

Does human capital mediate the relationship between digital competence and service innovation capability? Evidence from the UAE during covid-19 pandemic

Lama Blaique

Department of General Business and Management, American University in Dubai, Dubai, United Arab Emirates

Taghreed Abu Salim

Department of Business, Abu Dhabi University, Abu Dhabi, United Arab Emirates, and

Farzana Asad Mir

Department of Business Management, The British University in Dubai, Dubai, United Arab Emirates

Abstract

Purpose – The purpose of this study is to investigate the relationship between digital competence and the capability to innovate in the service sector and examine if this relationship is mediated by human capital in the context of COVID-19 pandemic.

Design/methodology/approach – Using a cross-sectional survey, data were collected from 188 service sector professionals in the United Arab Emirates. Data were analyzed using partial least square-based structural equation modeling.

Findings – The findings of partial least square based structural equation modeling analysis indicate that there is a significant positive relationship between digital competence and the capacity to innovate in the service sector, which is partially mediated by human capital.

Originality/value – This study contributes to knowledge by offering an understanding of the relationship between digital competence and innovation capability, especially in uncertain situations. This study also notes the importance of human capital as a strategic resource for innovation.

Keywords Human capital, Service innovation, Digital competence, COVID-19, United Arab Emirates

Paper type Research paper

1. Introduction

The service sector has inevitably been hit hard, with around 195 million employees losing their jobs because of the COVID-19 pandemic that surfaced in late 2019 and early 2020 (Boone, 2020). With the COVID-19 virus reportedly being transmitted through the air and direct contact between people and surfaces, the World Health Organization started mandating several safety precautions such as social distancing (WHO, 2020). Service firms reacted to these challenges by relying heavily on digitalization in delivering their services (Ismail *et al.*, 2013; Daga *et al.*, 2021). For example, the health-care sector substituted digitalized communications for paper-based ones to reduce surface contact and started using virtual consultations to comply with social



distancing rules (Baldwin and Tomiura, 2020). The purpose of this study is to investigate the relationship between digital competence and the capability to innovate in the service sector and to test for the mediating effect of human capital in the context of COVID-19 pandemic.

These unforeseen changes have resulted in challenging work contexts where corporations are still unclear how these new technologies can be deployed to offer better service solutions (Donth and Gustafsson, 2020). The pandemic may have caused permanent digital innovations that can be adopted for use long after the disease ceases to exist (Faraj *et al.*, 2021).

Brennen and Kreiss (2016) define digitalization as the mechanism for assembling analogue information into digital data. Digital competence is becoming a major issue in the corporate world, as not all employees have the skills for embracing digitalization. The term digital competence has aspects such as teamwork, communication, information management, the formation of content and knowledge, technical operation, problem-solving and ethics and responsibility (Ferrari, 2012). Similar concepts are found in the definition of 21st-century skills. The latter rests on the assumption that emerging technologies will change the traditional way of learning and activate essential skills in an increasingly digital environment (Van Laar *et al.*, 2017). In view of the challenging environment that organizations must operate in, organizations that invest in advancing their innovative capabilities tend to have a better chance of succeeding in future projects, because these capabilities leverage a firm's strategic advantage (Blaique *et al.*, 2022a; Gil-Gomez *et al.*, 2020). Past studies have established a link between intellectual capital and service innovation capability (Leitner, 2011; Subramaniam and Youndt, 2005; Nylén and Holmström, 2015). Previous studies have also examined the relationship between digital competence and service innovation capability (Battour *et al.*, 2022; Heenkenda, 2022). However, most have examined these constructs separately with limited research investigating how both constructs human capital and digital competence can impact service innovation during a pandemic (Esposito *et al.*, 2022; Stofkova, 2022). Our study addresses this oversight and differs from previous research by examining the relationship between digital competence and innovation capability while testing the mediating effect of human capital on this relationship. The context of the study, United Arab Emirates (UAE), is significant, as there is a strategic focus on developing innovation capability to move the country from an oil-based economy to a knowledge-based economy.

In this study, we use dynamic capabilities theory to enhance our understanding of the processes that support innovation capability in complex and unpredictable environments (Baden-Fuller and Teece, 2020; Teece *et al.*, 1997). According to the dynamic capabilities theory, strategic resources that tend to be unique, valued, hard to copy and non-substitutable aid firms in enhancing their innovative capability (Teece, 2018). Therefore, we argue that using knowledge resources through human capital allows an organization to improve its innovative capability. Organizations operating in knowledge-based economies rely heavily on intangible assets, such as human capital (Hippe, 2014; Skaggs and Youndt, 2004). Although the three aspects of intellectual capital, namely, human, organizational and social, have been heavily studied as predictors of innovation capabilities (Subramaniam and Youndt, 2005), knowledge about the link between human capital as a strategic resource and its importance for innovation still needs further exploration (Prajogo and Oke, 2016). This study aims to bridge this literature gap by investigating the relationship between digital competence and the capability to innovate in the service sector and examining if this relationship is mediated by human capital in the context of COVID-19 pandemic. The study also notes the importance of human capital as a strategic resource for innovation and reaffirms the importance of using strategic resources to fuel innovation, especially during a pandemic. In doing so, the study offers an understanding of

the relationship between digital competence and innovation capability, especially in uncertain situations. Moreover, the study contributes to knowledge by testing the applicability of the dynamic capabilities theory within a non-Western context such as the UAE.

