



# Understanding the Impact of Intellectual Capital on E-Business Entrepreneurial Orientation and Competitive Agility: An Empirical Study

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## Abstract

This study empirically examines the impact of intellectual capital on the frontiers of e-business entrepreneurial orientation and how intellectual capital and e-business entrepreneurial orientation contribute to competitive agility. A questionnaire was used for data collection from telecommunication companies and obtained from a sample of 212 participants. Data analysis was conducted using a structural equation modeling approach using smart PLS. The results show the positive impact of human capital, structural capital, and relational capital on e-business entrepreneurial orientation. The findings also indicate a direct positive impact of intellectual capital and e-business entrepreneurial orientation on competitive agility. An understanding of the impact of intellectual capital, e-business entrepreneurial orientation dimensions, and their relationship with competitive agility will provide organizations with a better background and knowledge on how to foster and manage these capabilities.

**Keywords** Intellectual capital · Human capital · Structural capital · Relational capital · Entrepreneurship · E-business entrepreneurial orientation · Competitive agility

## 1 Introduction

The need for competitive entrepreneurship is constant in today's environment amid the acceleration of economic changes and growing worldwide competition, and entrepreneurship is regarded as a necessary condition of firms seeking success (Kim et al. 2012). More than ever before, intangible assets are regarded as the most valuable sources of innovation and entrepreneurship and maintaining competitive ability (Mohammad et al. 2013). Underlying entrepreneurial orientation is a tendency to pursue the acquisition and implementation of novel knowledge and the integration of this knowledge with existing capabilities and resources (Hayton 2005; Kim et al. 2012; Kim et al. 2015). Studies of intangible assets have widely claimed that an organization's intellectual capital is a vital dimension in promoting entrepreneurship (Raymond et al. 2015).

Intellectual capital is steadily gaining momentum in the field of entrepreneurship. It assesses the role of knowledge

as a catalyst for value creation and enhancing a firm's performance through entrepreneurial movements (Dumay 2014). Knowledge intangible assets are closely connected with entrepreneurship strategy in heightened competitive environments, enabling the capitalization of a business's intellectual capital and turning it into innovation and agile responses to opportunities and threats, thus gaining superiority over other competitive organizations (Raymond et al. 2015).

The escalating scope of intellectual capital assets has been confirmed with the tremendous advances in IT and the rise of the knowledge-based economy, in which investment in e-business information systems has become essential (Namvar and Khalilzadeh 2013). E-business information systems are computer applications that use Internet technology, its universal connectivity, and the capabilities of the Web browser to integrate business processes within and beyond an organization (Pant and Ravichandran 2001). These systems are strategic assets as they enable renewable opportunities for creating new business models and ways for doing business (Pant and Ravichandran 2001).

In the new economy, e-business ventures have become adept at utilizing their intellectual capital to stimulate entrepreneurship throughout their operations (Seethamraju and Sundar 2013; Jafaridehkordi et al. 2015). In the current business environment, e-business applications have become

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inevitable. Advances in e-business technology provide unique opportunities to firms and entrepreneurs to creatively reinvent and reshape their survival and prosperity strategies. According to Namvar and Khalilzadeh (2013), although the pivotal importance of intellectual capital is certain in any business, its impact on e-business is more deterministic. Gholamian et al. (2010) also confirmed that firms must assess their intellectual capital to adopt and use e-business successfully.

Different theories have been developed to explain the impact of intellectual capital and e-business adoption on competitive advantage. However, the logic behind these theories may well be out of tune with today's business environment characterized by more active and high volatility levels, where competitive advantages are increasingly becoming obsolete and outdated faster than ever before (El-Haddadeh 2020). The pervasiveness of fluctuations in the business environment is forcing organizations to apply agile practices in their turbulent markets (Gupta et al. 2019). Nowadays, competitive advantages are shifting from sustainable to more temporary and short-term advantages, with an accompanying premium on competitive agility (Madhok and Marques 2014).

To the author's knowledge, no systematic investigation of the relationship between intellectual capital, e-business entrepreneurial orientation, and competitive agility has been conducted, particularly in the context of Jordan. Although intellectual capital has been a significant issue in the organization's strategy literature, it has not received much attention in the e-business context (El-Haddadeh 2020). The establishment and dissemination of new principles and practices that direct intellectual capital towards entrepreneurship has attracted wide attention. Despite these efforts, only a few known studies have been undertaken to merge the intellectual capital and entrepreneurial orientation practice landscapes to analyze how knowledge and e-business entrepreneurial orientation are related. Because of limited empirical research, it is unclear whether, and to what extent, intellectual capital influences the competitive agility of firms. Only fragmented literature has been published about the impact of e-business in general on competitive agility from an intellectual capital view are scarce. Most current literature has focused on standard firm performance metrics, largely overlooking competitive agility and avoiding the perspective of competitive dynamics (Vannoy and Medlin 2012; Nissen and von Rennenkampff 2017; Gupta et al. 2019).

Intellectual capital, e-business entrepreneurial orientation, and competitive agility are interesting concepts to examine how they are related and influence each other. Therefore, the present study aims to answer the following questions: Do intellectual capital, including human capital, structural capital, and relational capital, impact e-business entrepreneurial orientation? Does intellectual capital impact competitive agility? Does e-business entrepreneurial orientation have a significant impact on competitive

agility? Does e-business entrepreneurial orientation play a significant role in the relationship between intellectual capital and competitive agility?

This study supports an understanding of the existing theories and practices that can clarify the drivers and outcomes of e-business entrepreneurial orientation. The present study contributes to empirically understanding the role of intellectual capital in attaining e-business entrepreneurial orientation. It also provides valuable insights into the impacts of e-business entrepreneurial orientation on competitive agility. Furthermore, the present study provides a complementary view of the association among intellectual capital, e-business entrepreneurial orientation, and competitive agility, providing valuable guidance for managers to develop effective e-business entrepreneurship initiatives.

