How do digital capabilities affect firm performance? The mediating role of technological capabilities in the "new normal"

Jorge Heredia[a,*], Mauricio Castillo-Vergara[b], Cristian Geldes[c], Felix M. Carbajal Gamarra[d], Alejandro Flores[e], Walter Heredia[f]

[a] School of Business, Universidad del Pacífico, Calle Sánchez Cerro 2141, Jesús María, Lima 11, Perú
[b] Departamento Gestión y Negocios. Universidad Alberto Hurtado. Erasmo Escala 1835. Oficina 206. Santiago. Chile
[c] Faculty of Economics and Business, Universidad Alberto Hurtado. Erasmo Escala 1835, Santiago, Chile
[d] Energy Engineering, University of Brasilia, FGA-UnB, St. Leste Projeção A - Gama Leste, Brasília 72444-240, DF, Brazil
[e] School of Business, Universidad del Pacífico, Calle Sánchez Cerro 2141, Jesús María, Lima 11, Perú
[f] Facultad de Economía y Negocios, Universidad del Desarrollo, Santiago Chile

ARTICLE INFO

ABSTRACT

This study proposes a model to explain the effect of digital capabilities on firm performance in the "new normal" context from a firm-level perspective. Moreover, it analyzes the mediating role of technological capabilities and the Human Development Index (HDI) in explaining firm performance. Our study used data from the World Bank's Enterprise Surveys 2020, which included 999 firms from 27 countries. We applied the methodological approach, partial least square structural equation modeling (PLS-SEM), to test the hypothetical model. The results show that digital capabilities positively influence firm performance only through technological capabilities. We also empirically demonstrate that digital skills in low HDI economies have a more significant indirect effect on firm performance than in high HDI countries. Finally, some promising avenues for future research and implications for managers and policymakers are suggested based on these findings.

© 2022 The Author(s). Published by Elsevier España, S.L.U. on behalf of Journal of Innovation & Knowledge.
This is an open access article under the CC BY-NC-ND license
(http://creativecommons.org/licenses/by-nc-nd/4.0/)

Introduction

Companies are increasingly becoming aware of adapting to "new normal" challenges through their activities, strategies, and routines (Loureiro, Ferreira & Simões, 2021). Firms have begun to optimize and improve their processes' efficiency through digital tools to ensure business continuity. Thus, digital capabilities are gaining popularity due to a changing and turbulent environment (Zhen, Yousaf, Radulescu & Yasir, 2021).

However, our literature review indicates no consensus on the relationship between digital capabilities and firm performance (Martínez-Caro, Cegarra-Navarro and Alfonso-Ruiz, 2020). Some studies argue that digital capabilities positively affect a firm through reduced costs and increased flexibility (Drnevich & Croson, 2013). The more a firm is equipped with these resources and the more effectively it can use them, the more likely it is to develop a more complex and advantageous strategy (Wang, 2007). However, there is evidence that digital capabilities have little or no effect on firm performance Usai et al. (2021). argue that a firm's innovative performance is not the result of digital capabilities but creativity and constant efforts in research and development activities. It appears that recent research is "hard-pressed" to present evidence for a positive relationship between digitization and firm performance (Tan, Pan & Hackney, 2010). This shows that digital capabilities alone are insufficient for achieving a successful innovative performance.

The lack of evidence to establish a positive relationship between digital capabilities and firm performance is due to the limitations of the studies to explain their mechanisms. Similarly, previous research does not explain the internal mechanism of reconfiguration from a firm's perspective to increase innovation and firm performance (Salomo, Talke & Strecker, 2008). Therefore, our study seeks to fill this gap by analyzing companies' success in this "new normal" by increasing firm performance and digital transformation. In addition, in a manner similar to motivation, this study seeks to understand how digital transformation affects firm performance.

* Corresponding author.
E-mail addresses: ja.herediap@up.edu.pe (J. Heredia), mhcastillo@uahurtado.cl (M. Castillo-Vergara), cgeldes@uahurtado.cl (C. Geldes), fcarbajal@unb.br (F.M. Carbajal Gamarra), Flores_ja@up.edu.pe (A. Flores), wherediah@udd.cl (W. Heredia).

Therefore, this study proposes that technological capabilities play an essential role. Recent studies have endeavored to understand the relationship between technological and digital capabilities Zhen et al. (2021). explain how management capabilities influence digital capabilities and firm performance. Similarly, David-West, Iheanachor and Umukoro (2020) observed digital capabilities' failure in Nigeria and suggested that these technologies need other capabilities to achieve organizational goals. In this regard, in the present environment of constant change due to digitization, technological capabilities require adaptation at the same pace as digital capabilities (Lee & Trimi, 2018).

Due to the spectacular increase in digital technology in this "new normality" (Soto-Acosta, 2020), the concept of collaborative economy allows a greater adoption of digitization in companies by reducing costs and increasing firm performance.

Additionally, the effects of the COVID-19 pandemic vary from country to country. In countries with a low human development index (HDI), firms faced recovery problems during the pandemic due to inadequate infrastructure, scarce public health resources to vaccinate, and the development of informal work, which made them use massive digital platforms through mobile applications (gig economy) to overcome these institutional voids. However, countries with a high HDI responded rapidly during the pandemic using the more efficient capacity, which was built before the onset of COVID-19 (Caballero-Morales, 2021 Egger et al., 2021;).

Therefore, such countries reinforce the idea that digital capabilities play a vital role in new normality. Thus, these questions arise: (i) What is the mechanism by which digital capabilities can affect firm performance in accelerated digital transformation in the context of the new normal? More specifically, what are the mediating factors in the effect of digital capabilities on a firm's performance in the context of accelerated digital transformation by the new normal? (ii) Does the impact of digital capabilities get mediated more significantly by technological capabilities in countries with a low level of development (HDI)? We extended the dynamic capabilities theory and used a partial least squares structural equation model (PLS-SEM). In addition, this study used a sample of 999 private companies from 27 countries. We obtained the data from the World Bank Enterprise Surveys, 2020.

Our study presents several significant results and conclusions. First, technological capabilities mediate between digital capabilities and firm performance. In other words, technological capabilities complement digital capabilities to operationalize a firm's value proposition (Wang, 2007). Second, we moved forward in including the context in our relationship. We employed the HDI as a moderating variable. This study considers HDI by country (PNUD, 2020). The HDI measures each country's level of development based on variables, such as life expectancy, education, and income per capita (UNDP). Surprisingly, we found that the impact of digital capabilities on innovation and technology in countries with a low HDI is much more significant than that in countries with a high HDI.

Following our results and conclusions, we propose a new model that emphasizes the interaction between digital and technological capabilities in the "new normal" context. It also analyzes the moderating effect of the HDI to distinguish between high and low HDI economies.