2. Literature review

2.1 Context of the study

The UAE, like many other countries worldwide, has been heavily impacted by the COVID-19 pandemic. The country applied strict measures to control the spread of the virus, including lockdowns and travel restrictions. The Government also launched a comprehensive testing and contact tracing program. Despite these efforts, the number of cases in the UAE remained high, with a significant number of people testing positive for the virus (WHO, 2020). The UAE worked extensively to develop and distribute vaccines to its population (Government of UAE, 2021). The pandemic has also had a vast impact on the UAE's economy, with many businesses and industries being heavily affected. The Government implemented many measures to support the economy, including stimulus packages and financial assistance for businesses and individuals (Ministry of Economy, 2020). Among the several initiatives that Government offered to assist affected business and industries, the Dubai Economy launched the "Dubai Virtual Commercial City" initiative to support and encourage businesses to shift to an online platform (Dubai Economy, 2020). Additionally, the Abu Dhabi Department of Economic Development supported businesses and entrepreneurs in the form of grants, loans and other incentives to help them adapt to the new reality (Abu Dhabi Department of Economic Development, 2020).

Companies in different sectors have also been innovative in the services they offer to customers, like retail, health care and education. The retail sector started using technology such as virtual reality and augmented reality to create immersive shopping experiences for customers (KPMG, 2020). The health-care sector was quick to adapt to the pandemic, with many hospitals and clinics offering telemedicine services and virtual consultations to patients (Ministry of Health and Prevention, 2020). Furthermore, the education sector started using online platforms and virtual classrooms to continue delivering education to students during the pandemic (Ministry of Education, 2020). Therefore, the COVID-19 pandemic led to major changes in the way businesses operate in the UAE. Many companies started turning to service innovation aided by technology to adapt to the challenging economic environment.

2.2 Service innovation capability

The service sector underwent a major transformation focusing on innovative ways to offer services and benefits with additional value compared to the pre-COVID times (Baldwin and Tomiura, 2020; Daga *et al.*, 2021; Indrawati, 2020). Such innovative services are said to enhance the overall customer experience using technologies that offer flexible and convenient service. Online grocery shopping and kindred services enhancing productivity, for example, telehealth visits from doctors, are expected to continue after the pandemic has died down.

Organizations are expected to innovate if they are capable of so doing (Laforet, 2011). However, innovation capability comprises major processes that cannot be detached from the organization's practices to produce innovative results (Lau and Lo, 2019). Innovation capability consists of a firm's intangible assets and the competence to use them to generate innovations (Yliherva, 2004). In this study, we define innovation capability as the ability to change knowledge and ideas into novel products, services and processes that favor the firm (Lawson and Samson, 2001). Tura *et al.* (2008) identify three sub-components of innovative

capability: openness/creativity, knowledge/expertise and capacity to operationalize. The first component refers to the firm transcending its current solutions in the search for new opportunities. The second sub-component is the ability to learn whatever is needed to create innovation. The final sub-component concerns capabilities that locate and advance functions that the firm can capitalize on. Throughout this study, we investigate the factors – such as digital competence and human capital – that build innovation capabilities by enabling knowledge to be acquired.

Prior literature examined the relationship between various types of innovation and innovative performance specifically in the manufacturing sector (Gunday *et al.*, 2011; Kalay and Lynn, 2015). Less research, however, has focused on service innovation, and only few studies have tested the relationship between business strategies and perspective innovation (Akman and Yilmaz, 2008; Lilly and Juma, 2014). Other researchers have considered what links innovation capability with organizational performance (Huhtala *et al.*, 2014; Taherparvar *et al.*, 2014). Recent research has focused on a firm's use of digital technology and its impact on increasing innovation in the unconventional methods within the IT department. For instance, many firms are starting to digitize their products and services, include software-based technologies in their products or services and rely on analyzing data to profile customers and anticipate their needs. Therefore, employees with the required digital skills and proficiency are becoming a crucial factor in advancing a firm's innovative capability.

The context of the study is the UAE. The UAE economy has tremendously expanded while managing to preserve an income tax-free economy (Abdulla, 2017). This has aided in the advancement of the country to become one of the leading international hubs for service companies. The country is famous for having a vibrant multicultural ecosystem and a lively labor market. It has attracted many expatriate employees (de Waal and Frijns, 2016) who are interested in experiencing a multicultural corporate life or leveraging their own entrepreneurial endeavors (Bodolica and Spraggon, 2015).

In the next sections, we present detailed overview on digital competence and human capital.

2.3 Digital competence

Digitizing, which is the mechanism of changing analogue data into digital data sets, is the foundation of digitalization. It is defined as using digital opportunities (Brennen and Kreiss, 2016; Unruh and Kiron, 2017). Digitalization, as a way of mixing various technologies such as cloud technologies, big data, IoT, blockchain and three-dimensional printing, presents wide and diversified opportunities for service innovation (Matzler *et al.*, 2016). In addition, the use of such digital technologies can aid organizations in successfully elevating resource distribution and staff productivity (Coupette, 2015). Digitalization today is the change agent within organizations, as it presents a new technology based on the internet with ramifications on the whole society (Unruh and Kiron, 2017). The Partnership for the 21st century (P21) presents three kinds of learning: learning, literacy and life skills. Learning skills may include innovation and problem-solving, literacy skills related to ICT and the media and life skills pertaining to adaptability and leadership. The 21st-century skills relate to innovation, citizenship, teamwork, communication, digital proficiency and problem-solving (Voogt and Roblin, 2012). As the name indicates, these skills now accompany current economic and social trends which are unlike those of previous industrial eras.

However, one of the main challenges for organizations is the proper allocation of available resources and capabilities that will advance the use of digitalization to enhance the organization's innovative capability (Teece, 2018).