## 2 Literature Review

Today's firms are operating under highly competitive pressures, where physical and financial capitals and production facilities alone could not guarantee long-term survival or growth (Wu et al. 2008). The literature indicates that intellectual capital is regarded as the central strategic knowledge repository for all organizations (Namvar and Khalilzadeh 2013; Dumay 2014; Khan 2014). Intellectual capital can be defined as the total stocks of the collective knowledge, information, technologies, organization learning, and competencies that can generate or capture new values for organizations (Stewart 1997). The literature confirms that the most successful organizations in the new knowledge-based economy will be those who invest in their intellectual capital effectively (Mohammad et al. 2013; Khamis et al. 2014).

Entrepreneurship is described as the process of identifying and exploiting opportunities to introduce new products, services, structures, processes, or the creation of a new organization within or by a standing organization (Zhao 2006). Entrepreneurial orientation can be defined as the methods, practices, and decision-making styles managers use to act entrepreneurially and can be thought of as a type of strategic orientation insofar as it captures how a firm intends to compete (Wu et al. 2008). The literature has affirmed the central role of intellectual capital in the tendency of organizations to be entrepreneurial and innovative (Bontis 1998; Hayton 2005; Kiang et al. 2016). Mohammad et al. (2013) concluded that the effective use of intellectual capital enriches knowledge resources and entrepreneurial activities. Hayton (2005) emphasized the impact of intellectual capital on entrepreneurial orientation in risky business ventures. Furthermore, Eren and Kocapinar (2009) found that entrepreneurial orientation is a mediating variable between intellectual capital and performance.

Under the pressures of competition and the need for achieving operational excellence and improving efficiencies, the advent of cost-effective Web applications has left most organizations with no choice but to incorporate e-business into their operations. In the context of this study, e-business is defined as Internet-mediated integration of business and information systems, involving a fundamental rethinking and redesigning business processes as new ways of creating value and matching partners' expectations (Robinson 1999). Furthermore, this study identified e-business entrepreneurial orientation as a firm's orientation to explore and exploit novel e-business solutions in an effort that could lead to the creative destruction of existing business practices, products, services, structures, or processes that replaces or renews the old, creating new business value.

In the increasingly turbulent business environment, the landscape of competitive activities among firms increasingly requires the application of competitive agility (Seethamraju and Sundar 2013). Nayyar and Bantel (1994) introduced the concept of competitive agility, which is defined as a source of competitive advantage incorporating both the competitive ability of a firm to sense and respond to changes in its environment rapidly. The increasing intensity of competition and the fast pace of changes are forcing organizations to gain and exercise the capability to sense and respond to changing business environments rapidly. In this regard, agility is an organizational capacity to adapt, exploit opportunities, and grow in an unpredictable competitive environment (Goldman et al. 1995).

Dove (2001) demonstrated that agility results from both the physical power to act and the intellectual ability to manage and apply knowledge effectively. Many previous studies (El-Haddadeh 2020; Taji et al. 2016; Nafei 2016) have confirmed that competitive agility is created by gradually accumulating the necessary capabilities, including tangible and intangible resources, to act fast in various ways in light of business environment changes. Sambamurthy et al. (2003) emphasized that Intellectual capital plays a pivotal role more than ever before because it positions organizations to draw upon their previous knowledge and learning rapidly in sensing environment imperfections, discovering opportunities, and forming strategic innovation choices.

Along with unpredictable changes, continuous technological advancements are another aspect of environmental change organizations should wisely consider (Lee and Bach 2017). Van Oosterhout et al. (2006) asserted that the logic of IT-based competitive strategy must be reoriented toward competitive agility as an appropriate approach for competing in hypercompetitive business environments. Competitive agility can be viewed as a higher-order feature that is enabled primarily through investments in IT (Sambamurthy et al. 2003). According to Sambamurthy et al. (2003), the evolving role of technology is to promote competitive agility by improving

the firms' ability to implement new business strategies with speed and superiority. Researchers explain that IT allows organizations to collect and distribute information more effectively and efficiently and thereby reinforce their competitive agility in responding to business disruptions (Altschuller et al. 2010; Woo et al. 2012; Queiroz et al. 2018).

The literature (e.g., Mohammad et al. 2013; Matejun 2016; Nafei 2016) has confirmed that the detection of opportunity is a major characteristic of any entrepreneurial initiative without which that initiative cannot be established. Competitive agility depicts the value of timing in the search, identification, and discovery of entrepreneurial opportunities (Madhok and Marques 2014). According to Oh and Teo (2006), IT entrepreneurship represents the capability of firms to sense environmental changes and opportunities and a greater capacity to respond through the use of electronic networks and information systems.

In summary, the literature reviewed reveals that the relationships among intellectual capital, e-business entrepreneurial orientation, and competitive agility have not been empirically examined in a single comprehensive study or integrated into a unified research model. It also reveals that very little research has been oriented to investigate how intellectual capital impacts e-business entrepreneurial orientation or competitive agility. Previous studies have not evaluated the contribution of intellectual capital to the level of e-business entrepreneurial orientation in terms of competitive agility. Instead, attention was directed to studying the traditional performance of e-business acceptance and use.

### 3 Research Model and Hypotheses

Typically, the literature divides intellectual capital into three dimensions: human capital, structural capital, and relational capital (e.g., Kiang et al. 2016). The research model proposes that human, structural and relational capitals have a direct impact on e-business entrepreneurial orientation. (See Fig. 1). The present study also posits that e-business entrepreneurial orientation has a direct impact on competitive agility. Simultaneously, it proposes that e-business entrepreneurial orientation mediates the impact of intellectual capital on competitive agility. Lastly, this study examines the direct impact of intellectual capital on competitive agility.

Below each construct of the research model is discussed in more detail, followed by the related hypotheses.

#### 3.1 E-Business Entrepreneurial Orientation

A wide stream of research (e.g., Miller 1983; Wu et al. 2008; Kim et al. 2012; Al Omoush et al. 2018) has adopted three dimensions of entrepreneurial orientation, including innovativeness, pro-activeness, and risk-taking. Innovativeness

refers to the process of creating, accepting, and applying new ideas, products, services, and business processes. Scheepers et al. (2007) defined innovativeness as creating new business models, products or services, and technologies. According to Rogers (1995), innovation is any idea or practice perceived as new by an entity for adoption. Many previous studies (e.g., Oh and Teo 2006; Beckman et al. 2012; Matejun 2016; Jha and Bose 2020) have investigated how IT features of organizational capabilities facilitate innovation. Nissen and von Rennenkampff (2017) described e-business applications as an innovation engine. Advances in e-business are offering novel opportunities to firms to rethink and redesign their competitive strategy innovatively.

