Cogent Business & Management

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/oabm20

Exploring the mediating role of dynamic capabilities in the relationship between intellectual capital and performance of information and communications technology firms

Hoang Thanh Nhon, Nguyen Van Phuong, Ngo Quang Trung & Bui Quang Thong |

To cite this article: Hoang Thanh Nhon, Nguyen Van Phuong, Ngo Quang Trung & Bui Quang Thong | (2020) Exploring the mediating role of dynamic capabilities in the relationship between intellectual capital and performance of information and communications technology firms, Cogent Business & Management, 7:1, 1831724, DOI: 10.1080/23311975.2020.1831724

To link to this article: https://doi.org/10.1080/23311975.2020.1831724

Published online: 21 Oct 2020.

Thanh Nhon et al., *Cogent Business & Management* (2020), 7: 1831724
https://doi.org/10.1080/23311975.2020.1831724

cogent business & management

MANAGEMENT | RESEARCH ARTICLE

Exploring the mediating role of dynamic capabilities in the relationship between intellectual capital and performance of information and communications technology firms

Hoang Thanh Nhon[1,2*], Nguyen Van Phuong[1], Ngo Quang Trung[2] and Bui Quang Thong[1]

Received: 29 July 2020
Accepted: 29 September 2020

*Corresponding author: Hoang Thanh Nhon, International University, Vietnam National University, Ho Chi Minh city, Vietnam
E-mail: hoang.nhon@gmail.com

Reviewing editor:
Len Tiu Wright, De Montfort University Faculty of Business and Law, United Kingdom

Additional information is available at the end of the article

Abstract: Recent studies suggest a potential relationship between intellectual capital dimensions and dynamic capabilities in achieving superior performance. However, these studies have made little effort to develop a framework for understanding this relationship, which is unsettling for managers. To examine this potential, this paper proposes and tests a conceptual model to explain how three types of dynamic capabilities—learning, integration, and reconfiguration capability—mediate the impact of intellectual capital dimensions, including human, social, and organizational capital, on firm performance. This study, using a sample of 350 Vietnamese firms in the information and communications technology sector, found that dynamic capabilities play a mediating role in the relationship between intellectual capital dimensions and firm performance. Among dynamic capabilities, learning capability has the most significant mediating effect. Furthermore, the important roles of human, social, and organizational capital are addressed due to their direct effects on performance based on resource-based view theory, as well as their indirect effect via the mediation of dynamic capabilities.

Subjects: Education - Social Sciences; Business, Management and Accounting; Information Technology

Keywords: Intellectual capital; human; social; organizational capital; dynamic capabilities; learning; integration; reconfiguration capability

ABOUT THE AUTHOR

Hoang Thanh Nhon is a PHD Candidate in Business Administration in International University, Vietnam National University and a Lecturer in The Faculty of Commerce, Van Lang University in Ho Chi Minh City, Vietnam. He holds Master of Business Administration of Latrobe University, Australia. His research interests are in the areas of Intellectual capitals and Corporate Performance.

PUBLIC INTEREST STATEMENT

Intellectual capital is currently a topical issue, especially in developing countries where firms are seeking for ways to improve efficiency in business operation. However, this has not been achieved given the fact that most of the managers in those countries do not understand the mediating role of dynamic capabilities in the relationship between intellectual capital and performance. Due to its complexity and the higher costs involved in the development of the intellectual capital. This study, therefore, suggests that developing intellectual capital and improving the role of dynamic capabilities will lead a positive impact on firm performance, especially in the ICT sector.

1. Introduction

Many countries are in the process of transforming from manufacturing- to knowledge-based economies. This trend has created a need for innovative industries in which information and communications technology (ICT) has had an increasingly large impact on economic and social life. The development of ICT has enabled "information societies" of more than three billion people to access the Internet, with eight out of 10 Internet users owning a smartphone (VietNamNet, 2020). The demand for ICT services is increasing by leaps and bounds (VietNamNet, 2020). This rapid growth has led ICT to become the one of the main drivers of economic growth as well as a cornerstone of daily life in many countries. Vietnam is no exception: Vietnam's ICT sector grew substantially between 2010 and 2016, with its total revenue reaching US 59.9 USD billion in 2016 as the country emerged as a production center for ICT hardware and software products and services (VietNamNet, 2020). The government of Vietnam has increasingly recognized the important impact of the ICT industry on social and economic activities and recently devised a master plan for ICT called the "taking-off strategy," which specifies targets for 2020 and aims to continue the transformation of Vietnam into an advanced ICT country (VietNamNet, 2020).

However, in term of inputs and management knowledge, unlike other manufacturing industries ICT involves short product life cycles, high customer demand, and very unpredictable technological changes. Accordingly, acquiring and managing "valuable, rare, inimitable, and non-substitutable" (VRIN) sources like intellectual capital (IC) is crucial to achieving outstanding performance in ICT (Z. Wang et al., 2018). To follow the worldwide ICT trend, ICT firms that are able to survive and develop in a highly competitive and uncertain institutional environment must increase their capabilities in terms of IC development. IC is often referred to as the value created by three types of intangible resources: *human capital*, which describes individual knowledge, skills, and education; *organizational capital*, which includes all non-human knowledge containers (e.g. information and communication systems, databases, process manuals, strategies, routines); and *social capital*, which refers to the social relationships within an organization as well as individual relationships with customers, investors, competitors, or suppliers (Z. Wang et al., 2018). While Western empirical research on IC is popular, it is built on the assumption that IC is the key source of superior performance. Very few studies have been conducted to validate or operationalize this assumption in developing countries where the business environment is highly unstable, such as Vietnam.

The interaction between the external environment—especially the dynamic environment—and firm strategies is expected to be related to performance (Hsu & Wang, 2012). To maximize performance, managers must pursue competitive strategies that best match the conditions of the external environment. In other words, managers' perceptions of the external environment are expected to affect firm strategy. Therefore, a firm's strategy must involve deploying its resources, especially IC, to seize opportunities in the market. Dynamic capabilities (DCs) offer a bridge to debates in the strategy field proposing either a resource-based view (RBV) that a firm's resources, particularly those that are intangible, are more likely to contribute to the firm's ability to sustain superior performance or the emerging discourse surrounding the dynamic environment (Hsu & Wang, 2012). While there is a wealth of literature on IC (Zhou et al., 2019), very few studies have addressed how DCs mediate the impact of IC on firm performance. Drawing on previous studies related to dynamic theories (Singh & Rao, 2016; Zhou et al., 2017), this paper proposes an alternative mechanism for the IC–performance relationship whereby DCs mediate the effect of IC on firm performance.