Theoretical framework and development of hypotheses

The "new normal" is considered the great accelerator for the existing global trend toward adopting modern emerging technologies that set the tone for transformations in lifestyle, work patterns, and business strategies (Amankwah-Amoah, Khan, Wood & Knight, 2021). Therefore, it represents a significant change in the environment and the building of new technological innovation capabilities (Zhou et al., 2021).

Previous studies have found the use of specific capabilities of a firm and its reconfiguring role of other capabilities and resources, such as information technology (IT) (Grewal, Comer & Mehta, 2001), artificial intelligence, machine learning (Gordini & Veglio, 2017), the use of virtual reality (Boyd & Koles, 2019), videoconferencing (Hardwick & Anderson, 2019), and internet (Avlonitis & Karayanni, 2000), among others.

This study employed the dynamic capabilities theory (Teece, 2007), developed as an extension of the resource-based view (RBV) (Burisch & Wohlgemuth, 2016). Thus, the definition depended on how firms reconfigure and renew their resources and capabilities over time in turbulent environments (Teece, Pisano & Shuen, 1997). However, recent literature on dynamic capabilities still has a long way to go before constituting a solid integrated framework. In addition, despite the great efforts previously made (Eisenhardt & Martin, 2000a Teece, 2007; Zollo & Winter, 2002;), still present an incipient measurement (Loureiro et al., 2021).

Therefore, our study aims to analyze digital capabilities as a third-order capability that allows the activation of technological capabilities, ensuring an exemplary implementation of a company's value proposition. Indeed, dynamic third-order capabilities emphasize a firm's constant search for reconfiguration and recreation of resources and core capabilities to cope with a changing environment (Wang, 2007).

However, there is still not enough empirical evidence that seeks to explain the relationship between dynamic capabilities and firm performance (Baía & Ferreira, 2019) in the "new normal" context. Thus, a study argues that dynamic capabilities are necessary but insufficient to achieve firm performance ((Baia, Ferreira and Rodrigues, 2020).

In this sense, we consider that an empirical study on dynamic capabilities still needs to be conducted. The review establishes that most studies discuss the relationship between dynamic capabilities and firm performance (Loureiro, Ferreira and Simões, 2021). Ferreira and Fernandes (2017) argue that a good combination of resources and capabilities allows firms to achieve a competitive advantage that generates high performance Wilden and Gudergan (2015). argue that dynamic capabilities (precisely, technological capabilities) have a positive impact on firm performance. However, previous studies have found a negative relationship between digital capabilities and firm performance (Usai et al., 2021). This is because a firm's innovative performance results from creativity and constant research and development activities. It follows that digital capabilities are not the central axis for achieving success in firm performance (Usai et al., 2021).

Based on these antecedents, we present a theoretical model for this study, as shown in Fig. 1.

Interaction between digital and technological capabilities in the "new normal"

Technological capabilities refer to a firm's ability to develop new products and services by aligning its strategy with innovative processes (Wang, 2007). Such capabilities involve knowledge and skills in acquiring, using, absorbing, adapting, improving, and generating new technologies (Bell & Pavitt, 1995 Malhotra, Mathur, Diddi & Sagar, 2021;). These capabilities have enabled the development of new products and technologies, improving manufacturing processes and quality control skills, and predicting technological changes in the industry (DeSarbo, 2005).

Similarly, as a system, digital capabilities are provided through another supplier-user interaction that creates value, also defined as a digital output or service (Srivastava & Shainesh, 2015). Kohli and Grover (2008) defines it as the internal capability to provide customer information at the required instant. According to Lyytinen, Yoo and Boland (2016), digital capabilities are digital
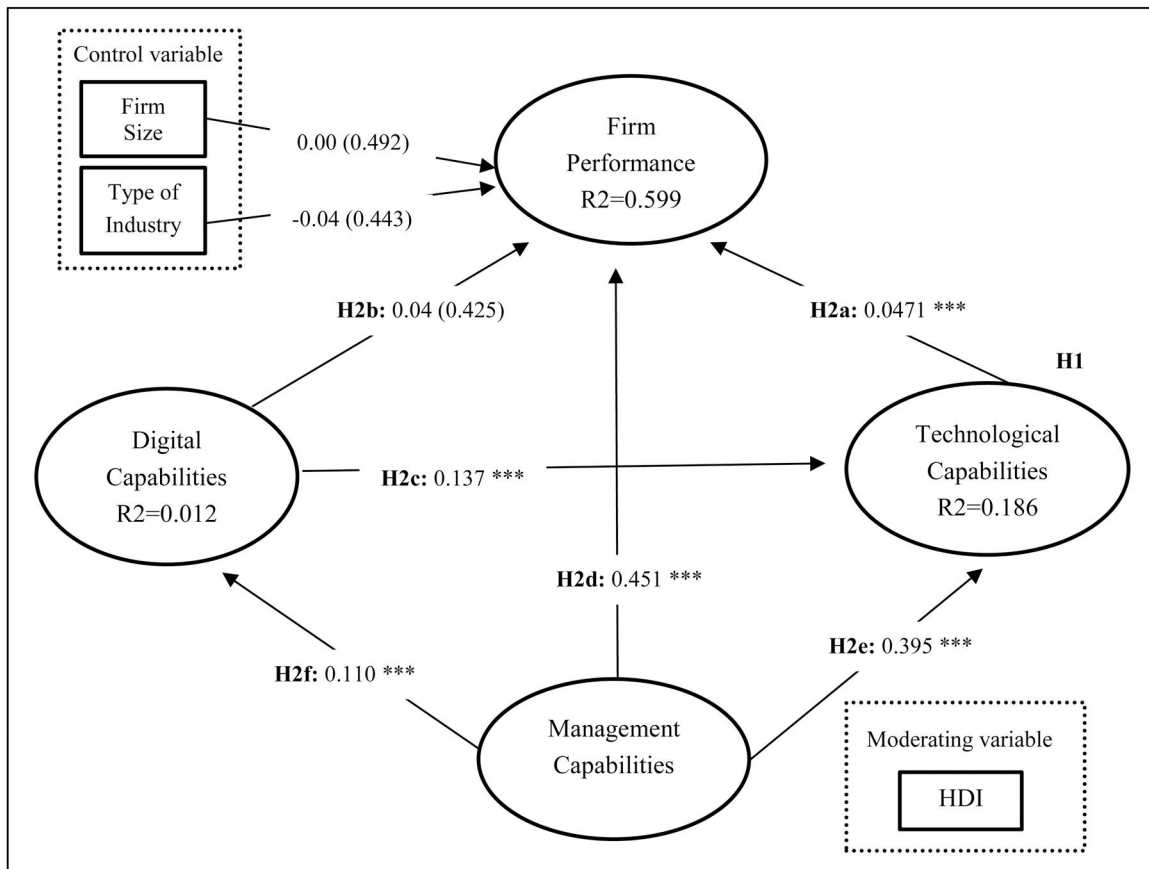
Fig. 1. Structural model results
  *Note: Significance level: ***p<.01.*
Source: Own elaboration

systems that generate new outcomes and structures without uncoordinated participation of third-party actors and without deliberate planning by the system creator. Consistent with Yoo, Boland, Lyytinen and Majchrzak (2012), multiple products or subsystems can be designed and controlled using the same digital tools.