The second dimension, pro-activeness refers to an organization's orientation to pursue new opportunities and develop new products or services to stay ahead of competitors (Oh and Teo 2006). Organizations that exhibit pro-activeness typically gain first-mover advantage as they take the initiative by discovering and exploiting new opportunities that are not part of normal or common operations (Miller 1983). The role of pro-activeness in formulating forward-looking strategies is essential for a firm to sense and detect e-business-enabled opportunities (Nissen and von Rennenkampff 2017). Previous studies (e.g., Wang et al. 2015; Matejun 2016) have affirmed that e-business entrepreneurial orientation involves an organization's willingness to be more proactive than rivals in introducing new e-business solutions instead of being reactive to the actions of competitors.

The third dimension, risk-taking, involves a company's willingness to support innovative projects and commit important resources to opportunities with a reasonable calculated chance of failure (Scheepers et al. 2007). Risk-taking in the context of firms includes venturing into the unknown and providing critical resources to ventures in unstable environments with an uncertain outcome or without certain knowledge of probable results (Miller 1983; Kim et al. 2015). Previous studies (e.g., Beckman et al. 2012; Raymond et al. 2015) recognized risk-taking propensity as a serious issue in

adopting new e-business technologies. E-business innovations have become increasingly risky, owing to changing business operations and rapid technological advances (Zhao 2006; Al Omoush et al. 2018). Scholars (e.g., Hayton 2005; Seethamraju and Sundar 2013; Mohammad et al. 2013) have widely investigated the significant risk of e-business failure.

### 3.2 Intellectual Capital and E-Business Entrepreneurial Orientation

The MERITUM project defined intellectual capital as the combination of the human, organizational and relational resources of an organization, which is divided into three categories: human capital, structural capital, and relational capital (Carlucci et al. 2004). Typically, most intellectual capital pioneers have adopted three-dimensional categorization, including human, structural, and relational capital (Edvinsson and Malone 1997; Roos et al. 1997; Stewart 1997; Bontis 1998). The more they support each other, the higher the value intellectual capital can have (Bontis 1998). However, a broad base of research (e.g., Hayton 2005; Mohammad et al. 2013; Xianfeng et al. 2015; Kiang et al. 2016) has addressed the impact of intellectual capital on corporate entrepreneurial orientation. Based on the literature, the present study endeavors to explore the impact of each dimension of intellectual capital on e-business entrepreneurial orientation in the following subsections.

#### 3.2.1 Human Capital

Human capital is the combined knowledge, innovativeness, know-how, expertise, skills, intelligence, and abilities of employees to build competence and apply education, knowledge, and practices (Hayton 2005). Qualified employees contribute to intellectual capital by bringing their education, skills, talents, competencies, behavioral, and mental agility to a firm (Gowthorpe 2009). A key success factor of corporate entrepreneurship is the readiness of human capital to be creative,

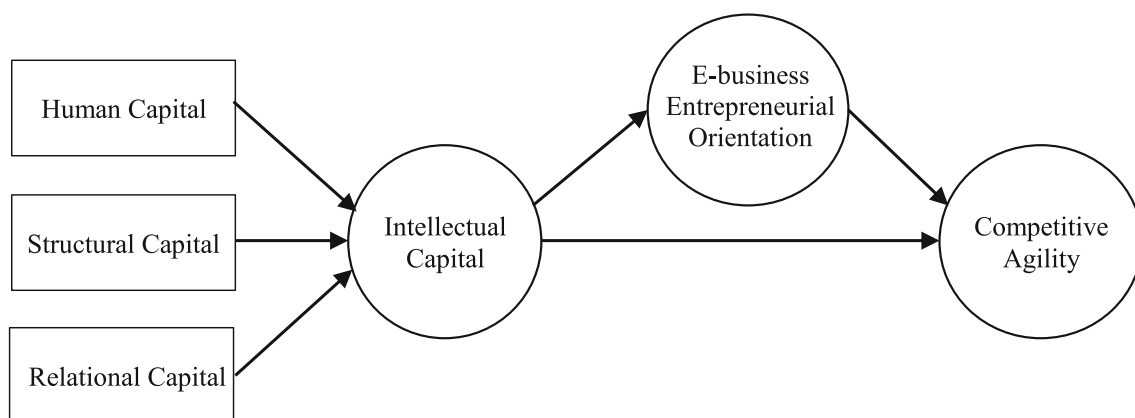


Fig. 1 Research model

more self-driven, bright, active, and skillful and a generator of new and novel ideas and knowledge (Batjargal 2007). Previous studies have also confirmed that the cognitive values of top management's human capital and how they perceive and interpret institutional pressures, threats, and opportunities are determinants of corporate entrepreneurship (Hayton 2005; Al Omoush et al. 2018). Many scholars have introduced entrepreneurial capital as a major new dimension in human capital (Audretsch and Keilbach 2004; Albort-Morant and Rey-Martí 2015). Entrepreneurial human capital involves an individual's and collective knowledge, skillset, and experiences related to entrepreneurial activities (Wu et al. 2008).

The literature (e.g., Batjargal 2007; Khamis et al. 2014; Jafaridehkordi et al. 2015; Nasiri et al. 2020) shows that the perception of the human capital of the value of such innovations affects the diversity of e-business adoption. Batjargal (2007) confirmed the pivotal role of human capital in enabling organizations to utilize their IT in more innovative ways to support their business operations to achieve better outcomes. Human capital assets are critical in directing an organization to IT prospects that increase its capacity to absorb and deploy new knowledge domains and obtain radical technological innovations (Charband and Navimipour 2016). Zhao (2006) concluded that human capital with higher educated and more experienced employees and managers could enhance e-business entrepreneurial orientation. Hayton (2005) also concluded that the human capital characteristics of top management have a critical impact on the entrepreneurial orientation of high technology ventures.