This research makes several contributions to the strategic management literature. First, this study extends previous research by offering insights into the relevance of human, organizational, and social capital for ICT firms in achieving outstanding performance in the face of dynamic environments such as Vietnam. Second, it advances existing research in this field by explicitly discussing how DCs mediate the effect of human and social capital on performance. Finally, it measures and evaluates the effects of IC on the development of various DCs in the ICT sector—

that is, the impact of uncertainty on the relationship between organizational capital and ultimately (through social and human capital) performance.

2. Theoretical background and development of hypotheses

2.1. Dynamic capabilities

Since DC was first conceptualized (Teece et al., 1997), numerous scholars have explored the definitions, precursors, processes, and aftermaths of DCs (Lin & Wu, 2014; Prena & Kustina, 2020; Tseng & Lee, 2014). However, there is still no consensus regarding its conceptualization. Originally, DC was defined as a "firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environment" (Teece et al., 1997). DCs were described as an organization's behavioral orientation constantly to integrate, reconfigure, renew, and recreate its resources and capabilities to the changing environment to attain and sustain competitive advantage (Fainshmidt et al., 2019).

Based on previous literature, this research conceptualizes DC as a firm's capability to learn, integrate, and reconfigure its resource base to address changing business conditions. Learning capability refers to a firm's capability to make its operations more efficient and effective by acquiring, changing, and discarding resources in accordance with environmental changes (Oliva et al., 2019). Integration capability denotes the ability of a firm to evaluate the value of existing resources, integrate them, and thereby develop a new resource base and capabilities which further determine the firm's ability to meet environmental challenges (Oliva et al., 2019). Reconfiguration capability refers to the recombination and transformation of existing resources that empower a firm to acclimatize to fluctuating market conditions (Oliva et al., 2019).

2.2. Intellectual capital

In 1969, Galbraith proposed the term "intellectual capital" and described it as the knowledge, skills, and brainpower activity that create value whenever utilized. Since then, numerous interpretations of the term have arisen. IC has been defined as useful knowledge that is convertible into profit and value (Inkinen, 2015). It has also been considered as a critical intangible asset for future competitiveness that firms should manage and deploy in order to achieve desired outcomes (Osinski et al., 2017). In this study, IC is defined as the sum of all organizational knowledge resources, which resides within as well as outside the organization. It is comprised of three constructs, namely human capital, social capital, and organizational capital, which represent the knowledge resources embedded in individuals, networks, and organizations, respectively.

2.3. Intellectual capital and dynamic capabilities

The existing literature indicates a significant association between knowledge and DCs. Some scholars identified knowledge as a significant factor for a firm's DCs and posited that endogenous and exogenous knowledge were impactful in developing DCs in both manufacturing and service firms (Hussinki et al., 2017). Lin and Wu (2014) noted the contributory role of VRIN resources in different DCs in Taiwanese companies. The knowledge resources embedded in individual, network, and organizational structures and processes constitute a unique configuration of a firm's resources, and the possession of knowledge resources builds different types of DCs. Drawing on this evidence, this study analyzes the effect of human, social, and organizational capital on learning, integration, and reconfiguration capabilities.

2.3.1. Human capital and dynamic capabilities

The primary component of IC is human capital. Knowledge is intrinsic to human capital (Inkinen, 2015). Human capital is defined as the knowledge, skills, and abilities residing in and used by the employees or members of an organization (Youndt et al., 2004). Taking into consideration the personal aspect of knowledge resources, existing studies have yielded sufficient evidence to show that a firm's learning, integration, and reconfiguration capabilities are highly dependent on its having knowledgeable, skilled, and experienced employees (Hussinki et al., 2017). Experienced

employees can identify changes and make superior decisions regarding resource allocation and pathfinding strategy, thereby predicting outcomes precisely. In turn, firms are more capable of adapting to changes in the business environment (Eriksson, 2014). It follows that capability has bearing on an individual's knowledge, motivation, skills, experiences, and probabilistic judgments (Singh & Rao, 2016). Hence, human capital supports the evolution of DCs.

Some researchers posited that experienced managers support the identification and exploration of opportunities, which is central to developing integration capability (Salunke et al., 2019). Tsou and Chen (2020) highlighted that an individual's knowledge and experience act as dynamic contributors in knowledge accumulation and utilization, founding to be significantly associated with integration and reconfiguration capability. Nieves and Haller (2014) maintained that employees' knowledge and skills encourage resource renewal as well as learning and reconfiguration capabilities.

Accordingly, this paper proposes the following hypotheses:

H1a: Human capital has a positive effect on learning capability.

H1b: Human capital has a positive effect on integration capability.

H1c: Human capital has a positive effect on reconfiguration capability.

2.3.2. Human capital and firm performance

Human capital brings value to a company as a criterion of competency and creativity possessed by employees which allows them to identify business opportunities, create new knowledge, and solve problems (Inkinen, 2015). A firm does not have its own human capital but rather leases the acquired knowledge, skills, and experience of its employees. The quality of human capital in a firm is influenced by its hiring practices and training activities (Gilbert et al., 2017). The economic value of human capital is dependent on how an employer uses and develops it. Scholars have deemed human capital the most important intangible resource for a firm's performance, especially in innovative sectors like ICT.

Therefore, the following hypothesis is proposed:

H1d: Human capital has a positive effect on firm performance.