Technological capabilities have enabled organizations to create opportunities to support their competitive advantage. In this regard, understanding the dynamics that influence the adoption of digital technologies becomes critical to their success El-Haddadeh (2020). examines the specific aspects of digitization that affect technology adoption in organizations Karimi and Walter (2015). analyze the impact of dynamic capabilities on digital disruption in firm performance. Digital disruption reduces intermediation costs (Sutherland, 2018) and incorporates technology more efficiently (Karimi & Walter, 2015).

In this sense, recent empirical studies have left the relationship between digital capabilities and firm performance ambiguous Torres, Sidorova and Jones (2018). highlight the role of business intelligence and analytics (BI&A) and its positive connection with firm performance from the perspective of dynamic capabilities. However, Usai et al. (2021) and Chen, Lin, Chen, Chao and Pandia (2021) propose that companies reshape their capabilities to meet new market demands by adopting digital transformation as their primary organizational strategy. This environment can also be presented to IT capabilities (Grewal, Comer and Mehta, 2001), artificial intelligence and machine learning (Gordini & Veglio, 2017), use of virtual reality (Boyd & Koles, 2019), video conferencing (Hardwick & Anderson, 2019), and the internet (Avlonitis & Karayanni, 2000), among others, that act as reconfiguring capabilities and resources within an organization. Given the reconfiguring role of digital capabilities in

other capabilities, we proposed that digital capabilities, as third-order capabilities, do not positively affect firm performance; instead, this relationship can be harmful.

Thus far, there is evidence that digital dynamic capabilities, which complement other capabilities, have a positive relationship with firm performance Soluk, Miroshnychenko, Kammerlander and De Massis (2021). studied the role of dynamic capabilities as mediators in the relationship between family influence and digital business model innovation (BMI) and the moderating role of environmental dynamism. Similarly, Khin and Ho (2019) examined the effect of digital orientation and capability on digital innovation and their mediating impact on the link between firm performance, digital direction, and digital capability. However, the present study includes new variables such as management and digital capabilities. Additionally, the interaction of HDI (moderating variable) with digital capabilities, technological capabilities, and firm performance has emerged in response to the "new normal."

The fundamentals of ensuring a successful adoption process depend on how organizations can identify the need to adopt such technological innovations (Kim, 2015). Hence, there is a need to adopt digital tools to improve the effectiveness of organizational functions and processes (Osmonbekov, Bello & Gilliland, 2002). Digital capabilities allow us to take advantage of a large amount of information from the environment and incorporate the technology more efficiently according to an organization's value proposition (Gobble, 2018).

In this "new normal," Almeida, Santos and Monteiro (2020); propose indications of the impact of digital capabilities in three business areas in the new normality: labor and social relations, marketing capabilities, and technological capabilities. Based on the above, digital

technology combines technological capabilities to meet an organization's objectives.

Digital tools have allowed companies to permanently capture significant volumes of information regarding consumers in recent years. In this sense, the development of digital capabilities acquires relevance in organizations, allowing the use of information to reduce the cost structure and redesign their processes. Consequently, technological capabilities are activated by digital ones, improving the quality of products and services provided and, therefore, improving firm performance (Ciampi, Demi, Magrini, Marzi & Papa, 2021).

This study considered that digital capabilities enable the identification of signals from the environment and as the main complement to other capabilities. Likewise, third-order capabilities allow for the activation of resources and inferior capabilities. Thus, the following hypothesis is proposed:

H1: Technological capabilities have a mediating effect between digital capabilities and firm performance.

Collaborative economies, the level of development of countries, and digital capabilities

Collaborative economies are emerging and growing through the possibility of developing or transforming new activities in emerging economies. Collaborative economies help to reconfigure capabilities and resources through digital technologies (Malik, 2020). Similarly, developing new capabilities in companies can lead to disruptive opportunities Fainshmidt, Pezeshkan, Lance Frazier, Nair and Markowski (2016). argue that new capabilities contribute more significantly to firm performance in emerging economies than in developed ones. Institutional factors such as informality and institutional gaps promote collaborative economies in emerging markets (Boateng, Kosiba & Okoe, 2019 Heredia, Geldes, Kunc & Flores, 2019;).

Therefore, collaborative economies have more significant advantages in emerging economies because of their lower levels of investment and more straightforward implementation (Dokko, 2015). Thus, in economies with a low level of development, the use of collaborative economies significantly reduces intermediation costs (Dokko, 2015).

Thus, it can be said that emerging economies have a low HDI. The initial premise of this index was that national development should include both life expectancy and literacy. Amartya Sen is the pioneer of this approach, and it is a widely known concept of human welfare or development. Emerging economies with a low level of HDI present high levels of creativity, and collaborative economies are growing in emerging economies (Vega-Muñoz, Bustamante-Pavez and Salazar-Sepúlveda, 2019). The development of a collaborative economy in emerging economies requires less complexity in the design of these tools than in developed economies. HDI represents the level of public health infrastructure (Ross & Wu, 1996), inequality, and poverty (Leung, Sharma, Adithipyangkul & Hosie, 2020).

During the pandemic, the term "gig economy" became popular due to the growth of digital platforms and apps. In this sense, the rapid spread of digital technology has generated new economic activities. A study argues that the pandemic positively impacted the "gig economy" (Umar, Xu & Mirza, 2021). In addition, communication technologies, digital platforms, and apps have allowed people with a computer, cell phone, and internet connection to perform jobs from anywhere in the world (Anwar & Graham, 2021). Therefore, intensification of the gig economy in emerging countries with a low HDI generates new employment opportunities (PNUD, 2020). An essential aspect of the "gig economy" is that it offers non-traditional forms of work because there is no employer-employee relationship, achieving greater flexibility, as workers decide the hours and days they work.