Given the above discussion, the present study hypothesizes:

H1: Human capital will have a positive impact on e-business entrepreneurial orientation.

### 3.2.2 Structural Capital

Structural capital is a non-thinking asset consisting of everything that remains when the employees go home, such as databases, customer files, manuals, trademarks, and organizational structure. According to Eren and Kocapinar (2009), structural capital includes the institutionalized knowledge and codified experiences preserved in or utilized through IT resources, business processes, organizational culture, management philosophy, strategies, and organizational structure. This capital also includes research and development (R&D) and organizational learning capabilities (Xian-feng et al. 2015; Kiang et al. 2016). Many previous studies have found that the components of structural capital are a significant determinant of achieving entrepreneurship (Mohammad et al. 2013; Xian-feng et al. 2015; Kiang et al. 2016). Prior research asserted that structural capital had helped companies to

capitalize on their knowledge and turn it into innovations (Wu et al. 2008; Gholamian et al. 2010; Wang et al. 2015).

It is well known that the adoption of innovative e-business requires organizational and managerial readiness. Structural capital was found to be a strongly important determinant of subsequent innovation and venturing activity for high technology ventures. Xian-Feng et al. (2015) found that structural capital was higher in a more advanced IT firm than in a less advanced one. According to Lee and Bach (2017), the ability of companies to manage risks embedded in regulatory and technological changes requires a strategy to prioritize an organization's risk-related challenges effectively and investment in the correct information, processes, and technology, with a supportive culture of risk, thinking at all levels of the business. Organizational learning capability was also found to be a key element of e-business entrepreneurial orientation (Namvar and Khalilzadeh 2013; Khamis et al. 2014).

The preceding discussion leads to hypothesize the following:

H2: Structural capital will have a positive impact on e-business entrepreneurial orientation.

### 3.2.3 Relational Capital

Social capital is the intangible resources rooted in social relations and networks among individuals, organizations, communities, and whole societies, which can be crowded when an actor desires to increase the possibility of success in a purposive activity (Gowthorpe 2009). Many previous studies (Batjargal 2007; Wu et al. 2008; Kim et al. 2012; Kiang et al. 2016) found a significant effect of relational capital on business entrepreneurship. The previous research (Namvar and Khalilzadeh 2013; Charband and Navimipour 2016; Kiang et al. 2016) emphasized that entrepreneurship is not an isolated entity but is a social activity in which entrepreneurs consistently use their social networks and interact through relationships to acquire new ideas and sharing information and knowledge, devising original opportunities for entrepreneurship. Social networks have been found as a primary resource of incremental and radical innovation (Xian-feng et al. 2015; Charband and Navimipour 2016). The literature also claimed that high relational capital could reduce entrepreneurial orientation risk (Hayton 2005; Khan 2014; Xian-feng et al. 2015).

Previous studies (Batjargal 2007; Vannoy and Medlin 2012) have confirmed the association between relational capital and e-business adoption. Sambamurthy et al. (2003) advocated that e-business entrepreneurship results from the collaborative and collective actions of IT and business executives. A considerable stream of research also affirmed that e-business adoption was subject to the values, standards, and expectations shared among business partners and other

members of social networks, such as professional and trade associations and accreditation agencies, to attain effective coordination and collaboration and to meet the requirements of professionalization (Gupta et al. 2019; Nasiri et al. 2020).

Given the above discussion, the present study hypothesizes the following:

H3: Relational capital will have a positive impact on e-business entrepreneurial orientation.

### 3.3 The Impact of Intellectual Capital on Competitive Agility

The previous studies (e.g., Dove 2001; Nafei 2016) confirmed that agility was best viewed as an intellectual ability to sense and a physical ability to act. According to Nissen and von Rennenkampff (2017) and Dove (2001), agility includes scanning and managing of intellectual capital assets effectively, enabling the business to compete and succeed in a highly unstable work environment. A broad base of literature (e.g., Sambamurthy et al. 2003; Vannoy and Medlin 2012; Taji et al. 2016) emphasizes that in a fast-changing environment, intellectual capital is an important option because it positions firms to quickly draw upon their prior knowledge and learning in sensing market imperfections, discovering arbitrage opportunities, and shaping strategic innovation moves.

The agility concept has been defined as a capability that encompasses technologies, processes, flexible organizational culture, and structure to confront the rapidly changing needs of customers and demands of markets (Nafei 2016). Madhok and Marques (2014) indicated that an organization's agility to confront uncertainty was facilitated by organizational, managerial, and governance activities supporting quick decision making and collaboration and coordination of efforts and resources. Furthermore, prior research (e.g., Altschuller et al. 2010; El-Haddadeh 2020; Madhok and Marques 2014) suggested that competitive agility requires strategizing through improvisation and learning faster than competitors and translating that learning into action rapidly. Many previous studies (e.g., Altschuller et al. 2010; Taji et al. 2016; Nissen and von Rennenkampff 2017) emphasized that today's organizational cultures must encompass values and behaviors that support agility in uncertain and ambiguous business environments.

The literature (e.g., Sambamurthy et al. 2003; Vannoy and Medlin 2012) asserted that relational capital could be an important determinant of competitive agility. The internal and external collaboration and sharing of knowledge across all partners have been described as major dimensions of agility (Gupta et al. 2019). In the context of competitive agility, Gupta et al. (2019) demonstrated that social networks optimize the collective awareness of the competitive environment, providing an effective way for firms to engage in knowledge

sharing and coordinate business activities among partners in dynamically complex domains.

Drawing upon the above discussion, the present study hypothesizes the following:

H4: Intellectual capital will have a positive impact on competitive agility.

### 3.4 E-Business Entrepreneurial Orientation and Competitive Agility

Entrepreneurial orientation has been found to exploit opportunities in dynamic business environments, emphasizing agility under the pressures of shifting competitiveness from advantages to opportunities (Oh and Teo 2006; Kim et al. 2015). Many studies (e.g., Madhok and Marques 2014; Lee and Bach 2017) have adopted action-based theory to explain competitive agility. This perspective characterizes entrepreneurial orientation and firms' agility as the basis of business competitiveness. To attain such agility, the action-based perspective emphasizes the role of entrepreneurial orientation, through a willingness to innovate and take risks and to be proactive to marketplace opportunities (Madhok and Marques 2014).