2.4 Human capital

Intellectual capital has been the focus of many recent studies. The concept was initially introduced by Galbraith (1969), who defined intellectual capital as an array of competencies that have the potential to impact a firm's future activities. Human capital, which is the focus of this study, is defined as the knowledge, capabilities and proficiency acquired and used by employees within the firm (Zahra and George, 2002). It is considered to be the main constituent of intellectual capital (Choo and Bontis, 2002) because human capital is the major source of intangible value in the intellectual era (Huo *et al.*, 2015). Intelligent, creative and skillful individuals who are highly proficient in their performance and tend to constitute the reservoir of novel ideas and knowledge within an organization characterize human capital (Wang *et al.*, 2011).

Previous research has indicated the significant role that human capital plays in enhancing innovation (Bornay-Barrachina *et al.*, 2017; Jia *et al.*, 2014). However, few studies have examined the influence of human capital in conjunction with other variables, like employees' digital competencies, on innovation (Prajogo and Oke, 2016; Subramaniam and Youndt, 2005).

2.5 Developing the theoretical framework

Teece (2009) defines innovation as a core component with dynamic capabilities. In highly volatile business environments, such as the one experienced because of the COVID-19 pandemic, organizations are expected to maintain a sustainable competitive advantage through their rare and hard to copy dynamic capabilities. Such capabilities enable the firm to regularly generate, expand, leverage, conserve and renew its rare asset base. The dynamic capability theory assumes that firms can be successful in changeable times so long as they can adapt to the changing environments. Scholars define "dynamic capability" as the ability of the firm to achieve competitive advantage in volatile conditions by seizing new opportunities and reconfiguring its human, physical and organizational resources (Mezger, 2014).

The three main activities in this theoretical framework, namely, sensing, seizing and reconfiguring, offer the organization a chance to adapt to the changes taking place in the market. The first activity refers to the ability to identify threats and create opportunities. This is considered a dimension for the creation of new ideas. Sensing is the capacity of the business to convert technical abilities to new business ideas and identify other ideas that exist among competitors and outside the industry's limits. The second activity relates to the ability to seize opportunities. This refers to a firm successfully choosing new ideas to further develop its capabilities. Seizing pertains to the firm's concentration on innovation activities by re-joining diverse areas such as technology, market demand and organizational knowledge. The last capacity pertains to the firm's power to stay competitive through enhancing, joining, safeguarding and rearranging both its tangible and intangible assets. This aspect relates to a firm's ability to create and revolutionize itself and not perish from obsolescence. It relates to choosing and sourcing major proficiencies and resources for facilitating innovation for the sake of the business (Mezger, 2014; Teece, 2018).

This study focuses on this third dimension, observing where the firm reinvents itself in the face of new challenges and unexpected change. It takes advantage of organizational factors, such as human capital and digital competence. These factors are expected to enhance the capacity to innovate in a service. Organizational factors have been shown to play a significant role in facilitating the innovation process and ultimately a firm's innovative capability (Chadwick *et al.*, 2015; Teece, 2018).

2.6 Hypotheses

In this section, we present the study’s hypotheses depicted in [Figure 1](#) titled Research Model. Research indicates that digitalization plays a major and transformational role in enhancing a firm’s service innovation capability ([Sjödin et al., 2020](#)). When digitalization is coupled with other resources, such as human capital, they together lead to new understandings and uses of information that generate new opportunities for service firms to innovate ([Lusch and Vargo, 2014](#)). In addition, the interchangeable nature of the service innovation mechanism allows for the development of major innovation alongside the changes and advances in technologies and changes in consumer demands ([Parida et al., 2019](#)). In their leading research study, [Vargo and Lusch \(2008\)](#) explain that digitalization has a focal role in the creation and functioning of service ecosystems, specifically in service innovation. For example, resources such as skills, expertise and information are joined and interchanged in novel techniques to generate value for the firm ([Parida et al., 2019](#)). Digital competence allows firms to create new digital products and services, which can result in increased revenue and market share ([Cetindamar and Phaai, 2017](#)). Previous research has indicated an increase in the level of efficiency and cost savings in the delivery of existing products and services for firms relying more on digital competence ([Radulovich et al., 2018](#)). Digital competence opens various opportunities for firms to better understand and engage with their customers, leading to improved customer service and increased customer loyalty ([Cetindamar and Phaai, 2017](#)). Companies may be able to identify new business opportunities and to keep up with the fast-changing market needs and competition from other global players because of enhanced levels of business competence ([Battour et al., 2022](#)). Therefore, we hypothesize the following:

H1. There is a significant relationship between digital competence and the capacity to innovate in a service.

The dynamic capabilities theory pertains to an organization’s power to regenerate its current resources through learning and recombining knowledge ([Bowman and Swart, 2007](#)). In a dynamic environment, firms build their competitive advantage by investing more in difficult to imitate and progressive capabilities, making intangible assets such as human capital a significant resource. The theory explains that organizations can assimilate, create and redesign their capacities to adapt to rapidly evolving environments ([Teece et al., 1997](#)). As discussed earlier, human capital pertains to the skills, knowledge and abilities available

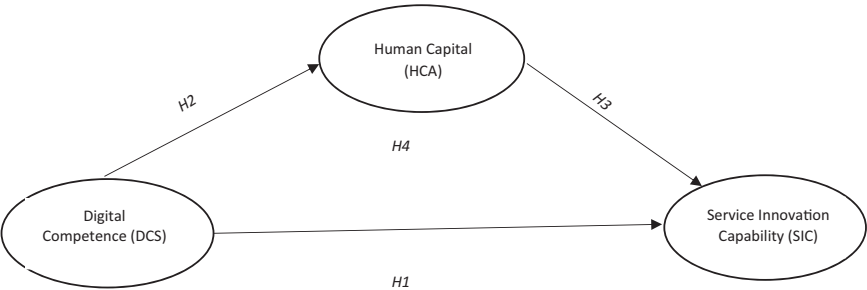


Figure 1.
Research model

Source: Author’s own creation

for human use. It is also considered the rarest and most difficult to imitate resource accessible to organizations (Bornay-Barrachina *et al.*, 2017). Digital competence, on the other hand, can be considered a variety of skills related to collaboration, information management and problem-solving (Ferrari, 2012). Investing and acquiring competence in digital skills would tend to leverage a firm's human capital. Building on these arguments, we propose the following:

H2. There is a significant relationship between digital competence and human capital.