2.3.3. Social capital and dynamic capabilities

Regarding the relational facet of knowledge resources, researchers have defined social capital as an essential form of knowledge located in the interactions between individuals and networks of relationships (Hongyun et al., 2019), conceptualizing it as the contingent factor behind the occurrence of social ties, new alliances, and partnerships. The literature on social exchange theory highlights that strong ties and alliances play a vital role in the development of a firm's integration and reconfiguration capabilities (Eisenhardt & Martin, 2000). Strong social networks enable an organization to acquire information related to new opportunities, gain new experience and expertise, and create new processes that enhance its capabilities to grasp opportunities. Accordingly, network relationships contribute to the processes and routines that play an indispensable role in releasing, acquiring, and integrating resources. As such, social capital plays an important role in the development of DCs.

Some scholars maintained that experiences with prior alliances drive learning, create knowledge, prevent mistakes, facilitate information and resource advantage, support the identification of new opportunities and threats, and thereby develop learning capabilities (Singh & Rao, 2016). Eriksson (2014) noted that network-generated learning gives rise to resource configuration. Based on the above, it is clear that a high level of social capital enhances an organization's ability to learn, integrate, and reconfigure, thus encouraging the development of DCs.

Accordingly, the following hypotheses are proposed:

H2a: Social capital has a positive effect on learning capability.
H2b: Social capital has a positive effect on integration capability.
H2c: Social capital has a positive effect on configuration capability.

2.3.4. Social capital and firm performance
Social capital encompasses the context and stock of relationships, interpersonal trust, and the norms that allow for certain behaviors and sustainable relationships between individuals and ensure conditions conducive to organizational development and knowledge exchange (Nhon et al., 2018). As such, the way that social capital facilitates accessing, processing, synthesizing, and exchanging knowledge within and across organizations influences the performance of knowledge-based organizations like ICT firms.

Thus, the following hypothesis is proposed:

H2d: Social capital has a positive effect on firm performance.

2.3.5. Organizational capital and dynamic capabilities
Organizational capital is described as "institutionalized knowledge and experience" that is codified and warehoused in systems, databases, processes, manuals, routines, and patents (Inkinen, 2015). A high level of institutionalized knowledge facilitates the smooth flow of communication among partners in relationship networks, creates learning, and accelerates the acquisition of new resource bases (Prena & Kustina, 2020) which is central to the notion of knowledge integration, enhancement, and utilization. This suggests the role of organizational capital as an enabling factor for DCs.

The literature highlights that organizational structure and processes act as formalized mechanisms to impart learning and internalize, utilize, share, and articulate organizational resources (Y. Wang et al., 2019) that further enhance the capabilities of a firm. Youndt et al. (2004) argued that codified knowledge permits organizations to reinforce their prevailing expertise and helps develop innovative capabilities. Y. Wang et al. (2019) maintained the plausible role of information technology in integration capabilities, while Prena and Kustina (2020) recommended knowledge codification as an essential factor for developing integration and reconfiguration capabilities. It is argued for the positive effect of organizational capital on knowledge acquisition and integration. Hsu and Wang (2012) also stated that organizational processes and IT facilitate knowledge accumulation and utilization in an organized way, which is considered a requisite component of DC. Hsu and Wang (2012) argued that new knowledge generated through experiences is a vital element in DC. For instance, organizational capital provides a positive culture (a contingent factor for learning), encourages individuals to acquire new knowledge, and facilitates an environment that enhances an organization's ability to create knowledge and leverage that knowledge to produce value and achieve the organization's potential.

Based on the above, this paper hypothesizes the following:

H3a: Organizational capital has a positive effect on learning capability.
H3b: Organizational capital has a positive effect on integration capability.
H3c: Organizational capital has a positive effect on reconfiguration capability.

2.3.6. Organizational capital and firm performance
The purpose of organizational capital is to coordinate communication and action between individuals in an organization (Gilbert et al., 2017). A review of the literature indicates three distinct dimensions of organizational capital: (a) structural; (b) cultural; and (c) knowledge

(Gilbert et al., 2017). The structural dimension of organization capital includes the organization's formal procedures and processes that provide decision-making guidelines. This also includes human resources policies and guidelines for labor-management practices such as hiring, task management, staffing, and disciplinary action (Gilbert et al., 2017). The cultural dimension accounts for processes that serve the long-term strategies of a firm, including formal objectives, strategic plans, missions, values, and vision (Djuric et al., 2019) organizational culture and conceptions of corporate social responsibility traditions (Asiaei & Jusoh, 2015). The knowledge dimension refers to the processes through which knowledge and information are created, utilized, exchanged, and preserved, including investment in research and development as well as copyrights and patents (Nhon et al., 2018). Most major ICT firms are of small and medium size and are thus able to develop organizational capital that is less hierarchical in nature and allows for the autonomy and independence in decision-making that is necessary to increase innovation and absorb new knowledge.

Based on the above arguments, the following hypothesis is proposed:

H3d: Organizational capital has a positive effect on firm performance.

2.4. Mediating effects of the different dynamic capabilities

2.4.1. Mediating effects of learning capability

Learning in this context refers to the process of making firm operations more effective and efficient through repetition and review. In product development, learning capability allows firms to avoid repeating mistakes by using information from past lessons and enables them to explore new knowledge and develop new products (Obeidat et al., 2018). Some scholars indicated that a firm can enhance its performance by learning new knowledge, concepts, and expertise through external cooperative alliances. In addition, learning orientation has been found to improve innovative capability (Lee & Falahat, 2019). Lin and Wu (2014) suggested that a firm should modify its business direction through internal and external learning by changing, acquiring, or discarding resources. Internal learning can be achieved through training, knowledge database maintenance, and knowledge sharing programs. In addition, a firm can enhance its external learning capability by anticipating industry knowledge and becoming involved in learning seminars or communities.

Accordingly, the paper posits the following hypotheses:

H4: Learning capability has a positive influence on firm performance.

H5a: Learning capability mediates the positive effect of human capital on firm performance.

H5b: Learning capability mediates the positive effect of social capital on firm performance.

H5c: Learning capability mediates the positive effect of organizational capital on firm performance.

2.4.2. Mediating effects of integration capability

Yang et al. (2019) showed that firm acquirers can gain resource exchange and integration expertise through successful alliance activities and thus improve their performance. These results provide examples of how integration capability positively transforms value resources into improved performance.

In light of this research, the paper proposes the following hypotheses:

H6: Integration capability has a positive influence on firm performance.