Agility is about persistent foresight, making reasonable adjustments, and providing essential resources to change before it happens (Woo et al. 2012; Kim et al. 2015), suggesting that proactive behavior is pivotal to promoting organizational agility, especially in industries with high fluctuation levels. Proactive companies are the fastest to innovate and convert that innovation into new products and services. Agile firms quickly and effectively sense emerging shifts and discontinuities in their environments, assemble the needed resources to innovate new competitive solutions and change directions in short order while leaving themselves options to pursue other paths (Sambamurthy et al. 2003; Kim et al. 2015).

There are no real business opportunities without risks. Several studies (e.g., Madhok and Marques 2014; Raymond et al. 2015; Ahmed et al. 2019) indicated a positive relationship between risk-taking of entrepreneurial firms and increasing competitive agility. Organizational agility needs to manage the opportunities and accompanying risks effectively (Nafei 2016). Madhok and Marques (2014) suggested that rather than waiting for scenarios to be considered, a business that engages in competitive agility often perceives uncertainty as a source of variability from which opportunities can be generated. The action-based approach emphasizes the importance of the willingness to take risks as a key factor in achieving competitive agility (Lee and Bach 2017; Nissen and von Rennenkampff 2017).

Altschuller et al. (2010) and Vannoy and Medlin (2012) revealed that firms dedicate their investments in IT to solutions that help them quickly collect, process and analyze the

information they have developed, possess potentially inimitable sensing and agile capabilities. Recent studies (e.g., Queiroz et al. 2018; Ahmed et al. 2019) demonstrate that high IT-agility contributes to improved business agility and forms competitive agility. Recent advances in IT, such as Web-based systems, social media, grid computing, service-oriented architecture, and process management solutions, provide the requisite agility for the business (Seethamraju and Sundar 2013). The literature (e.g., Sambamurthy et al. 2003; Queiroz et al. 2018) also confirmed that digitized platforms of e-business processes, such as e-commerce, e-procurement, ERP, supply chain management systems, and customer relationship management, help firms build their competitive agility.

Drawing upon the above discussion, the present study hypothesizes the following:

H5: E-business entrepreneurial orientation will have a positive impact on competitive agility.

### 3.5 The Mediating Impact of E-Business Entrepreneurial Orientation on Competitive Agility

The literature hints at a mediating impact of e-business entrepreneurial orientation dimensions on the relationship between intellectual capital and competitive agility. This mediating role is better distinguished through the mediating role of entrepreneurial orientation in the impact of intellectual capital on organizational performance that has been examined in prior research (Eren and Kocapinar 2009; Xian-feng et al. 2015). Many previous studies also investigated the mediating role of IT in the relationships between intellectual capital and firm competitiveness improvement (Sambamurthy et al. 2003; Wu et al. 2008; Wang et al. 2015).

Agility capability includes the consolidation and integration of IT, people, knowledge management, business processes, and facilities (Taji et al. 2016; Queiroz et al. 2018). According to Sambamurthy et al. (2003), IT investments and intellectual capital enhance competitive agility. Sambamurthy et al. (2003) argued that IT is deeply embedded into the strategic levers, including processes, knowledge, and relationships that undergird a firm's competitive agility. Queiroz et al. (2018) affirmed that knowledge capital reinforces a firm's agility and promotes its adjustment to the evolving e-business environment.

The capabilities of e-business systems offer prospects for solidifying inter-organizational networks of relationships and building value constellations as a platform for competitive agility (Nafei 2016). In the context of intellectual capital, Nissen and von Rennekampff (2017) described three fundamental activities through which IT could facilitate agility. These included customer relationships, collaboration, and

coordination with external partners, and the leveraging of expertise across the enterprise. Sambamurthy et al. (2003) suggest that IT-enabled relational capital could be a key determinant of competitive agility. Vannoy and Medlin (2012) also demonstrated that understanding how organizations utilize IT to support internal and external social networks may provide new opportunities to build competitive flexibility and responsiveness to market changes.

Scholars (e.g., Pavlou and El Sawy 2010; Queiroz et al. 2018) confirmed that systemic insight, strategic foresight, and managerial commitment are valued organizational capabilities that act as leveraging mechanisms in activating the IT-based options and striking them to execute agile competitive moves. Previous studies have also emphasized that while e-business provides great promises, organizations may be unable to leverage their competitiveness without developing an adequate structure of intellectual capital that encourages the acquisition, creation, and sharing of knowledge within and across their boundaries (Van Oosterhout et al. 2006; Raymond et al. 2015).

Drawing on the above discussion, this study posits the following:

H6: E-business entrepreneurial orientation will have a mediating impact on the role of intellectual capital in achieving competitive agility.

## 4 Research Methodology

### 4.1 The Measurement

Measurement instruments of the model constructs were derived and adapted from the related literature that has been used by various previous researchers showing high reliability and validity. For example, the scale of intellectual capital was obtained from Bontis (1998); Gowthorpe (2009) and Namvar and Khalilzadeh (2013). The measurements of e-business entrepreneurial orientation were adopted from Scheepers et al. (2007) and Al Omoush et al. (2018). In line with the previous definitions of competitive agility and according to the previously used scales (e.g., Pavlou and El Sawy 2010; Seethamraju and Sundar 2013; Nafei (2016), the present study measures this construct in terms of sensing agility, decision-making agility, acting agility, and competitive moves.