The rapid growth of the "gig economy" in emerging economies (low HDI) is because there is a greater supply of informal workers in these economies as well as a greater adoption of temporary work by mobile applications driven businesses. In this sense, companies' digital capabilities increase, reducing business costs and increasing firm performance. Thus, we propose the following hypothesis:

H2: In countries with low HDI, the impact of digital skills on technological capabilities is more significant than in countries with high HDI.

Methodology

The data were obtained from the "Enterprise Survey – Covid19: Impact on firms" conducted by the World Bank 2020. We extracted data from a sample of 999 private companies that had participated in the survey. The sample is according to the adequate number of responses in the variables included in the study.

The countries considered in the sample are Guatemala, Bulgaria, Latvia, Moldova, Romania, El Salvador, Mongolia, Morocco, Honduras, Nicaragua, Czech Republic, Poland, Georgia, Estonia, Hungary, Slovak Republic, Italy, Croatia, Slovenia, Greece, North Macedonia, Portugal, Lithuania, Cyprus, Malta, Zimbabwe, and Zambia. We considered 27 countries to overcome the limitations of previous studies, which had considered a single country for analysis. Our research focused on studying a large group of countries to ensure adequate variability and robustness. This group of countries has one thing in common, that is, they have not produced vaccines for the pandemic.

In addition, the R-squared value improves when country effects are considered (Olczyk & Kuc-Czarnecka, 2021). Rocha (2021). indicates that it is necessary to consider a set of countries to understand the heterogeneous effects and improve the robustness of a model. Hence, we highlight that the selected sample was previously considered a missing data treatment of up to 50% missing values in the variables for each analyzed firm (Hair, Sarstedt, Ringle & Gudergan, 2017). Consequently, the companies that presented more than half of the variables as missing had to withdraw from the study. Note that the companies that participated in the survey belonged to manufacturing, retail, and other sectors.

We used the HDI (as a moderation variable), and the values corresponding to each country are shown in Table 7. We eliminated the possibility of heterogeneity bias in the sample (Motiwalla, Albashrawi & Kartal, 2019), using HDI as a moderating variable. We proposed HDI in 2020 as a moderating variable because it captures the actual effect of the pandemic, as HDI is an indicator of the previous level of preparedness of the countries. We also considered it a key variable because it allowed us to analyze the heterogeneity of countries. In this way, we tested our model in two clusters of countries, with lower and higher HDI, to better understand the intensity of pandemic damage (COVID-19) at the firm level; countries with lower HDI have suffered more due to the pandemic because they do not have sufficient financial resources, and vice versa (Caballero-Morales, 2021 Egger et al., 2021;). Therefore, the HDI is the only indicator that considers people's capacity to be affected by the COVID-19 pandemic (Mithani, 2020).

Definition of variables

The present study considered four variables through internal factors (resources and capabilities) and external factors (moderating HDI) that are relevant to firm performance in this "new normal."

The independent variable of the model was management capability. The mediating variables of the model were digital and technological capabilities. Finally, the dependent variable was firm performance. We emphasize that all the variables are constructs in which a series of indicators have been formed Table 1. shows descriptions of these variables.

Table 1
Definition of constructs and indicators.

Constructs	Indicators	Description	Variables and Scale				References
Management capabilities	Liquidity	Since the COVID-19 outbreak, has the liquidity or cash flow of this facility increased?	Dichotomous. "No"	1	"Yes"	0	Wernerfelt (1984) Westhead, Wright and Ucbasaran (2001)) DeSarbo (2005);
Technological capacity	Supply Variation	Comparing the supply of inputs, raw materials, or finished goods and materials purchased for resale from this establishment [insert last completed month] to the same month in 2019, did it increase (did they increase)?	Dichotomous. "No"	1	"Yes"	0	Bell and Pavitt (1995)·DeSarbo, 2005;
	Variation hours of operating	Comparing the total hours of operation of this facility per week [insert last full month] to the same month in 2019, did it increase (did they increase)?	Dichotomous. "No"	1	"Yes"	0	(Feng, Sun, Chen and Gao, 2020) DeSarbo (2005);
Digital capability	Online activity	Did this facility experience initiating or increased online business activity in response to the COVID-19 outbreak?	Dichotomous. "No"	1	"Yes"	0	Zhou and Wu (2010)
	Delivery	Did this facility experience an increase in the delivery or provision of goods or services in response to the COVID-19 outbreak?	Dichotomous. "No"	1	"Yes"	0	
	Remote work	Did this facility experience initiation or increased telecommuting of staff in response to the outbreak of COVID-19?	Dichotomous. "No"	1	"Yes"	0	
Firm performance	Demand variation	Comparing the demand for this establishment's products and services for [insert last completed month] to the same month in 2019, did it increase?	Dichotomous. "No"	1	"Yes"	0	Rolstadàs (1998)
	Change in sales	Comparing this establishment's sales for [insert last completed month] to the same month in 2019, did the sales increase?	Dichotomous. "No"	1	"Yes"	0	
Control variable	Type of industry	To which industry does the company belong: manufacturing, retail, or services?	Manufacturing Retail = 2 Services = 3		=1		Medase and Abdul-Basit (2020) Moretti and Biancardi (2020);
	Firm Size	At the end of December 2019, how many permanent, full-time employees did this establishment employ?	Continuous variable				Höflinger, Nagel and Sandner (2018) Clauss et al., 2021;

Source: Own elaboration.

Measures

We used the "Enterprise Survey – Covid19: Impact on firms." The World Bank designed this study to measure the effect of the virus on the countries considered in the sample. The measures used for each variable in the study were dichotomous. The constructs used were management capabilities, technological capacity, digital capabilities, and firm performance. The liquidity variable represents management capability. The measure of technological capabilities is the variation in operating hours and supplies—digital capabilities measured by online activity, delivery, and the adoption of remote work. Finally, firm performance refers to two items: change in sales and demand for goods and services (see Table 1).

All constructs were measured as mode A composites (Henseler & Schuberth, 2020). We analyzed the standard method to assess the quality of the information, which could improve the relationships between variables when collected from the same source. The analysis applying Harman's single-factor test (Podsakoff & Organ, 1986) did not reveal that the variables were grouped into a single factor, thus presenting no problems (Twigg, Kutzer, Jacob & Seaman, 2019).

We included the following control measures to eliminate the possible endogeneity of the omitted variable bias (Hamilton & Nickerson, 2003), which has been shown in the literature to impact firm performance. Size is measured using the number of employees in a firm (Clauss et al., 2021 Medase & Abdul-Basit, 2020; Moretti & Biancardi, 2020;). We also included industry-type dummy variables to represent the selected subsectors (manufacturing, retail, and services) (Clauss et al., 2021 Höflinger, Nagel & Sandner, 2018;). To detect and overcome the possible existence of unobserved heterogeneity bias due to unknown factors, we followed the proposal of Motiwalla, Albashrawi and Kartal (2019) and segmented the sample into different groups according to countries with high or low HDI.