H7a: Integration capability mediates the positive effect of human capital on firm performance.

H7b: Integration capability mediates the positive effect of social capital on firm performance.

H7c: Integration capability mediates the positive effect of organizational capital on firm performance.

2.4.3. Mediating effects of reconfiguration capability

To deal with a rapidly changing industry environment, a firm must reassemble or transform its internal and external resources (Farzaneh et al., 2020). However, firms must also develop a more cost-effective process than their competitors to reconfigure and transform their resource. As a result, reconfiguration capability is generally considered a key capability for monitoring market and technology trends and for ensuring timely responses through resource transformation (Teece et al., 1997).

Lin and Wu (2014) indicated that strategic flexibility, which stresses the flexible use and reconfiguration of resources, strengthens the positive effects of technological capability and thus improves firm performance. To deal with fast-changing industry environments, firms should rapidly respond to the market and competitors. Additionally, firms should efficiently and effectively communicate with their alliance network to create competitive advantages.

Accordingly, the following hypotheses are proposed:

H8: Reconfiguration capability has a positive influence on firm performance.

H9a: Reconfiguration capability mediates the positive effect of human capital on firm performance.

H9b: Reconfiguration capability mediates the positive effect of social capital on firm performance.

H9c: Reconfiguration capability mediates the positive effect of organizational capital on firm performance.

2.5. Conceptual framework

Based on the literature review and synthesis of IC and DC theory as well as the proposed hypotheses, this paper suggests a conceptual framework (Figure 1).

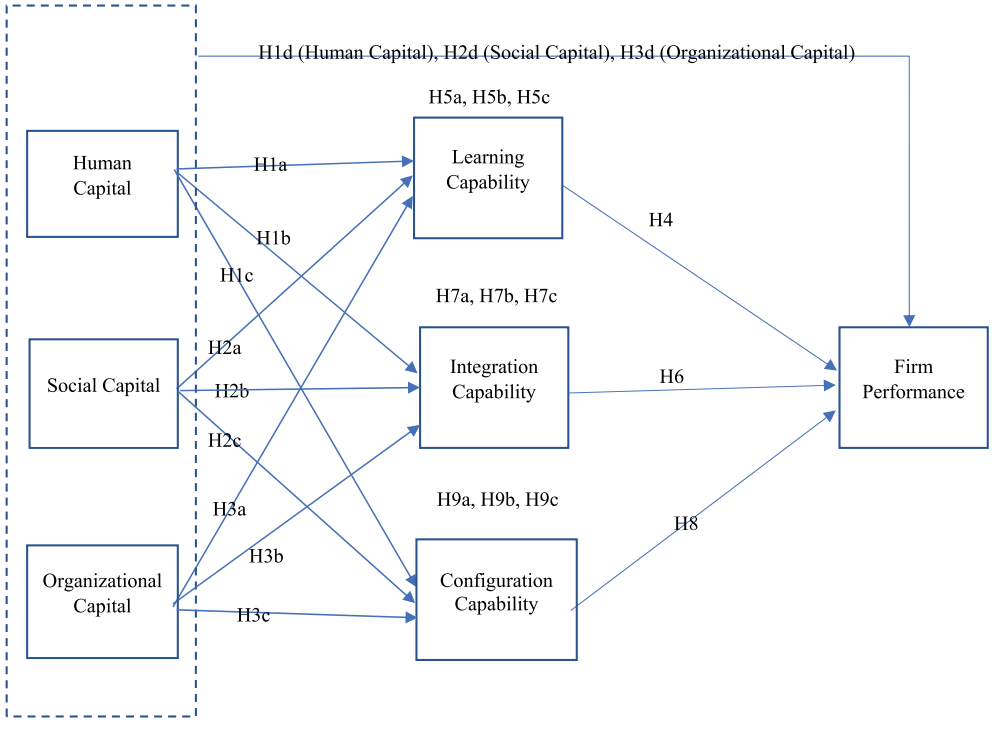

Figure 1. Conceptual framework

3. Methodology

3.1. Sample size determination

In academic research, it is impossible to collect data from every participant in a study population due to limited time, costs, and human resources. The list of ICT firms used in this study was obtained from the website www.vietask.com. Determining sample size depends on the proportion of the total sample variation in the dependent variable. A sample size larger than 30 and smaller than 500 is appropriate for quantitative studies (Creswell, 2009). The required minimum sample size for factor analysis is at least 10 times the largest number of the construct used to measure a construct, or 10 times the largest number of structural paths directed at a particular construct in the structural model (Creswell, 2009).

In the first step of sample size determination, the target population is defined. Once the decision to sample has been made, the first question related to sampling concerns is identifying the target population—that is, the complete group of specific population elements relevant to the research project. The website www.vietask.com indicates a total of 4,483 ICT firms in 64 provinces in Vietnam. In the second step, the sampling frame is applied. A sampling frame is the list of elements from which the sample may be drawn. For the sampling frame step, the number of sampling units drawn from each stratum is proportional to the population size of that stratum. For this research, a sample was selected of 350 ICT firms across all provinces in proportion to population size.

3.2. Measures

The questionnaires used in this study were developed based on validated scales. However, as the survey was conducted in Vietnam, two academic domain experts who were fluent in both Vietnamese and English were recruited for the translation process. The questionnaire was pre-tested in meetings with 10 academic domain experts and 10 senior managers from Vietnamese ICT firms. The purpose of the pretest was to evaluate the content validity of the measures and whether respondents understood the instructions, items, and scales. Throughout the questionnaire, 7-point Likert scales were used, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

3.2.1. Measures of intellectual capital

IC comprises three dimensions: human capital, organizational capital, and social capital (Youndt et al., 2004). Each dimension individually determines the distinctive aspect of the conceptual realm. Items measuring human capital indicate the level of knowledge embedded in individuals, social capital items indicate the level of organizational knowledge residing in networks and relationships, and organizational capital items indicate the level of knowledge embedded in organizational structures, databases, processes, and patents. All items are available in Appendix A.