### 4.2 Instrument Development

A paper-based survey with closed questions was selected for the convenience of data collection. The questionnaire contained a total of 40 items, as illustrated in Table 1. All questions used a five-point Likert scale; ranging from "not

**Table 1** Constructs and measurement items

Construct	Code	Measurement Item
Human Capital	HC1	Employees are highly skilled and experienced in their areas of specialization.
	HC2	The company devotes many resources to update and develop employees' knowledge and skills.
	HC3	The company's employees are encouraged to learn and develop new knowledge and ideas for the business.
	HC4	Employees are highly motivated in their work and constantly perform at their best.
Structural Capital	STC1	Policies, procedures, and work instructions are documented in manuals and databases.
	STC2	Knowledge and information are embedded in the company's structure, systems, and procedures.
	STC3	Our organizational culture inspires initiatives, creativity, and novel ways of thinking.
	STC4	The company provides all the support needed supports for the research and development efforts.
Relational Capital	REC1	The company encourages employees to share their knowledge, experience, and skills.
	REC2	Our employees are skilled at relationship building and collaboration with each other and engage in collective actions.
	REC3	The company believes that it is very important to collaborate and share knowledge with its business partners.
	REC4	The social network of the company has a great impact on improving our products, services, and processes.
Innovativeness	IN1	Our company invests heavily in new e-business systems.
	IN2	The company emphasizes continuously introducing unique e-business processes and activities.
	IN3	Employees are motivated to come up with new e-business ideas and applications.
	IN4	The company is open to outside ideas that can lead to adopting new e-business applications.
Pro-activeness	PR1	The firm continuously foresees potential environmental changes and seek new emerging e-business opportunities ahead of the competitors.
	PR2	The company is leading in introducing new e-business applications.
	PR3	The company supports the process of recognition and exploitation of new e-business entrepreneurial opportunities.
	PR4	The company constantly endeavors to introduce new e-business technologies ahead of competitors.
Risk-taking	RT1	Top managers have a strong propensity for high-risk e-business ventures if estimated high returns.
	RT2	The company mobilizes substantial resources to support e-business ventures in uncertain conditions.
	RT3	The company takes bold actions by venturing into new e-business applications.
	RT4	Our company shows a great deal of tolerance for high-risk e-business projects and rewards individuals for taking calculated risks.
Competitive Agility		
Sensing agility	SA1	The company detects changes that are already underway in the business environment and industry and predicting what will happen in the future.
	SA2	The company continuously pursues the opportunities and threats to changes in its environment.
	SA3	The company pursues assiduously changes that occur in the movements of competitors.
Decision-making agility	DA1	The company analyzes the emergent events and changes concerning customers, competitors, and technology without any delay.
	DA2	The company is keen to enhance the speed and accuracy of decision-making.
	DA3	The company is keen to adopt and use the emerging decision support systems and analytical technologies that improve the agility of decision-making.
Acting agility	AA1	The company can adapt its resources, processes, and relationships promptly to match the needs of a changing environment.
	AA2	The company responds quickly to the dynamic business environment and competitors' market actions.
	AA3	The company can adapt to fundamentally different or new work environments.
Competitive moves	CM1	New pricing actions, such as new price lists, discounts, or rebates.
	CM2	New marketing actions, such as rewards, promotions, or marketing campaigns.
	CM3	New product actions, such as new product/service launch, roll-out, release, or changes in the capacity of production.
	CM4	New alliance actions, such as new joint ventures, partnerships, equity alliances, or technology development alliances.



all” represented as one to “to a great extent” represented as five.

### 4.3 Sampling and Questionnaire Distribution

The telecommunication sector was chosen as the population of the present study. The telecommunication companies are a very attractive option to study intellectual capital and e-business entrepreneurial orientation (Yaseen et al. 2016). This sector is one of the most competitive businesses that fundamentally depend on IT, e-business applications, innovation, and knowledge to deliver their products and services. The study was conducted on Jordanian communication companies. The unit of analysis comprised of top managers, middle managers, managers of branches, consultants, and professionals. Three hundred forty-five questionnaires were distributed among the study participants. Nine responses of the 221 collected were incomplete and thus were eliminated from the data analysis, resulting in 212 valid responses, producing a 61.4% effective response rate. Table 2 presents the distribution of the respondents.

## 5 Data Analysis and Results

Smart PLS version 2.0 was used for data analysis. Smart PLS utilizes a component-based approach to structural equation modeling. PLS is a powerful analytical method for testing a new model and studying causal models, including multiple constructs and measures. Fornell and Larcker (1981) confirm that the PLS method is robust in that it does not need a large sample or normally distributed multivariate data. Further, a PLS path model consists of two elements. These are the measurement model (outer model) to provide the results related to the reliability and validity of the scales and the structural model (Inner model) to represent the relationships (paths) between the research constructs.

### 5.1 Measurement (Outer) Model Results

The measurement model was examined for internal consistency, convergent, and discriminant validity. Factor loadings

analysis was performed to filter scales to improve their measurements. The results indicate that the factor loadings of some items are less than 0.50 on their constructs and must be removed from the scale. Specifically, one item was removed from each construct of the human capital (STC4) and relational capital (REC3) scales, and two items from each construct of the e-business entrepreneurial orientation (IN4, PR2) and competitive agility (DA2, CM4) scales because of a low item loading level ( $\alpha = 0.05$ ). Internal consistency reliability was measured using Cronbach’s alpha, Rho A, and Composite Reliability (CR). As shown in Table 3, all constructs exhibited acceptably high scores exceeding the 0.70 threshold. Furthermore, an AVE value of 0.50 or higher indicates that the construct explains more than half of the variance of its indicators. Table 3 shows that all values of AVE were > 0.5, which suggests convergent validity.

The comparison between the square roots of AVE and the correlation values of the constructs was used to assess the discriminant validity of measures (Fornell and Larcker 1981). As shown in Table 4, none of the off-diagonal elements exceeded the respective diagonal element. Thus, discriminant validity was demonstrated.

### 5.2 Assessing the Structural Model and Testing the Research Hypotheses

The results of the structural modeling analysis are shown in Fig. 2. Path analysis was conducted to provide a graphic of the links between the constructs of the research model. The path coefficient ( $\beta$ ) and the t-value test were used as a basis for testing the hypothesized paths.

Table 5 presents the results of hypotheses testing. The results reveal that human capital, structural capital, and relational capital had a significant and positive impact on e-business entrepreneurial orientation.

All proposed hypotheses related to the impact of intellectual capital on e-business entrepreneurial orientation (H1, H2, H3) are accepted. The results also show that intellectual capital (H4) and e-business entrepreneurial orientation (H5) significantly impact competitive agility.