Data analysis

We tested our research model using partial least squares (PLS) and the SmartPLS package (v.3.3.3) (Ringle & Sarstedt, 2016). We used PLS for the following reasons.

(1) The research model is complex, depending on the type of hypothesized relationships (direct, mediation, and moderation); (2)

It has the advantage of not imposing distributional assumptions for the indicators, and (3) The constructs included are composite (Chin, 2010 Sarstedt, Henseler & Ringle, 2011;). This model is also widely used to test theories using the dynamic capabilities approach (Ali, Javed & Danish, 2021 Ebrahimi, Hamza, Gorgenyi-Hegyes, Zarea & Fekete-Farkas, 2021; Frempong, Mu, Adu-Yeboah, Hossin & Adu-Gyamfi, 2021;).

The application of the PLS technique involves several steps, including model fitting, applying a bootstrapping process (10,000 subsamples), following bootstrap-based exact fit tests for the estimated model (Henseler, Ringle and Sarstedt, 2016). Further, we evaluated the measurement model by analyzing the fit of the saturated model (Müller, Schuberth and Henseler, 2018). Finally, the algebraic sign, magnitude, and statistical significance of the path coefficients were assessed and coefficients of determination (R^2) were evaluated (Ali, Rasoolimanesh, Sarstedt, Ringle & Ryu, 2018).

We tested the moderating hypothesis, H2, using multi-group analysis (Henseler & Fassott, 2010). We divided the sample into two groups: countries with a high or low HDI. Before comparing the path estimates between groups, it was necessary to ensure measurement invariance of the composites. Then, it was possible to ensure that the effect of HDI as a moderating variable in the model was due to the path coefficients of the structural model and not because of the parameters of the external model. A three-step procedure for analyzing the measurement invariance of composite models (MICOM) was used (Henseler, Ringle and Sarstedt, 2016).

Results

Measurement model

The indicator loadings of each construct were generally above 0.707, except for the online activity indicator, whose value was 0.664, which was slightly below the threshold. We retained to improve the explanation of the construct (Henseler & Schuberth, 2020). The composite reliability of the constructs was above 0.7, and AVE was above 0.5. Cronbach's alpha and rhoA values for the technological and digital capabilities constructs were slightly below the cutoff. However, we kept these indicators considering that a value above 0.5 may be sufficient (Taherdoost, 2016). We evaluated discriminant validity according to the Fornell-Larcker criterion (Fornell & Larcker, 1981) and heterotrait-monotrait ratio (HTMT) value (Henseler, Ringle and Sarstedt, 2016). These values are listed in Table 2.

Structural model

Following Hair, Sarstedt, Ringle and Gudergan (2017), to assess the statistical significance of the path coefficients, we used bootstrapping (10,000 resamples) to generate t-statistics, along with confidence intervals. The R^2 values for firm performance and

Table 3
Global model fit.

Estimated model	Original value	HI95-HI99
SRMR	0.030	0.026−0.030
Duls	0.050	0.037−0.049
Dg	0.012	0.012−0.015

Notes: SRMR: standardized root mean squared residual (SRMR); dULS: unweighted least squares discrepancy; dG: geodesic discrepancy; HI95: bootstrap-based 95% percentiles; HI99: bootstrap-based 99% percentiles.
Source: Own elaboration.

technological capability were significant Fig. 1. shows the results of this model. In total, only one of the direct effects was non-significant, whereas the other five were significant.

Finally, we followed the proposed measures to assess the goodness-of-fit of the estimated model (Dijkstra & Henseler, 2015). The standardized root mean square residual (SRMR) of the model was less than 0.10, as proposed in other studies (Ringle, Sarstedt & Straub, 2012 Williams, Vandenberg & Edwards, 2009;) Table 3. shows that the variances were not significant because the 99 percent bootstrap quantiles of the value of the three measures (SRMR, the unweighted least squares discrepancy dULS, and the geodesic discrepancy dG) were higher than the original values (Henseler, Ringle and Sarstedt, 2016), making the model explanatory.

To test the mediation hypothesis, H1, we applied the analytical approach described by Nitzl, Roldan and Cepeda (2016). We specified the indirect effect of digital capabilities on firm performance through technological capabilities. As shown in Table 4, digital capabilities do not directly affect firm performance. As (Usai et al., 2021) mentioned, we identified complete mediation by introducing technological capabilities, supporting the idea of Wang (2007) that technological capabilities complement digital capabilities. In addition, the results did not reveal heterogeneity bias for any of the controlled variables. Thus, Hypothesis 1 is accepted.

To test the moderating hypothesis, H2, concerning multi-group analysis, we used a measurement model invariance of composite models (MICOM) (Henseler, Ringle and Sarstedt, 2016). This approach

Table 4
Summary mediation effect.

		Percentile			
Direct Effects	Coefficient	Lower (2.5%)	Upper (95%)	Sig.	t-value
c' (Dig−>Perf)	0.004	−0.029	0.042	No sig.	0.175
a (Dig−>Tecn)	0.137	0.082	0.193	Sig.	4.076
b (Tecn −> Perf)	0.471	0.392	0.548	Sig.	9.91
Indirect effects	Point estimate				
a*b	0.064	0.037	0.096	Sig.	3.621

$p<.001$ (based on t (4999), one-tailed test.
Source: Own elaboration.

Table 2
Measurement model - Discriminant validity.

	Fornell−Larcker Criterion						Heterotrait−Monotrait Ratio (HTMT)					
	1	2	3	4	5	6	1	2	3	4	5	6
1. Firm Performance	**0,935**											
2. Technological Cap.	0,654	**0,850**					0,898					
3. Digital Cap.	0,137	0,169	**0,709**				0,203	0,285				
4. Management Cap.	0,645	0,411	0,105	**1000**			0,697	0,524	0,145			
5. Size	0,083	0,096	0,106	0,092	1000		0,090	0,121	0,143	0,092		
7. Sector	0,000	−0,001	0,075	−0,004	−0,102	1000	0,006	0,048	0,105	0,004	0,102	

Fornell−Larcker Criterion: Diagonal elements (bold) are the square roots of the variance shared between the constructs and their measures (average variance extracted). Off-diagonal elements are the correlations among the constructs. For discriminant validity, diagonal elements should be more significant than off-diagonal elements. AVE: Average variance extracted.
Source: Own elaboration.

Table 5
MICOM results.

