beneficial IT investments, the view has been supported by many papers and researches emphasizing the key role of strategic IT alignment. It gradually evolved into the need for full integration of IT strategy into comprehensive business strategy (Mithas et al., 2013). In the recent paper Westerman (2018.) pursues the view that there is no need for distinguishing a separate digital strategy but argue the need for comprehensive business strategy “enabled by digital”. Lu and Ramamurthy (2011.) challenge unquestionable positive influence of IT strategic alignment on firm performance and argue that IT-business strategic alignment may also bring some threats for sustainable business development.

Most of the models depicting impact of ICT investments on firm’s performance recognize *organizational agility* as the main organizational capability that moderates influence of investments in IT resources and competences on firm’s success (Sambamurthy et al., 2003; Tallon and Pinsonneault, 2011). This ability to detect and seize market opportunities with speed and surprise reflects firm’s readiness for competitive actions that are a significant antecedent of firm performance. Most of the models, except Sambamurthy et al. (2003.) and partially Lu and Ramamurthy (2011.), failed to recognize entrepreneurial approach as the main moderating factor for beneficial ICT-enabled digitization.

The high market volatility in digital era made many scholars and managers arguing that digitization makes strategy obsolete (Porter, 2001.) what makes IT strategic alignment, the main prerequisite of beneficial digital investments, impossible or at least difficult. If we consider that the intent of strategic management is to develop and successfully exploit competitive advantages (Thompson et al., 2005), while corporate entrepreneurship is concerned with recognizing opportunities that, when effectively exploited through firm’s competitive advantages, lead to enhanced value and wealth creation (Hitt et al., 2011; Zahra, 1993; Phan et al, 2009., Miller, 1983), in highly turbulent digital era that tends to weaken industry profitability it is more important than ever that well-structured strategic management is performed and the main principles of corporate entrepreneurship are implemented. These strategic processes in place coupled with successfully developed IT-enabled capabilities (like agility) will enable successful strategic renewal and corporate ventures.

Despite some of the theoretical models recognize entrepreneurial approach as an important moderating factors that influence the link between IT investments and firm performance, there is still a significant gap in understanding how corporate entrepreneurship (innovativeness, proactiveness, risk-taking) influence the strategic value of IT investments.

Broader understanding of this influence will support optimization of IT investments and maximizing positive impact on firm performance.

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