3.2.2. Measures of dynamic capabilities

As noted above, DCs comprise three dimensions: learning, integration, and reconfiguration (Eisenhardt & Martin, 2000; Teece et al., 1997). Each dimension individually determines the distinctive aspect of the conceptual realm. The measurement items of the learning, integration, and reconfiguration scales were developed based on studies by Eisenhardt and Martin (2000) and Teece et al. (1997). All items are available in Appendix A.

3.2.3. Measures of firm performance

Subjective measures of firm performance were used, as respondents are generally reluctant to provide accurate information pertaining to objective measurements. Additionally, it has been demonstrated in many studies that the application of subjective measures of firm performance is reliable and valid (Ross et al., 2012). All items are reported in detail in appendix A.

3.3. Data description

We distributed 448 questionnaires to CEOs, project managers, and other executives at Vietnamese ICT firms and ultimately received 350 responses. All participants were male. According to table 1, background, the majority of respondents (76%) held only bachelor's degrees, followed by those holding master's

Table 1. Demographic description

Variable	Category	*N*	Percentage (%)
Age	20s	10	3
	30s	255	73
	40s	81	23
	≥ 50	5	1
Education	Vocational school	13	4
	Bachelor's degree	267	76
	Master's degree	71	20
ICT category	Software services	200	57
	Hardware services	31	9
	Hardware manufacturing	10	3
	Digital media	80	23
	Telecommunication	30	9

degrees (20%). Demographic information also indicated that the majority of participants in the survey (76%) were younger than 40 years old. Regarding participants' specific ICT subcategory, 66% worked in software or hardware services, 23% worked in digital media, and only 9% worked in telecommunications. In general, the Vietnamese ICT sector is a young sector with extensive opportunities for development.

4. Results

4.1. Results of construct reliability and validity evaluation

Cronbach's α was initially used for reliability analysis to measure the internal consistency of the measurement scales. A reliability coefficient above 0.6 is considered acceptable (Hair et al., 1998). The α values for the human, social, and organizational capital scales were 0.861, 0.805, and 0.773, respectively, representing good scale reliability. The learning, integration, and configuration scales had α values of 0.920, 0.900, and 0.898, respectively, also representing good reliability. The firm performance scale had an α value of 0.880, indicating good reliability.

Next, we used exploratory factor analysis (EFA) to conduct dimensionality analysis as indicated by factor loading score. The general purpose of factor analytic techniques is to condense the information contained in the original construct into a smaller set of new composite dimensions or factors (Hair et al., 1998). All factor loading scores meeting the suggested level of 0.5 result in the satisfaction of the condition of unidimensionality confirmation (Hair et al., 1998). In this study, which had an original set of 35 measurement items, 30 items met the factor loading score threshold of 0.5, with a minimum score of 0.598.

4.2. Results of convergent and discriminant validity evaluation

Before verifying the hypotheses, confirmatory factor analysis (CFA) was conducted to assess how the conceptual model fit the data using the AMOS software. To ensure that the data fit the model well, the root-mean-square error of approximation (RMSEA) should be less than or equal to 0.08 (Hair et al., 1998). The goodness-of-fit index (GFI) and comparative fit index (CFI) should satisfy thresholds of 0.9 (Hair et al., 1998). Our CFA resulted in an acceptable fit for our data set (GFI = 0.909; CFI = 0.975; RMSEA = 0.034). Further, we used CFA to test convergent and discriminant validity. We checked average variance extracted (AVE) and composite reliability (CR). The CRs for human capital, social capital, organizational capital, learning, integration, reconfiguration, and firm performance were 0.864, 0.908, 0.808, 0.920, 0.902, 0.901, and 0.884, respectively. All were higher than the suggested level of 0.7 (Hair et al., 1998). The AVEs for human capital, social capital, organizational capital, learning, integration, reconfiguration, and firm performance were 0.561,

Table 2. Validity

	Reconfiguration capability	Firm performance	Integration capability	Learning capability	Human capital	Social capital	Organizational Capital
Reconfiguration capability	**0.696***	0.460	0.332	0.503	0.541	0.334	0.364
Firm performance	0.460	**0.605***	0.500	0.448	0.397	0.310	0.254
Integration capability	0.332	0.500	**0.699***	0.560	0.392	0.281	0.294
Learning capability	0.503	0.448	0.560	**0.741***	0.430	0.350	0.332
Human capital	0.541	0.397	0.392	0.430	**0.561***	0.380	0.423
Social capital	0.334	0.310	0.281	0.350	0.380	**0.711***	0.309
Organizational capital	0.364	0.254	0.294	0.332	0.423	0.309	**0.513***

*AVE values

0.711, 0.513, 0.741, 0.699, 0.696, and 0.605, respectively. All were likewise above the proposed threshold of 0.5 (Hair et al., 1998). Therefore, the test of convergent validity was satisfied.

For the test of discriminant validity, if the AVE of each construct is larger than the squared correlation coefficient of that construct compared with any other construct in the model, the constructs are deemed different from one another (Cheung et al., 2010). The results of this test (Table 2) demonstrate that all constructs had discriminant validity.

4.3. Hypothesis verification

In the hypothesis verification step, we tested all hypotheses using process software developed by Hayes (2013). Collectively, H1a, H2a, and H3a propose direct individual effects of human, social, and organizational capital on learning capability; H1b, H2b, and H3b propose direct individual effects of human, social, and organizational capital on integration capability; and H1c, H2c, and H3c propose direct individual effects of human, social, and organizational capital on reconfiguration capability. H1d, H2d, and H3d represent direct individual effects of human, social, and organizational capital on firm performance, and H4, H6, and H8 propose direct individual effects of learning, integration, and reconfiguration capability on firm performance. H5a–H5c suggest indirect effects whereby the associations among human, social, and organizational capital and firm performance are mediated by learning capability; H7a–H7c suggest indirect effects whereby the associations among human, social, and organizational capital and firm performance are mediated by integration capability; and H9a–H9c suggest indirect effects whereby the associations among human, social, and organizational capital and firm performance are mediated by reconfiguration capability. The mediation effects were tested using bootstrapping analysis—a powerful method to determine the statistical significance of mediation—to confirm a significant indirect effect, following the work of Preacher and Hayes (2013).