A considerable amount of a firm's innovation is embedded in employees' skills, indicating the significant role that human capital plays in enhancing innovation (Zaborovskaia *et al.*, 2020). As discussed earlier, a firm's knowledge is embedded in its human capital and from such knowledge innovations emerge (Oke *et al.*, 2012; Subramaniam and Youndt, 2005). Therefore, when firms invest in human capital, they tend to enhance creativity and advance new ideas, resulting in improvement in the capacity to innovate. This is because creativity challenges existing and prevailing knowledge. It makes it easier to deal with diversified and novel knowledge, which ultimately advances the possibility of producing new ideas and innovations (Subramaniam and Youndt, 2005). Human capital, therefore, in service organizations is expected to enhance the capability to innovate by using skills that challenge the prevalent methods and generate new knowledge. In addition, in service firms, employees' competence, skills and creativity are used to produce rare and hard to copy service delivery (Czarniewski, 2014; Nenonen and Storbacka, 2020; Skaggs and Youndt, 2004). Thus, the following hypothesis is postulated:

H3. There is a significant relationship between human capital and the capacity to innovate in a service.

Digitalization has become a major catalyst in the economic and business world, partially because of the impact of the COVID-19 pandemic. Digitalization is also considered as one of the important aspects of innovation (Zaborovskaia *et al.*, 2020). The accelerated emergence of digitalization requires employees to obtain a high level of digital competency that will ultimately improve a firm's innovative capabilities (Van Laar *et al.*, 2017). People are considered the foundation of innovation, specifically human capital, which is deemed the rare reservoir of a firm's skills and proficiencies (Chadwick *et al.*, 2015; Czarniewski, 2014; Kefela, 2010; Van Laar *et al.*, 2017; Subramaniam and Youndt, 2005). The current work context dictates the need for proficient employees who can leverage their digital skills in the face of the complexities and changes brought by the COVID-19 pandemic. These employees should be capable of proficiently choosing knowledge from the available information in their environment and putting it into new service solutions. Therefore, workers need both superior technological training and adequate skills to aid them in adapting to such a dynamic environment. Digital competence can help individuals acquire new skills and knowledge, leading to an increase in their human capital (Mazurchenko and Zelenka, 2022; Vieru *et al.*, 2015). Studies have shown that digital competence can help individuals to learn quickly and effectively, which can increase their productivity and performance in the workplace. Digital competence can help firms to attract and retain talented individuals, which can increase the overall human capital of the firm (Van Laar *et al.*, 2020).

Based on the dynamic capabilities theory, intangible resources like human capital are expected to enhance the capacity to innovate in a service because they are socially

complicated, unique and difficult to imitate (Hitt *et al.*, 2001; Teece, 2009). Previous studies indicate that innovations incorporate organizational knowledge which is found mostly in employee human capital (Fonseca *et al.*, 2019; Kudryavtseva and Shvediani, 2019). Thus, the following hypothesis is proposed:

- H4. Human capital mediates the relationship between digital competence and the capacity to innovate in a service.

3. Method

3.1 Sample

To test the research model, data were collected using an online cross-sectional survey questionnaire. Our sampling frame consisted of the UAE public and private sector service organizations. Using a non-probability purposive sampling (Etikan *et al.*, 2016), questionnaire links were forwarded to 700 professionals working in the service sector in the UAE through LinkedIn or emails from our contact list with a cover letter explaining the purpose of the study. The targeted respondents were the managers/supervisors working in these organizations, as they are the focal point in terms of implementation of the innovation processes and human resource allocations. Table 1 shows the characteristics of our respondents. We received a total of 188 complete responses, showing a response rate of 27%. Table 1 presents the study descriptive statistics. Most of the respondents were male (65.4%). The public sector (49.5%) had the highest representation, followed by the private sector (32.4%) and then the semi-government sector (18.1%). Approximately 70% of the respondents worked in large enterprises.

As this was a cross-sectional study using single source data, common method bias was a potential problem. We controlled for this issue by informing our respondents that their responses would be strictly confidential, and results would only be reported at the aggregate level. Moreover, Harman's single-factor test was done to detect common method bias *ex post* (Podsakoff *et al.*, 2003). Results did not show a unifactor solution, and the maximum variance of 40.5% was shown by any one factor, indicating the absence of common method bias.

3.2 Measurement instrument

The measurement items were derived from the existing literature. The scale for capacity to innovate in a service (SIC) was adopted from Jansen *et al.* (2006). In this reflective construct, six items measured exploratory innovation and six items measured exploitative innovation. Items to measure human capital (HCA) were adopted from the intellectual capital scale developed by Subramaniam and Youndt (2005). The digital competence skills (DCS) scale comprising 16 items was adapted from Van Laar *et al.* (2017). All items were measured using a Likert scale from 1 = strongly disagree to 7 = strongly agree. All the questionnaire items were modified to reflect the COVID-19 pandemic context. Please see Appendix for the questionnaire items.