Composite	Original Correlation	95% confidence interval	p-value	Compositional invariance?
1. Firm Performance	0,989	[0,970;1000]	0,223	Yes
2. Technological Capabilities	0,992	[0,942;1000]	0,472	Yes
3. Digital Capabilities	0,673	[0,566;1000]	0,131	Yes
4. Management Capabilities	1	[1000;1000]	0,683	Yes
5. Size	1	[1000;1000]		
6. Sector	1	[1000;1000]	0,040	No
Composite	Difference of mean value	95% confidence interval	p-value	Equal mean values?
1. Firm Performance	0,058	[−0,131;0,135]	0,416	Yes
2. Technological Capabilities	0,092	[−0,129;0,139]	0,166	Yes
3. Digital Capabilities	0,377	[−0,134;0,134]		No
4. Management Capabilities	−0,079	[−0,132;0,132]	0,301	Yes
5. Size	0,209	[−0,119;0,139]	0,001	No
6. Sector	0,271	[−0,123;0,126]		No
Composite	Difference of variances ratio	95% confidence interval	p-value	Equal variances?
1. Firm Performance	0,009	[−0,346;0,311]	0,953	Yes
2. Technological Capabilities	0,247	[−0,421;0,389]	0,235	Yes
3. Digital Capabilities	0,465	[−0,165;0,156]		No
4. Management Capabilities	−0,279	[−0,491;0,408]	0,236	Yes
5. Size	0,382	[−1138;1102]	0,635	Yes
6. Sector	0,034	[−0,085;0,078]	0,432	Yes

Source: Own elaboration.

involved three steps: (i) configuration invariance, (ii) compositional invariance, and (iii) full-measurement model invariance (Henseler, Ringle and Sarstedt, 2016; Sarstedt, Henseler and Ringle, 2011). We used the MICOM procedure by running a two-tailed permutation test for the moderating variable (HDI) at a 5% significance level and 10,000 permutations. The results of the MICOM procedure are shown in Table 5. The results of the permutation-based multigroup analysis are shown in Table 6, indicating the hypothesis tested for each group as H2a, H2b, H2c, H2d, H2e, and H2f. According to the HDI, three relationships show differences between countries: the effect of technological capabilities on firm performance, the impact of digital capabilities on technological capabilities, and the effect of liquidity on firm performance.

Finally, technological capabilities have a mediating effect between digital capabilities and firm performance at 100% because this study shows that the relationship between digital capabilities and firm performance is not significant. Similarly, through an analysis of impacts

comparing countries with low HDI with countries with high HDI, we can affirm that in countries where the HDI is low, the impact of digital capabilities is more significant on firm performance than in countries where the HDI is high. The results do not indicate an unobserved level of heterogeneous bias because the model results did not change when analyzing groups with control variables. Thus, Hypothesis 2 is accepted.

Discussion

To evaluate the goodness-of-fit of the estimated model, we followed the measures proposed by Dijkstra and Henseler (2015). The SRMR for the model was less than 0.10, as suggested by Ringle, Sarstedt and Straub (2012) Table 3. shows that the deviations were not significant because the 99 percent bootstrap quantiles of the three measures (SRMR, the unweighted least squares discrepancy dULS, and the geodetic discrepancy dG) were more significant than

Table 6
Permutation-based multi-group analysis for path coefficients and indirect effects.

Hypothesis	Path	Path Coefficients (IDH=0)	Path Coefficients (IDH=1)	Path Coefficients Difference IDH	Permutation p-value	Hypothesis Supported
H2a	Technological capacity −>Firm Performance	0,656	0,373	0,283	0,007	Yes
H2b	Digital Caps. −> Firm Performance	−0,037	0,001	−0,038	0,392	No
H2c	Digital Caps. −> Technological Caps.	0,245	0,050	0,195	0,006	Yes
H2d	Management Caps. −> Firm Performance	0,179	0,579	−0,400	0,001	Yes
H2e	Management Caps. −>Technological Caps	0,350	0,424	−0,075	0,481	No
H2f	Management Caps. −> Digital Caps.	0,142	0,138	0,004	0,939	No
	Size−> Firm Performance	0,039	−0,008	0,047	0,466	No
	Sector−> Firm Performance	0,057	0,057	0,072	0,086	No

Source: Own elaboration.

Table 7
Construction of HDI as a moderating variable.

Countries	HDIcontinuous	HDI dichotomous (moderating)
Guatemala	0.663	0
Bulgaria	0.816	1
Latvia	0.866	1
Moldova	0.750	0
Romania	0.828	1
El Salvador	0.673	0
Mongolia	0.737	0
Morocco	0.686	0
Honduras	0.634	0
Nicaragua	0.660	0
Czech Republic	0.900	1
Poland	0.880	1
Georgia	0.812	1
Estonia	0.892	1
Hungary	0.854	1
Slovak Republic	0.860	1
Italy	0.892	1
Croatia	0.851	1
Slovenia	0.917	1
Greece	0.888	1
North Macedonia	0.774	0
Portugal	0.864	1
Lithuania	0.882	1
Cyprus	0.887	1
Malta	0.895	1
Zimbabwe	0.571	0
Zambia	0.584	0
Mean	**0.797**	

Source: Own elaboration.

the original values (Henseler, 2017; Henseler, Ringle and Sarstedt, 2016). Therefore, based on the analysis performed and the results obtained, it is stated that the present study is confirmatory.

We also identified that technological capabilities fully mediate digital capabilities. Therefore, the development of digital capabilities influences technological capabilities to improve firm performance. Digital capabilities enable digital activities, which impact the use of information to improve processes because it is an activity with internal origins.

The impact of digital technology on technological capabilities is more significant in countries with a low HDI than in those with a high HDI. Two complementary factors explain the high incidence of collaborative economies in low HDI economies. The first is the low cost of digital platforms' implementation. The second factor is the increase in creativity in low-HDI economies due to the scarcity of resources and the need to adapt. In response, low-cost digital tools have been adopted and employed in such economies (Vega-Muñoz, Bustamante-Pavez and Salazar-Sepúlveda, 2019).

Conclusions

Although we know that digital capabilities are related to firm performance, we know very little about the mechanism of this relationship and the role of HDI as a moderating variable to allow us to explain this phenomenon. Based on this, we believe it is necessary to address this "gap" through a structural model (PLS-SEM) that demonstrates a firm's performance in this "new normal." For this reason, the authors analyzed 999 firms in the World Bank, 2020 study, based on data from 27 countries.

This study shows that digital capabilities do not directly affect firm performance. Moreover, technological capabilities function as mediators between digital capabilities and firm performance. In addition, this study observes that in countries with low HDI levels, the effects of digital capabilities on technological capabilities are more significant than in countries with high HDI levels. In this sense, digital infrastructure such as digital marketing has allowed companies to

survive in this "new normal" (Ghorbani et al., 2021). Moreover, in emerging economies with low HDI during the pandemic outbreak, the use of digital platforms and apps (gig economy) intensified, allowing companies to improve their performance.