4.4. Test results of direct and indirect effects

The study tests direct and indirect effects. First, human, social, and organizational capital and learning, integrating, and configurating capability were regressed on firm performance. As shown in Table 3, all constructs excluding reconfiguration capability (H8) were significantly related to firm performance. Therefore, H1a, H2d, H3d, H4, and H6 are supported. Among these constructs, learning capability had the most significant influence on firm performance.

Second, human, social, and organizational capital were regressed on learning, integrating, and configurating capability. According to the test results for model 2 (Table 4), H1a, H2a, and H3a are supported. In this model, among human, social, and organizational capital, human capital had the strongest influence on learning capability. The test results for model 3 (Table 4) likewise revealed that H1b, H2b, and H3b are supported. Among the three IC dimensions, social capital had the

Table 3. Regression Analysis 1

Model 1

	B	SE	*p*	LLCI	ULCI
Constant	2.7227	.2389	.0000	2.2528	3.1926
Human capital → firm performance (H1d)	.0888	.0335	.0085	.0229	.1548
Social capital → firm performance (H2d)	.0663	.0260	.0113	.0151	.1175
Organizational capital → firm performance (H3d)	.0690	.0301	.0224	.0098	.1281
Learning capability → firm performance (H4)	.2422	.0343	.0000	.1667	.3177
Integration capability → firm performance (H6)	.0971	.0343	.0049	.0297	.1645
Reconfiguration capability → firm performance (H8)	.0565	.0458	.2181	−.0336	.1466

Table 4. Regression Analysis 2

Model 2					
	β	**SE**	***p***	**LLCI**	**ULCI**
Constant	4.1838	.1992	.0000	3.7919	4.5757
Human capital → learning capability (H1a)	.1768	.0423	.0000	.0937	.2599
Social capital → learning capability (H2a)	.1177	.0341	.0006	.0507	.1847
Organizational capital → learning capability (H3a)	.1262	.0398	.0017	.0478	.2046
Model 3					
	β	SE	*p*	LLCI	ULCI
Constant	4.1432	.2285	.0000	3.6939	4.5926
Human capital → integration capability (H1b)	.1245	.0485	.0010	.0291	.2198
Social capital → integration capability (H2b)	.1375	.0390	.0005	.0407	.2143
Organizational capital → integration capability (H3b)	.0770	.0457	.0159	.0188	.1986
Model 4					
	β	SE	*p*	LLCI	ULCI
Constant	2.7605	.2452	.0000	2.2782	3.2428
Human capital → reconfiguration capability (H1c)	.3554	.0520	.0000	.2531	.4578
Social capital → reconfiguration capability (H2c)	.1438	.0419	.0007	.0614	.2262
Organizational capital → reconfiguration capability (H3c)	.1215	.0490	.0137	.0251	.2180

strongest impact on integration capability in this model. The last model in Table 4, model 4, shows that H1c, H2c, and H3c are confirmed. In this model, human capital had the most significant effect on firm reconfiguration capability.

Finally, we tested the indirect effects of human, social, and organizational capital on firm performance through learning, integration, and reconfiguration capability. The test outcome (Table 3) revealed that H8 was not supported—in other words, human, social, and organizational capital do not have an indirect effect on firm performance through reconfiguration capability. Consequently, H9a, H9b, and H9c are not supported. Meanwhile, the path analyses (Table 5) confirmed H5a, H5b, H5c, H7a, H7b, and H7c. Among the three DCs, learning capability had the most significant mediating effect. In

Table 5. Regression and mediation analysis

Model 5	***β***	**Boot-SE**	**Boot-LLCI**	**Boot-ULCI**
Human capital → learning capability → firm performance (H5a)	.0345	.0180	.0026	.0733
Human capital → integration capability → firm performance (H7a)	.0301	.0185	.0013	.0724
Model 6	*β*	Boot-SE	Boot-LLCI	Boot-ULCI
Social capital → learning capability → firm performance (H5b)	.0140	.0084	.0009	.0333
Social capital → integration capability → firm performance (H7b)	.0333	.0151	.0092	.0687
Model 7	*β*	Boot-SE	Boot-LLCI	Boot-ULCI
Organizational capital → learning capability → firm performance (H5c)	.0118	.0084	.0174	.0812
Organizational capital → integration capability → firm performance (H7c)	.0263	.0136	.0039	.0566

addition, based on the test outcomes, we confirmed that there were no full mediation effects in this study. Full mediation effects would occur if constructs had no direct influence on firm performance (Hayes, 2009). Learning and integration capability thus have only partial mediation effects on the relationship between human, social, and organizational capital and firm performance.

5. Conclusion

Overall, this study reduces ambiguity regarding the mediating mechanism of DCs through which IC improves firm performance. Specifically, these findings provide evidence that learning and integration capability serve as important mediating mechanisms between IC dimensions and firm performance. By accumulating human, social, and organizational capital and developing DCs to mediate IC, firms can improve their competitive advantage and performance. In addition, among the three DCs, learning capability had the most significant mediating effect. Therefore, it is crucial to develop learning capability by creating mechanisms to absorb information and knowledge through iterative business practice. Moreover, developing learning capability internally via human resources development programs and externally via strategic cooperative alliances is also critical for improving firm competence.

5.1. Theoretical and managerial contributions

This article makes several contributions to the literature on DCs and IC. First, the paper provides an understanding of the indirect effects of IC dimensions on firm performance by adding to the argument that the mediating effects of DCs are not identical. Rather than treating DCs as a whole, the study deconstructed DCs into three dimensions and separately examined the effects of each dimension. Our findings suggest that, unlike learning and integration capability, reconfiguration capability does not have a significant effect on firm performance. Second, in combining RBV and DCV, the analytical results of this study also demonstrate an integrated consideration of both IC and DCs. Competitive advantage results not only from the accumulation of IC dimensions but also from the development of DCs, particularly learning capability.