4. Analysis and results

We used partial least square-based structural equation modeling (PLS-SEM) for the analysis using SmartPLS-3 software. PLS-SEM offers high predictive power in estimation of model relationships (Hair *et al.*, 2011). It can accommodate small sample sizes and does not make any normality assumptions (Hair *et al.*, 2017) and, hence, is deemed suitable for this study. In terms of sample size, our sample, comprising 188

			Service innovation capability
Factors	Sample (N = 188)	%	
<i>Gender</i>			717
Female	65	34.6	
Male	123	65.4	
<i>Age</i>			
20–25 years	13	6.9	
26–31 years	27	14.4	
32–37 years	40	21.3	
38–43 years	44	23.4	
44–49 years	31	16.5	
50–55 years	25	13.3	
56–61 years	5	2.7	
Above 61 years	3	1.6	
<i>Education level</i>			
Diploma	2	1.1	
College	2	1.1	
Bachelor	84	44.7	
Master	84	44.7	
Doctoral	16	8.5	
<i>Job level</i>			
Executive	10	5.3	
Senior managers	53	28.2	
Middle managers	44	23.4	
Junior managers	20	10.6	
Supervisors	61	32.4	
<i>Years of experience</i>			
0–5	35	18.6	
6–11	42	22.3	
12–17	41	21.8	
18–23	32	17.0	
Above 23	38	20.2	
<i>Sector</i>			
Private sector	61	32.4	
Public sector	93	49.5	
Semi-government sector	34	18.1	
<i>Type of services</i>			
Mix of product and service (solutions)	67	35.6	
Product	19	10.1	
Service	102	54.3	
<i>Organization size</i>			
Between 50–250 employees (medium enterprise)	37	19.7	
Less than 50 employees (small enterprise)	20	10.6	
More than 250 employees (large enterprise)	131	69.7	
Source: Author's own creation			Table 1. Descriptive statistics of the sample and respondents

responses, exceeded the ten times rule for PLS-SEM analysis that dictates that the sample size should be equal to or larger than ten times the maximum number of structural paths pointing to a particular latent construct in the structural model (Hair *et al.*, 2017).

4.1 Measurement model

The measurement model was analyzed to establish the constructs' reliability, convergent validity and discriminant validity. First, the item loadings were examined for indicator reliability. For each construct, the items with a loading value below the threshold of 0.7 were dropped and the remaining items with loadings above 0.7 were retained for further analysis (Hair *et al.*, 2019) (Table 2).

Next, internal consistency was established using composite reliability (Hair *et al.*, 2017) with results showing values within the acceptable range of 0.7–0.95 (Nunnally and Bernstein, 1994). The Cronbach's alpha values were also found to exceed the threshold of 0.7. Moreover, the average variance extracted values were greater than 0.5, indicating that the convergent validity criterion was also satisfied (Hair *et al.*, 2017). These results are summarized in Table 3.

For discriminant validity, the cross-loadings of indicators were examined. The results showed that each item loaded much higher on its related construct and low on other constructs (Farrell, 2010). Next, in the Fornell–Larcker criterion results, the square root of the average variance extracted of the constructs on the diagonal were greater than the

Table 2.

Item loading table

Constructs	DCS	HCA	SIC
DCS6	0.734		
DCS7	0.707		
DCS10	0.721		
DCS11	0.729		
DCS15	0.814		
DCS16	0.745		
HCA1		0.885	
HCA2		0.822	
HCA3		0.730	
HCA4		0.788	
HCA5		0.920	
SIC1			0.743
SIC9			0.716
SIC10			0.860
SIC11			0.719

Source: Author's own creation

Table 3.

Assessment of
reliability,
convergent and
discriminant validity

Constructs	DCS	HCA	SIC
DCS	0.743		
HCA	0.641	0.832	
SIC	0.620	0.703	0.762
Average variance extracted	0.551	0.692	0.580
Cronbach's alpha	0.880	0.919	0.845
Composite reliability	0.882	0.923	0.852

Note: The first three rows show $\sqrt{AVE}$ on the diagonal for Fornell–Larcker criterion

Source: Author's own creation

correlation coefficients for other constructs (Table 3). Finally, heterotrait-montotrait ratio test was conducted whereby a value above 0.9 indicates a lack of discriminant validity, and the value of 1 should not fall between the confidence intervals of the heterotrait-montotrait ratio (Henseler *et al.*, 2015). Results presented in Table 4 indicate that values were within the acceptable range showing a good discriminant validity.

4.2 Structural model

First, the collinearity of the endogenous constructs with the predictors was evaluated using the variance inflation factor. The variance inflation factor value for inner model was 1.698, that is, below the threshold of 5 (Hair *et al.*, 2017), suggesting that there were no collinearity issues.

The structural model was evaluated using the coefficient of determination (R^2), predictive relevance (Stone–Geisser Q^2) and the effect size f^2 of path coefficients. A bootstrap analysis with 5,000 resamples was run to obtain the significance of the estimates. Table 5 summarizes the structural model results. As depicted in Figure 2, a firm's DCS is found to have a positive and significant relationship with the SIC ($H1$) ($\beta = 0.287$, $t = 2.152$ and $p < 0.05$) as well as with the firm's HCA ($H2$) ($\beta = 0.641$, $t = 8.957$ and $p < 0.05$). Moreover, a firm's HCA is found to have a significant positive relationship with the SIC ($H3$) ($\beta = 0.519$, $t = 3.846$ and $p < 0.05$). The structural model explains 41.1% of the variance for HCA ($R^2 = 0.411$) and 54.3% of the variance for SIC ($R^2 = 0.543$). As the R^2 values of 0.75, 0.50 and 0.25 represent substantial, moderate and weak explanatory power, respectively (Henseler *et al.*, 2009), our model values were in the small to moderate range. Next, we examined the effect size f^2 to determine the contribution of the exogenous construct to the endogenous latent variable, where values higher than 0.02, 0.15 and 0.35 depict small, medium and large f^2 effect sizes, respectively (Cohen, 1992). Table 5 shows our model's effect size values with values ranging from small to large effect sizes.