The Sobel test was applied to examine the mediating role of e-business entrepreneurial orientation in the impact of intellectual capital on competitive agility (Table 6).

The Sobel test reveals that the mediating role of e-business entrepreneurial orientation (H6) is positive and different from zero, with a z-value of 3.620 ( $p < 0.008$ ).

## 6 Discussion

The results of the study indicate that human capital has a positive impact on e-business entrepreneurial orientation. These findings are supported by previous studies (e.g.,

**Table 2** The distribution of respondents

Respondents	No.	%
Top managers	25	11.8
Middle managers	70	33.0
Managers of branches	47	22.2
Consultants	19	09.0
Professionals	51	24.1
Total	212	100

**Table 3** Validity and reliability estimates of research constructs

Construct	Cronbach's alpha	rho_A	CR	AVE
Human capital	0.809	0.816	0.876	0.640
Structural capital	0.862	0.867	0.916	0.784
Relational capital	0.836	0.839	0.901	0.752
E-business entrepreneurial orientation	0.903	0.909	0.916	0.524
Competitive agility	0.908	0.910	0.923	0.522

Batjargal 2007; Khamis et al. 2014; Jafaridehkordi et al. 2015) that confirmed the pivotal importance of human capital in enabling organizations to utilize their IT in more innovative ways and enhance e-business entrepreneurship. According to Batjargal (2007), one of the critical determinants of entrepreneurial orientation is the readiness of human capital to be creative, bright, and skillful and a contributor to novel ideas and new knowledge. This result is also in agreement with Hayton (2005), who concluded that the human capital characteristics of top management had a vital influence on the entrepreneurship of new high technology ventures.

The results support the positive impact of structural capital on e-business entrepreneurial orientation. These findings align with other studies (e.g., Gholamian et al. 2010; Mohammad et al. 2013), who showed that structural capital assets were key enablers for achieving entrepreneurial orientation dimensions.

The findings of the present study support the significant and positive impact of relational capital on e-business entrepreneurial orientation. Prior research (Xian-feng et al. 2015; Kiang et al. 2016) found a significant impact of relational capital on business entrepreneurship, where entrepreneurial organizations consistently harness their social networks to obtain new ideas and knowledge and develop new entrepreneurial opportunities. These results are also consistent with findings from prior research (e.g., Batjargal 2007; Vannoy and Medlin 2012) that addressed the importance of relational capital and networks in e-business adoption.

The findings of the present study indicated a positive impact of intellectual capital on competitive agility. These results are consistent with earlier findings (e.g., Sambamurthy et al. 2003; Vannoy and Medlin 2012; Taji et al. 2016) emphasizing that in a fast-changing environment, intellectual capital is an important option because it positions firms to quickly draw upon their prior knowledge and learning in sensing market imperfections, discovering arbitrage opportunities, and

shaping entrepreneurial moves. The previous studies (e.g., Hayton 2005; Batjargal 2007; Nissen and von Rennenkampff 2017) confirmed the effect of human capital on competitive agility. The literature also confirmed that organizational agility is greatly influenced by the features of structural capital (El-Haddadeh 2020; Madhok and Marques 2014; Nafei 2016).

The results show that e-business entrepreneurial orientation has a significant impact on competitive agility. These findings align with the action-based perspective that explains a firm's competitive agility as a function of entrepreneurship. Many previous studies (e.g., Oh and Teo 2006; Raymond et al. 2015) found a significant relationship between the dimensions of entrepreneurial orientation and increasing competitive agility. Furthermore, these results are in tune with the prior research (e.g., Sambamurthy et al. 2003; Van Oosterhout et al. 2006; Queiroz et al. 2018), emphasizing that the platforms of e-business are a primary source of competitive agility.

Finally, the findings reveal that e-business entrepreneurial orientation has a mediating role in the impact of intellectual capital on achieving competitive agility. These findings agree with the mediating role of entrepreneurship between the relationship of intellectual capital and business performance that has been investigated in the literature (Eren and Kocapinar 2009; Xian-feng et al. 2015). They are also consistent with previous research (e.g., Sambamurthy et al. 2003; Wu et al. 2008; Wang et al. 2015) that confirmed the mediating role of IT in the relationship between intellectual capital and enhancing firms' competitiveness.

## 7 Conclusion and Implications

The present study aimed at understanding the impact of intellectual capital on the frontiers of e-business entrepreneurial

**Table 4** Discriminant validity

No.	Constructs	1	2	3	4	5
1	Human capital	<b>0.800</b>				
2	Structural capital	0.306	<b>0.885</b>			
3	Relational capital	0.578	0.370	<b>0.867</b>		
4	E-business entrepreneurial orientation	0.509	0.445	0.461	<b>0.724</b>	
5	Competitive agility	0.619	0.374	0.598	0.632	<b>0.732</b>