In term of its managerial contributions, the paper makes the following suggestions. The outcome of this study shows that among IC dimensions, human capital has the greatest direct and indirect effect on firm performance, especially in the ICT sector. Today, the success of any firm is measured in terms of continuous innovation, which relies on retaining employees with skills and knowledge and avoiding high employee turnover. Our findings regarding the importance of learning capability support this. Learning capabilities involve the combination of problem-solving and coordinated search strategies and may require the skills and knowledge of individuals. Learning capability is also accumulated and path-dependent; what is learned and practiced is stored and exposed in a firm's economic performance.

Next, the direct and indirect effects of social capital on firm performance found here are consistent with previous discussions on the main source of firm performance. This is a significant finding due to its strategy implications, namely that social capital must be involved in growing learning and integration capability for research and development and marketing activities. Therefore, the outcome of this study offers a relational view of competitive advantage that focuses on network routines and processes.

Previous literature has stressed the positive link between organizational capital and performance. Interestingly, our findings also show that learning and integration capability play a mediating role in this relationship. This finding supports the idea that DCs should be used as a significant means of renewing resources and restoring capability diversity, as well as avoiding the inertia and simplicity that result from a scarcity of long-term efficient resource deployment within an organizational structure.

In sum, our findings provide guidance in answering the question: What are the dimensions of IC, and what types of DCs effectively mediate them in competitive environments? Strategic management should consider RBV and DCV together rather than separately.

5.2. Limitations and future research

First, this study is limited by its use of perceptual data. Therefore, managers may be unable to identify many examples of practical managerial actions based on the study results. Second, the study did not consider dynamic environment as a variable under which IC and DCs are relevant to improving firm performance. Therefore, a potential extension of this study could employ a longitudinal study design to empirically confirm causality and assess IC dimensions, DCs, and firm performance over time. Future research could also examine the role of environment dynamism in the relationship among DCs, IC dimensions, and firm performance.

Funding
The authors received no direct funding for this research.

Author details
Hoang Thanh Nhon[1,2]
E-mail: hoang.nhon@gmail.com
Nguyen Van Phuong[1]
Ngo Quang Trung[2]
Bui Quang Thong[1]
[1] International University, Vietnam National University, Ho Chi Minh City, Vietnam.
[2] Van Lang University, Ministry of Education & Training, Ho Chi Minh City, Vietnam.

Citation information
Cite this article as: Exploring the mediating role of dynamic capabilities in the relationship between intellectual capital and performance of information and communications technology firms, Hoang Thanh Nhon, Nguyen Van Phuong, Ngo Quang Trung & Bui Quang Thong, *Cogent Business & Management* (2020), 7: 1831724.

References

Asiaei, K., & Jusoh, R. (2015). A multidimensional view of intellectual capital: The impact on organizational performance. *Management Decision*, *53*(3), 668–697. https://doi.org/10.1108/MD-05-2014-0300

Cheung, M. K., Chiu, Y., & Lee, K. O. (2010). Online social networks: Why do students use Facebook? *Computers in Human Behavior*, *27*(4), 1337–1343. https://doi.org/10.1016/j.chb.2010.07.028

Creswell, J. W. (2009). Mapping the field of mixed methods research.

Dezsö, C. L., & Ross, D. G. (2012). Does female representation in top management improve firm performance? A panel data investigation. Strategic management journal, 33(9), 1072–1089

Djuric, M., Filipovic, J., & Komazec, S. (2019). Reshaping the future of social metrology: Utilizing quality indicators to develop complexity-based scientific human and social capital measurement model. *Social Indicators Research*, 1–33.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, *21*(10–11), 1105–1121. https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E

Eriksson, T. (2014). Processes, antecedents and outcomes of dynamic capabilities. *Scandinavian Journal of Management*, *30*(1), 65–82. https://doi.org/10.1016/j.scaman.2013.05.001

Fainshmidt, S., Wenger, L., Pezeshkan, A., & Mallon, M. R. (2019). When do dynamic capabilities lead to competitive advantage? The importance of strategic fit. *Journal of Management Studies*, *56*(4), 758–787. https://doi.org/10.1111/joms.12415

Farzaneh, M., Ghasemzadeh, P., Nazari, J. A., & Mehralian, G. (2020). Contributory role of dynamic capabilities in the relationship between organizational learning and innovation performance. *European Journal of Innovation Management*. https://doi.org/10.1108/EJIM-12-2019-0355

Gilbert, J. H., Von Ah, D., & Broome, M. E. (2017). Organizational intellectual capital and the role of the nurse manager: A proposed conceptual model. *Nursing Outlook*, 29.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis*. Prentice Hall.

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium. Communication Monographs, 76(4), 408–420. doi:10.1080/03637750903310360

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford.

Hongyun, T., Kankam, W. A., Appiah-Twum, F., & Akolgo, I. G. (2019). Effect of social capital on firm performance: The role of entrepreneurial orientation and dynamic capability. *International Review of Management and Marketing*, *9*(4), 63. https://doi.org/10.32479/irmm.8108

Hsu, L. C., & Wang, C. H. (2012). Clarifying the effect of intellectual capital on performance: The mediating role of dynamic capability. *British Journal of Management*, *23*(2), 179–205. https://doi.org/10.1111/j.1467-8551.2010.00718.x

Hussinki, H., Ritala, P., Vanhala, M., & Kianto, A. (2017). Intellectual capital, knowledge management practices and firm performance. *Journal of Intellectual Capital*, *18*(4), 904–922. https://doi.org/10.1108/JIC-11-2016-0116

Inkinen, H. (2015). Review of empirical research on intellectual capital and firm performance. *Journal of Intellectual Capital*, *16*(3), 518–565. https://doi.org/10.1108/JIC-01-2015-0002

Lee, Y. Y., & Falahat, M. (2019). The impact of digitalization and resources on gaining advantage in international markets: Mediating role of marketing, innovation and learning capabilities. *Technology Innovation Management Review*, *9*(11), 26–38. https://doi.org/10.22215/timreview/1281

Lin, Y., & Wu, L. Y. (2014). Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. *Journal of Business Research*, *67*(3), 407–413. https://doi.org/10.1016/j.jbusres.2012.12.019

Nhon, H. T., Thong, B. Q., & Van Phuong, N. (2018). The impact of intellectual capital dimensions on Vietnamese information communication technology firm performance: A mediation analysis of human

and social capital. *Academy of Strategic Management Journal, 17*(1), 1-15.