Furthermore, the development of digital capabilities is essential to generate innovation and to take advantage of the mediating effect of technological capabilities to improve firm performance. This is even more critical in less developed economies because the implementation of digital platforms has a disruptive impact owing to reduced costs and ease of implementation.

Recommendations

The results show that in countries with a low level of development, collaborative economies have a greater impact because of low costs in these economies. Therefore, we recommend taking advantage of the returns of collaborative economies in developing countries and the increasing demand for activities related to e-commerce because the effect on them is disruptive. Likewise, the context of informality (Boateng, Kosiba and Okoe, 2019; Pérez, Yang, Bai, Flores & Heredia, 2019;) is ideal for developing collaborative economies, expanding products and services, improving market access, and income generation.

Digital transformation can be a critical tool for companies to accelerate technological innovation (Troise, Corvello, Ghobadian & O'Regan, 2022). Our study emphasizes that digital capabilities can generate technological innovation faster than traditional capabilities (long-term resource investment and funding constraints). Thus, companies must digitize as quickly as possible to become more efficient. Additionally, the government should provide facilities for companies to develop technologies more quickly (Heredia, Rubiños, Vega, Heredia & Flores, 2022).

Future research directions

The analysis conducted in our research collected cross-sectional information at a specific point within the context of the "new normal." In the future, we can analyze firm dynamics and the influence of technology collaboration networks, and how they are affected by macroeconomic cycles, industry life cycles, and firm age (Ramírez-Alesón & Fernández-Olmos, 2021). Also, we propose to analyze the interaction of digital capabilities with other types of capabilities and resources in organizations (such as labor and social relations, marketing capabilities, and technological capabilities) (Almeida, Santos and Monteiro, 2020). Future research should focus on a longitudinal study or conduct analyses using a non-recursive structural model, which shows that a firm's performance influences its resources and capabilities. We propose new moderating variables, such as the globalization index (KOF) and the global competitiveness index (GCI), as suggested by Skare and Soriano (2021). Likewise, another line of future research is on the dynamic perspective of the model, which would allow us to contrast our results and make significant contributions in the light of the appearance of new variants of the COVID-19 virus.

Finally, future research should focus on replicating this study in developed and vaccine-producing countries, given that our study only considered a segment of vaccine-receiving countries to monitor the effects of the pandemic (Dinleyici, Borrow, Safadi, van Damme & Munoz, 2021).

Implications

This study provides relevant management implications for leadership in the pursuit of improving firm performance through digital capabilities. First, digital capabilities are a sufficient, but not necessary, condition. Second, the positive impact of technological capabilities (mediating variable) on the relationship between digital

capabilities and firm performance. Third, during the pandemic, the sustainable growth of "gig economy" activities, especially in countries with a low HDI.

In terms of societal implications, we recognize the role of firms' digital capabilities during the COVID-19 pandemic and in achieving a "new normal." Furthermore, this study argues for the positive impact of digital capabilities in low HDI countries (Kryzhanovskij, Baburina & Ljovkina, 2021); which indicates that digitalization (firm-level perspective) can provide sufficient opportunities to generate growth, help improve people's quality of life, and promote human development.

References

Ali, F., Rasoolimanesh, S. M., Sarstedt, M., Ringle, C. M., & Ryu, K. (2018). An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research. *International Journal of Contemporary Hospitality Management*, 30, 514–538. doi:10.1108/IJCHM-10-2016-0568.

Ali, S., Javed, H. M. U., & Danish, M. (2021). Adoption of green IT in Pakistan: A comparison of three competing models through model selection criteria using PLS-SEM. *Environmental Science and Pollution Research*, 28, 36174–361921. doi:10.1007/s11356-020-12163-3.

Almeida, F., Santos, J. D., & Monteiro, J. A. (2020). The challenges and opportunities in the digitalization of companies in a post-COVID-19 World. *IEEE Engineering Management Review*, 48(3), 97–103. doi:10.1109/EMR.2020.3013206.

Amankwah-Amoah, J., Khan, Z., Wood, G., & Knight, G. (2021). COVID-19 and digitalization: The great acceleration. *Journal of Business Research*, 136, 602–611. doi:10.1016/j.jbusres.2021.08.011.

Anwar, M. A., & Graham, M. (2021). Between a rock and a hard place: Freedom, flexibility, precarity and vulnerability in the gig economy in Africa. *Competition & Change*, 25(2), 237–258. doi:10.1177/1024529420914473.

Avlonitis, G. J., & Karayanni, D. A. (2000). The impact of internet use on business-to-business marketing: Examples from American and European companies. *Industrial Marketing Management*, 29(5), 441–459. doi:10.1016/S0019-8501(99)00071-1.

Baía, E. P., & Ferreira, J. J. (2019). Dynamic capabilities and performance: How has the relationship been assessed? *Journal of Management & Organization*, 1–30. doi:10.1017/jmo.2019.88.

Baia, E., Ferreira, J. J., & Rodrigues, R. (2020). Value and rareness of resources and capabilities as sources of competitive advantage and superior performance. *Knowledge Management Research & Practice*, 18(3), 249–262. doi:10.1080/14778238.2019.1599308.

Bell, M., & Pavitt, K. (1995). ᴛʜᴇ ᴅᴇᴠᴇʟᴏᴘᴍᴇɴᴛ ᴏꜰ ᴛᴇᴄʜɴᴏʟᴏɢɪᴄᴀʟ ᴄᴀᴘᴀʙɪʟɪᴛɪᴇs. *I.U. ʜᴀQᴜᴇ, ᴛʀᴀᴅᴇ, ᴛᴇᴄʜɴᴏʟᴏɢʏ ᴀɴᴅ ɪɴᴛᴇʀɴᴀᴛɪᴏɴᴀʟ ᴄᴏᴍᴘᴇᴛɪᴛɪᴠᴇɴᴇss ᴇᴅɪ ᴅᴇᴠᴇʟᴏᴘᴍᴇɴᴛ sᴛᴜᴅɪᴇs: 22* (pp. 69–101). Washington, DC: The World Bank.

Boateng, H., Kosiba, J. P. B., & Okoe, A. F. (2019). Determinants of consumers' participation in the sharing economy: A social exchange perspective within an emerging economy context. *International Journal of Contemporary Hospitality Management*, 31(2), 718–733. doi:10.1108/IJCHM-11-2017-0731.

Boyd, D. E., & Koles, B. (2019). Virtual reality and its impact on B2B marketing: A value-in-use perspective. *Journal of Business Research*, 100, 590–598. doi:10.1016/j.jbusres.2018.06.007.