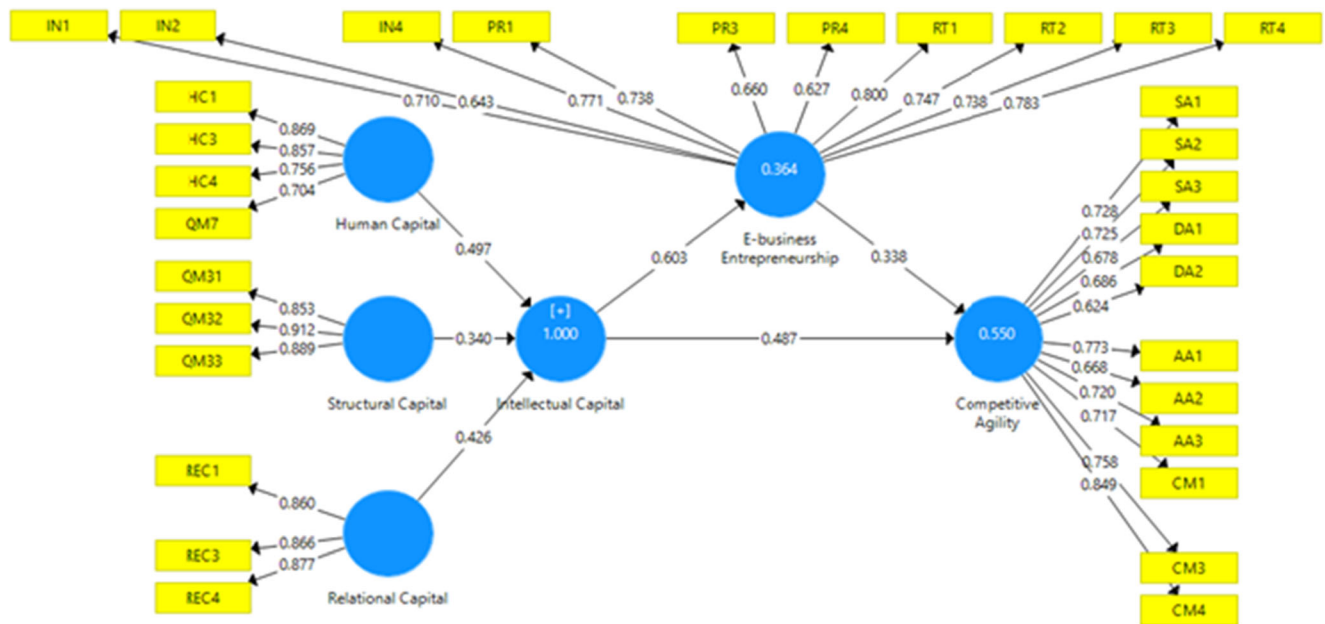


Fig. 2 Path coefficient analysis

orientation. It also investigated the impact of intellectual capital and e-business entrepreneurial orientation on competitive agility. The findings affirm that the intellectual capital of firms impacted e-business entrepreneurial orientation. The human knowledge, experience, intelligence of individuals, and abilities to learn are important aspects in providing the readiness of human capital to be creative, bright, and skillful and a source of new and novel ideas and knowledge that are crucial elements to reinforce e-business entrepreneurial orientation success. Institutionalized knowledge and experiences preserved and utilized through IT resources, organizational culture, strategies, business processes, procedures, and policies are essential factors in achieving e-business entrepreneurial orientation dimensions. Furthermore, the results also suggest that the knowledge embedded in the internal and external social relationships and networks and collaboration among employees, business partners, and other stakeholders are essential sources of new and novel e-business entrepreneurial opportunities.

The study confirmed the positive impact of intellectual capital and e-business entrepreneurial orientation on detecting

changes that are already underway in the business environment, sensing market imperfections, and discovering arbitrage opportunities. They also enhance the efforts of analyzing the emergent events and changes and improving the speed and quality of decision-making regarding customers, competitors, general market conditions, and technology. The results indicate that intellectual capital and e-business entrepreneurial orientation serve as important determinants of an organization’s ability to adapt its resources, processes, and relationships and respond quickly to the dynamic business environment and competitors’ market actions. The findings emphasize that intellectual capital and e-business entrepreneurial orientation are valued organizational capabilities that act as leveraging mechanisms to execute agile competitive moves in terms of new pricing, marketing, and product actions.

The current study also affirmed that the capabilities of Intellectual capital are complementary organizational resources to reinforce the role of e-business entrepreneurship in formulating forward-looking strategies to grow and thrive in an unpredictable environment. The present study reveals that intellectual capital is a pivotal actor in e-business entrepreneurial orientation, contributing to creating competitive agility. These findings emphasize the need for today’s organizations to align the development of intellectual capital with their e-business entrepreneurial orientation.

Table 5 The results of hypotheses testing

H	$\beta$	T value	Sig.	The results
1	0.497	11.478	0.000	Supported
2	0.340	7.015	0.000	Supported
3	0.426	13.019	0.000	Supported
4	0.487	6.429	0.000	Supported
5	0.338	3.625	0.000	Supported

Table 6 Results of the sobel test

H	z-value	P value.	The results
6	3.620	0.000	Supported

This study contributes to the existing literature on intellectual capital and e-business entrepreneurial orientation in several important areas. First, this study supports an understanding of the existing theories and practices that can clarify the drivers and outcomes of e-business entrepreneurial orientation. Second, the findings contribute to empirically understanding the pivotal role of intellectual capital in attaining e-business entrepreneurship. Third, the study adds to the body of knowledge and provides valuable insight into the impact of e-business entrepreneurial orientation on competitive agility. Last, this research provides new prospects for future research to study the impacts of intangible assets on e-entrepreneurship, contributing to the development of intellectual capital and e-business entrepreneurship theories.

The results of this study have many practical implications. This study presents a complementary view of the association between intellectual capital, e-business entrepreneurial orientation frontiers, and competitive agility, providing valuable guidance for managers to develop effective e-business entrepreneurship initiatives. In today's turbulent business environments, firms urgently need to realize that if they want to enhance the competitive agility, developing their intellectual capital and e-business entrepreneurship capabilities is essential. Understanding the role of intellectual capital and e-entrepreneurial orientation dimensions and their relationships with competitive agility will equip managers and leaders with a better background and knowledge on how to promote and manage these capabilities. Furthermore, the study provides managers with measurements to evaluate the level of e-business entrepreneurial orientation and the indicators of competitive outcomes that can be adapted to assess its business value.

This study has limitations that can provide directions for future research. The telecommunication sector was chosen as the population for the survey. First, the results warrant further research that could examine different samples in other industries. Second, the study tested hypotheses with a questionnaire survey that provided only cross-sectional data. Longitudinal studies are needed to examine the dynamic impact of Intellectual capital on e-business entrepreneurial orientation and detect changes in competitive agility over time. Third, not every dimension of entrepreneurial orientation that has been investigated in the literature, like competitive aggressiveness, growth strategies, resource orientation, and self-renewal orientation, were examined. Finally, to reduce the level of complexity, the present study did not examine in more detail the impact of intellectual capital and e-business entrepreneurial orientation on competitive agility. Therefore, future research needs to conduct a deeper investigation into the impact of the three dimensions of intellectual capital and e-business entrepreneurial orientation on competitive agility.

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