Constructs	DCS	HCA
HCA	0.637 [0.488–0.771]	
SIC	0.621 [0.465–0.759]	0.699 [0.570–0.812]

Source: Author's own creation

Table 4.
Heterotrait-montotrait ratio table

Structural path	Effect	t^a value	f^2	Ratio to total effect (%)	Bias corrected 95% confidence interval	Conclusion
DCS $\rightarrow$ SIC	0.287	2.152*	0.106	46	[0.043–0.550]	$H1$ supported
DCS $\rightarrow$ HCA	0.641	8.957***	0.698	100	[0.488–0.769]	$H2$ supported
HCA $\rightarrow$ SIC	0.519	3.846***	0.347	100	[0.235–0.758]	$H3$ supported
DCS $\rightarrow$ SIC via HCA	0.333	3.794***		54	[0.169–0.522]	$H4$ supported
Total effect DCS $\rightarrow$ SIC	0.620	6.868***		100	[0.169–0.522]	

Notes: ^a*Significant at $p < 0.05$; **significant at $p < 0.01$; ***significant at $p < 0.001$ (two-tailed test)

Source: Author's own creation

Table 5.
Structural model results

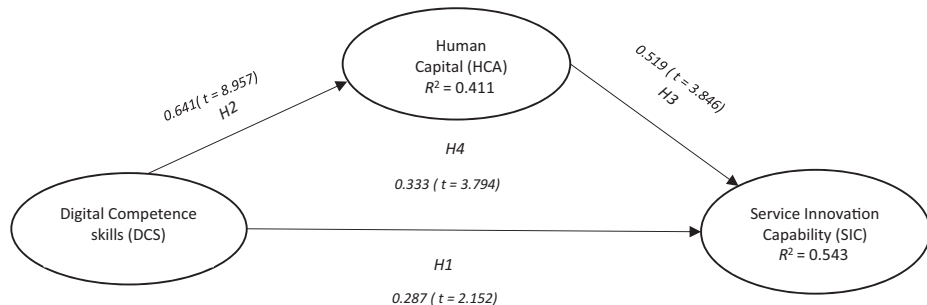


Figure 2.
Structural model

Source: Author's own creation

Finally, the Q^2 values were examined to establish predictive relevance of the exogenous variables (Geisser, 1974). Using the blindfold procedure, the Q^2 value shows how well the path model can predict the originally observed data values (Hair *et al.*, 2019), with a value of $Q^2 > 0$ showing predictive relevance. Our results showed both SIC ($Q^2 = 0.275$) and HCA ($Q^2 = 0.317$) satisfied this requirement. Moreover, model fit was examined by looking at the composite-based standardized root mean square residual value. The model fit was confirmed as the model generated the test value of 0.058 which was below the threshold of 0.08 (Henseler *et al.*, 2016).

4.3 Mediation analysis

Mediation analysis was performed to test whether the impact of DCS on SIC is mediated by HCA (H4). The results (Table 5) revealed that the direct relationship (DCS $\rightarrow$ SIC) was significant ($\beta = 0.287$, $t = 2.151$ and $p < 0.05$). The indirect effect of DCS on SIC through HCA (DCS $\rightarrow$ HCA $\rightarrow$ SIC) was also found significant ($\beta = 0.333$, $t = 3.794$ and $p < 0.05$). This showed that the relationship between DCS and SIC was partially mediated by HCA (Hair *et al.*, 2017).

5. Discussion

This research investigated the relationship between employees' digital competence skills and the capacity to innovate in a service during the COVID-19 pandemic within the UAE context. The study also investigated the mediation effect of human capital on the relationship between digital competence and capacity to innovate. The dynamic capabilities theory served as the study's theoretical foundation. The results of our empirical study supported the proposed hypotheses with human capital being a partial mediator of the relationship between the employees' digital competence and their capacity to innovate.

The study's results are similar to previous studies that found a positive relationship between digital competence and innovation capability (Battour *et al.*, 2022; Mazurchenko and Zelenka, 2022; Van Laar *et al.*, 2017; Vieru *et al.*, 2015). The results also reaffirm previous studies that indicate that digital skills enhance employee's skills and experience. In addition, human capital can improve a firm's capacity to innovate (Cetindamar and Phaal, 2017; Van Laar *et al.*, 2020). However, most of the recent research on innovation in the service sector focused on Western regions, with little research investigating emerging markets (Bodolica *et al.*, 2020). This study attempts to test the interplay of the above-mentioned variables within a Middle Eastern context, namely, UAE during a challenging time where COVID-19

pandemic was dictating unprecedented changes in the service sector. We now present the discussion of the main findings and then the practical implications of this study.

The result of the study support *H1* reiterating findings from previous studies that digital competencies of employees in a firm can help advance a firm's innovation capability during a pandemic or other crises (Chadwick *et al.*, 2015; Sjödin *et al.*, 2020; Parida *et al.*, 2019; Voogt and Roblin, 2012). The result also shows that while digitalization is generally considered important, the relationship between the employees' digital competence and the capacity to innovate determines the firm's capacity to adapt to a challenging environment such as COVID-19 pandemic. Successful management of a firm during uncertain times such as a pandemic requires service firms to deliver the best digital service solution based on evolving customers' needs. For this, firms are required to compare various alternatives, understand the value chain and be as cost-effective as possible. This approach can be seen as a dynamic capability in itself (Teece, 2018).