Nieves, J., & Haller, S. (2014). Building dynamic capabilities through knowledge resources. *Tourism Management*, *40*, 224–232. https://doi.org/10.1016/j.tourman.2013.06.010

Obeidat, D., Yousef, B., Nofal, R., & Masa'deh, R. E. (2018). The effect of transformational leadership on entrepreneurial orientation: The mediating role of organizational learning capability. *Modern Applied Science*, *12*(11), 77. https://doi.org/10.5539/mas.v12n11p77

Oliva, F. L., Couto, M. H. G., Santos, R. F., & Bresciani, S. (2019). The integration between knowledge management and dynamic capabilities in agile organizations. *Management Decision*, *57*(8), 1960–1979. https://doi.org/10.1108/MD-06-2018-0670

Osinski, M., Selig, P. M., Matos, F., & Roman, D. J. (2017). Methods of evaluation of intangible assets and intellectual capital. *Journal of Intellectual Capital*, *18*(3), 470–485. https://doi.org/10.1108/JIC-12-2016-0138

Prena, G. D., & Kustina, K. T. (2020). Relationship of intellectual capital to dynamic capabilities in village credit institutions. *GIS Business*, *15*(1), 95–108. https://doi.org/10.26643/gis.v15i1.17894

Salunke, S., Weerawardena, J., & McColl-Kennedy, J. R. (2019). The central role of knowledge integration capability in service innovation-based competitive strategy. *Industrial Marketing Management*, *76*, 144–156. https://doi.org/10.1016/j.indmarman.2018.07.004

Singh, B., & Rao, M. K. (2016). Effect of intellectual capital on dynamic capabilities. *Journal of Organizational Change Management*, *29*(2), 129–149. https://doi.org/10.1108/JOCM-12-2014-0225

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509–533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

Tseng, S. M., & Lee, P. S. (2014). The effect of knowledge management capability and dynamic capability on organizational performance. *Journal of Enterprise Information Management*, *27*(2), 158–179. https://doi.org/10.1108/JEIM-05-2012-0025

Tsou, H. T., & Chen, J. S. (2020). Dynamic capabilities, human capital and service innovation: The case of Taiwan ICT industry. *Asian Journal of Technology Innovation*, 1–23.

VietNamNet. (2020). ICT Industry Earns $59.9 Billion. Retrieved from https://english.vietnamnet.vn/fms/science-it/170268/ict-industry-earns-59-9-billion.html

Wang, Y., Su, X., Wang, H., & Zou, R. (2019). Intellectual capital and technological dynamic capability: Evidence from Chinese enterprises. *Journal of Intellectual Capital*, *20*(4), 453–471. https://doi.org/10.1108/JIC-06-2018-0096

Wang, Z., Cai, S., Liang, H., Wang, N., & Xiang, E. (2018). Intellectual capital and firm performance: The mediating role of innovation speed and quality. *The International Journal of Human Resource Management*, 1–29. https://doi.org/10.1080/09585192.2018.1511611

Yang, D., Jiang, W., & Zhao, W. (2019). Proactive environmental strategy, innovation capability, and stakeholder integration capability: A mediation analysis. *Business Strategy and the Environment*, *28*(8), 1534–1547. https://doi.org/10.1002/bse.2329

Youndt, M. A., Subramaniam, M., & Snell, S. A. (2004). Intellectual capital profiles: An examination of investments and returns. *Journal of Management Studies*, *41*(2), 335–361. https://doi.org/10.1111/j.1467-6486.2004.00435.x

Zhou, S. S., Zhou, A. J., Feng, J., & Jiang, S. (2019). Dynamic capabilities and organizational performance: The mediating role of innovation. Journal of Management & Organization, 25(5), 731–747. doi:10.1017/jmo.2017.20

Appendix A
Questionnaire Items

Firm Performance (7-point Likert scale, adapted from Ross and Grade (2012))
Organization demonstrated more profitability than other market competitors
Organization has greater capacity in developing new products or services than other competitors
Organization has higher quality of products or services than other competitors
Organization has greater capability in developing new products, service or programs
Organization has greater ability to attract and retain essential employees
Organization achieved greater satisfaction among customers or clients
Organization experienced a greater growth in sales than other market competitors
Social, Organizational, and Human Capital (7-point Likert scale, adapted from Youndt et al. (2004))
Social Capital
Employees are skilled at collaborating with each other to diagnose and solve problems
Employees share information and learn from one another
Employees interact and exchange ideas with people from different areas of the organization
Employees interact with customers, suppliers, alliance partners, etc., to develop solutions
Employees apply knowledge from one area of the company to problems and opportunities that arise in another
Organizational Capital
Organization use patents and licenses as a way to store knowledge
Organizational knowledge is contained in manuals, databases, etc.
Organization's culture (stories, rituals) contains valuable ideas, ways of doing business, etc.
Organization embeds much of its knowledge and information in structures, systems, and processes
Human Capital
Employees are highly skilled
Employees are widely considered the best in our industry
Employees are creative and bright
Employees are experts in their jobs and functions
Employees develop new ideas and knowledge
Learning, Integration, and Reconfiguration Capabilities (7-point Likert scale, adapted from Teece et al. (1997) **and** Eisenhardt and Martin (2000))
Learning Capabilities
Frequent industry knowledge learning program
Frequent internal educational training
Frequent knowledge sharing and establishment of learning groups
Frequent internal cross-department learning program
Integration Capabilities
Focus on customer information collection and potential market exploration
Employ specialized firms to collect industry information for managerial decisions
Focus on integrating industry-related technologies to develop new products
Record and integrate historical methods and experiences in handling firm issues
Reconfiguration Capabilities
Clear human resource reallocation procedure
Fast organizational response to market changes
Fast organizational response to competitor's actions
Efficient and effective communication with cooperative organization

Cogent Business & Management **(ISSN: 2331-1975) is published by Cogent OA, part of Taylor & Francis Group.**

Publishing with Cogent OA ensures:

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

Submit your manuscript to a Cogent OA journal at www.CogentOA.com