The results of the study also support *H2* showing that digital competence is significantly related to human capital. The ongoing changes within firms and in the economy during the pandemic acknowledges the importance of human capital competencies. Human capital becomes the most competitive and rarest resource in the development of high-tech industries and the formation of the digital economy. The ongoing digitalization processes have an impact on the formation and development of human capital. People become the main factor in production. Their knowledge, skills and competencies in information technology become the driving force in sustaining the firms' competitive advantage (Marsh, 2018). Thus, this hypothesis is aligned with the literature that emphasizes the importance of human capital development and stresses the need for high level of digital skills and the ability to adapt to a new way of thinking allowing users to work intuitively in the digital environment. In addition, the quality of human capital in the context of digitalized firms includes such characteristics as the ability to use computer programs, independence, creativity, new competencies, knowledge and skills (Zaborovskaia *et al.*, 2020).

Previous research indicates that employees' digital skills could contribute to successful adoption of technology during uncertainty. Thus, firms need to invest in not only technology but also the people and skills that enable the workforce to use it to the best advantage. This enables "digital dexterity," or the ability for the firm as a whole to move swiftly to exploit new digital opportunities (Soule *et al.*, 2016). Digital skills have been highlighted among the factors that enable employees to operate effectively in the digital workplace. It can enable them to quickly and conveniently access information, collaborate with others, share knowledge and solve problems more proficiently in technology-rich environments.

The supported result of *H3* is similar to previous findings (Mathew *et al.*, 2021; Oke *et al.*, 2012; Subramaniam and Youndt, 2005). We found that human capital plays an essential role in enhancing innovation capability. Human capital is expected to be related to innovation because highly skilled employees are likely to learn technology faster, apply more knowledge in solving problems and contribute more creative solutions than less-skilled employees (Takeuchi *et al.*, 2007). Human capital, therefore, in service organizations is expected to enhance the service by enabling employees to use skills that challenge the current methods and generate new knowledge. In addition, in service firms, employees' competence, skills and creativity can be used to produce rare and hard to copy efficient service delivery (Skaggs and Youndt, 2004; Susskind *et al.*, 2003).

The results of *H4* support a partial mediation. This highlights the importance of human capital especially during a crisis. This result reemphasizes findings from previous studies that have stressed the important role that human capital plays in shaping firms' innovative

capacities (Bornay-Barrachina *et al.*, 2017; Wang *et al.*, 2011). The COVID-19 crisis highlights the need to be resilient, rapid and decisive in such a turbulent environment to facilitate the human capital to adapt to the new digital working environment (Blaique *et al.*, 2022b). The current study draws attention to the importance of human capital in facilitating the relationship between the digital competence and the capacity to innovate in a service. This supported hypothesis also stresses the dynamic nature of the capacity to innovate in a service where innovation is needed. Time should be given to get the benefits needed for the organization through training or hiring of new staff. This finding also reaffirms the important role that digital competence plays in enhancing an employee's human capital as also indicated by previous studies (Mazurchenko and Zelenka, 2022; Prajogo and Oke, 2016; Vieru *et al.*, 2015).

5.1 Theoretical contribution

The current study has contributed to theory in several ways. The study aimed to provide theoretical and empirical evidence for the existence and importance of dynamic capabilities in service firms. The results of this study have reiterated the importance of the theory's key concepts, namely, sensing opportunities, seizing opportunities and reconfiguring resources within the service sector.

The study has also aided in identifying key antecedents of dynamic capabilities, namely, digital competence and human capital, that may help to better understand how firms develop and maintain dynamic capabilities over time.

The study also reaffirmed the significance of the dynamic capabilities theory during crisis and challenging times, as the study's data were collected during COVID-19 pandemic. The study has also tested the applicability of the theory in UAE, a non-Western context. The current study on service innovation capability within UAE can help to understand how dynamic capabilities are affected by different contextual factors, such as industry characteristics, competition and technology pertaining to a specific context. By doing so, the study advances knowledge on why some firms are more successful at developing and maintaining dynamic capabilities than others.

5.2 Practical implications

The results of this study indicate the positive relationship between digital competence and service innovation capabilities. It also shows the role of human capital as a partial mediator of this relationship. Therefore, organizational leaders are advised to invest extensively in enhancing employees' digital capabilities if they wish to ensure a resilient, inclusive recovery from unexpected crisis. Managers play a significant role in improving employees' digital competencies to advance innovation capabilities within their organizations. Therefore, it is advised to provide employees with opportunities to learn and develop digital skills through formal training and education programs, as well as on-the-job learning experiences (Blaique *et al.*, 2022b; Santoso *et al.*, 2019). Managers are also encouraged to foster a supportive organizational culture that encourages employees to experiment with new technologies and digital tools and to share their learning with their colleagues. This has been shown to have a positive impact on employees' digital competencies, as well as on their motivation to innovate (Imron *et al.*, 2021). Managers are advised also to use technology to enable collaboration and communication among employees. The use of digital tools such as instant messaging, video conferencing and project management software can help to improve team collaboration and enhance employees' digital competencies (George *et al.*, 2020).

The study indicates that managers should focus on protecting human capital in times of crisis and provide a pathway to mitigate its worst impacts. They are advised to develop a clear strategy to deal with a sudden rise in demand for new digital skills for their employees. Finally, human resource managers are encouraged to take a more active role in contributing to the era of digitalization. They can facilitate skills development and rethink their policies and procedures for enhancing employees' human capital. Relying on technology as a solution to advance innovation for service firms requires new skills that are gained by retraining the existing proficient staff or by hiring qualified staff (Agarwal *et al.*, 2017). It is also important to acknowledge employees' initiatives to leverage their digital knowledge and encourage the talented ones to start their digital learning process quickly and enhance the firm's capability and performance (Blaique *et al.*, 2022b; Nylén and Holmström, 2015).

6. Limitations and future research areas

This study has several limitations. As the analysis was conducted using data from a sample of UAE firms, the generalizability of the findings may be limited. Future research is encouraged to explore other geographical contexts. Given the little research on innovation in service contexts overall and its relationship with digital competence, future research across several service industries would help determine if the innovation capability dimensions and their performance outcomes are industry-specific or are more generalizable.

Despite these limitations, the results of this study contribute to the literature and theory on how digital competence of employees affect the service innovation capability mediated by human capital during the COVID-19 pandemic. We believe that these results provide insights into the underlying theoretical logic linking the three constructs together.

7. Conclusion

This study empirically tests the relationship between the digital competence and the capability to innovate in the service sector in the UAE during COVID-19 pandemic. It also examines if this relationship is mediated by human capital. Using PLS-SEM, the study analyzed data collected from 188 service sector professionals in UAE. The results show that there is a significant positive relationship between digital competence and the capacity to innovate in a service. The results also indicate that human capital partially mediates the relationship between digital competence and capacity to innovate. The results of the study reiterate how important it is for organizations to dynamically act in the face of unexpected circumstances. It also stresses the importance of strategically using resources such as digital competence and human capital to drive innovation.

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Appendix. Measurement scales

Service innovation capability (SIC)

(Likert Scale: 1 = Strongly Disagree to 7 = Strongly Agree)

Comparing to normal working days, in COVID- 19 your organization

- SIC1 accepts demands that go beyond existing products and services;
- SIC2 invents new products and services;
- SIC3 experiments with new products and services in the local market;
- SIC4 commercializes products and services that are completely new to the unit;
- SIC5 uses new opportunities in new markets;
- SIC6 uses new distribution channels;
- SIC7 refines the provision of existing products and services;
- SIC8 implements small adaptations to existing products and services;
- SIC9 introduces improved, but existing products and services for our local market;
- SIC10 improves our provision's efficiency of products and services;
- SIC11 increases economies of scales in existing markets; and
- SIC12 expands services for existing clients.

Human capital scale (Likert scale: 1 = strongly disagree to 7 = strongly agree)

During the COVID-19 pandemic, your colleagues/employees at your organization can be described as

- HCA1 being highly skilled;
- HCA2 being widely considered the best in our industry;
- HCA3 being creative and bright;
- HCA4 being experts in their particular jobs and functions; and
- HCA5 being able to develop new ideas and knowledge.

Digital skills

How can you describe the easiness of doing the following on your mobile phone?

(Likert Scale: 1 = Extremely Difficult to 7 = Extremely Easy)

Technical

- DCS1 I understand the characteristics of (mobile) devices or applications.
- DCS2 I operate basic (mobile) application operations and access resources for everyday use.
- DCS3 I access resources for everyday use.
- DCS4 I avoid losing orientation when navigating online.

I can use information technology to: (1 = not confident at all to 7 = very confident)

Information management

- DCS5 judge the usefulness and sufficiency of information for a specific purpose; and

DCS6 organize information to be able to find it later.

Communication

DCS7 communicate information and ideas effectively to multiple audiences using a variety of media and online formats; and

DCS8 generate meaning through exchanges using a range of contemporary ICT tools.

Creativity

DCS9 generate ideas; and

DCS10 develop new ways of doing things.

Critical thinking

DSC11 ask and answer questions of clarification related to the problem;

DSC12 judge the suitability of a source for a given problem;

DSC13 invoke arguments for claims based upon their consistency with other knowledge claims (e.g. personal, memory, testimony, coherence, rationality and replication); and

DSC14 link facts, ideas and notions.

Problem-solving

DSC15 apply my knowledge about the problem to find a solution; and

DSC16 apply the written knowledge (i.e. books or websites) about the problem to find a solution.

About the authors

Lama Blaique has a PhD in Business Management from the British University in Dubai. She currently fills the position of Assistant Professor of Business Management at the American University of Dubai. She has over 15 years of experience in the fields of academia and executive research in the GCC and Levant region. Her research interests are in the areas of organizational behavior, human resources and gender and diversity. She has several publications in peer-reviewed journals. She serves as a Journal Reviewer and is a member of the Academy of International Business (AIB). Lama Blaique is the corresponding author and can be contacted at: blaiquelama@gmail.com

Dr Taghreed Abu Salim is a high-performing professional with more than seven years of experience in teaching Business Management topics such as Service Innovation, Operations Management and Service Management. Her extensive experience includes teaching in traditional and fully online/mixed programs, doing active research, supervising PhD candidates and providing academic leadership. An important contribution Dr Salim makes to COBA is her familiarity with the industry, locally and globally. This industry experience, especially after COVID-19, has led her to work on developing a Master's degree program in Digital Transformation over the past two years. She was honored to develop it as part of COBA and looks forward to launching it soon in collaboration with industry.

Dr Farzana Asad Mir is an Assistant Professor in the Faculty of Business and Law and has expertise in the areas of project management and organizational leadership. She is also the Director of BUiD Doctoral Training Centre. Dr Mir's research interests are broadly within the field of management, and she is particularly interested in examining the individual and team-level factors that may play a role in improving project and organizational performance. Other areas of interest are accountability arrangements, management control systems, institutional theory and change management. Her academic research interests are augmented by more than 15 years of professional work experience in the fields of project management and quality assurance.