Burisch, R., & Wohlgemuth, V. (2016). Blind spots of dynamic capabilities: A systems theoretic perspective. *Journal of Innovation & Knowledge*, 1(2), 109–116. doi:10.1016/j.jik.2016.01.015.

Caballero-Morales, S. O. (2021). Innovation as recovery strategy for SMEs in emerging economies during the COVID-19 pandemic. *Research in International Business and Finance*, 57, 101396. doi:10.1016/j.ribaf.2021.101396.

Chen, C. L., Lin, Y. C., Chen, W. H., Chao, C. F., & Pandia, H. (2021). Role of government to enhance digital transformation in small service business. *Sustainability*, 13(3), 1028. doi:10.3390/su13031028.

Chin, W. W. (2010). Handbook of partial least squares. In V. E. Vinzi, W. W. Chin, J. Henseler, H. Wang (Eds.), *Hᴀɴᴅʙᴏᴏᴋ ᴏꜰ ᴘᴀʀᴛɪᴀʟ ʟᴇᴀsᴛ sQᴜᴀʀᴇ: Cᴏɴᴄᴇᴘᴛs, ᴍᴇᴛʜᴏᴅs ᴀɴᴅ ᴀᴘᴘʟɪᴄᴀᴛɪᴏɴs ɪɴ ᴍᴀʀᴋᴇᴛɪɴɢ ᴀɴᴅ ʀᴇʟᴀᴛᴇᴅ ꜰɪᴇʟᴅs* (pp. 655–690). Berling: Springer.

Ciampi, F., Demi, S., Magrini, A., Marzi, G., & Papa, A. (2021). Exploring the impact of big data analytics capabilities on business model innovation: The mediating role of entrepreneurial orientation. *Journal of Business Research*, 123, 1–13. doi:10.1016/j.jbusres.2020.09.023.

Clauss, T., Kraus, S., Kallinger, F. L., Bican, P. M., Brem, A., & Kailer, N. (2021). Organizational ambidexterity and competitive advantage: The role of strategic agility in the exploration-exploitation paradox. *Journal of Innovation and Knowledge*, 6(4), 203–213. doi:10.1016/j.jik.2020.07.003.

David-West, O., Iheanachor, N., & Umukoro, I. (2020). Sustainable business models for the creation of mobile financial services in Nigeria. *Journal of Innovation & Knowledge*, 5(2), 105–116. doi:10.1016/j.jik.2019.03.001.

DeSarbo, W. S. (2005). Revisiting the Miles and Snow strategic framework: Uncovering interrelationships between strategic types, capabilities, environmental uncertainty, and firm performance. *Strategic Management Journal*, 47–74. doi:10.1002/smj.431.

Dijkstra, T. K., & Henseler, J. (2015). Consistent and asymptotically normal PLS estimators for linear structural equations. *Computational statistics & data analysis*, 81, 10–23. doi:10.1016/j.csda.2014.07.008.

Dinleyici, E. C., Borrow, R., Safadi, M. A. P., van Damme, P., & Munoz, F. M. (2021). Vaccines and routine immunization strategies during the COVID-19 pandemic. *Human vaccines & immunotherapeutics*, 17(2), 400–407. doi:10.1080/21645515.2020.1804776.

Dokko, J. M. (2015). Workers and the online gig economy. *Tʜᴇ Hᴀᴍɪʟᴛᴏɴ Pʀᴏᴊᴇᴄᴛ*, 1–8.

Drnevich, P. L., & Croson, D. C. (2013). Information technology and business-level strategy: Toward an integrated theoretical perspective. *MIS quarterly*, 37(2), 483–509. http://www.jstor.org/stable/43825920.

Ebrahimi, P., Hamza, K. A., Gorgenyi-Hegyes, E., Zarea, H., & Fekete-Farkas, M. (2021). Consumer knowledge sharing behavior and consumer purchase behavior: Evidence from E-commerce and online retail in hungary. *Sustainability*, 13(18), 10375. doi:10.3390/su131810375.

Egger, D., Miguel, E., Warren, S. S., Shenoy, A., Collins, E., Karlan, D., et al. (2021). Falling living standards during the COVID-19 crisis: Quantitative evidence from nine developing countries. *Science Advances*, 7(6), eabe0997. doi:10.7910/DVN/SBUFNN.

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.

El-Haddadeh, R. (2020). Digital innovation dynamics influence on organisational adoption: The case of cloud computing services. *Information Systems Frontiers*, 22(4), 985–999. doi:10.1007/s10796-019-09912-2.

Fainshmidt, S., Pezeshkan, A., Lance Frazier, M., Nair, A., & Markowski, E. (2016). Dynamic capabilities and organizational performance: A meta-analytic evaluation and extension. *Journal of Management Studies*, 53(8), 1348–1380. doi:10.1111/joms.12213.

Feng, B., Sun, K., Chen, M., & Gao, T. (2020). The impact of core technological capabilities of high-tech industry on sustainable competitive advantage. *Sustainability*, 12(7), 2980. doi:10.3390/su12072980.

Ferreira, J., & Fernandes, C. (2017). Resources and capabilities' effects on firm performance: What are they? *Journal of Knowledge Management*, 21(5), 1202–1217. doi:10.1108/JKM-03-2017-0099.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. doi:10.20546/ijcrar.2016.409.006.

Frempong, M. F., Mu, Y., Adu-Yeboah, S. S., Hossin, M. A., & Adu-Gyamfi, M. (2021). Corporate sustainability and firm performance: The role of green innovation capabilities and sustainability-oriented supplier−buyer relationship. *Sustainability*, 13(18), 10414. doi:10.3390/su131810414.

Ghorbani, Z., Kargaran, S., Saberi, A., Haghighinasab, M., Jamali, S. M., & Ale Ebrahim, N. (2021). Trends and patterns in digital marketing research: Bibliometric analysis. *Journal of Marketing Analytics*, 1–15. doi:10.1057/s41270-021-00116-9.

Gobble, M. M. (2018). Digitalization, digitization, and innovation. *Research-Technology Management*, 61(4), 56–59. doi:10.1080/08956308.2018.1471280.

Gordini, N., & Veglio, V. (2017). Customers churn prediction and marketing retention strategies. An application of support vector machines based on the AUC parameter-selection technique in B2B e-commerce industry. *Industrial Marketing Management*, 62, 100–107. doi:10.1016/j.indmarman.2016.08.003.

Grewal, R., Comer, J. M., & Mehta, R. (2001). An investigation into the antecedents of organizational participation in business-to-business electronic markets. *Journal of Marketing*, 65(3), 17–33. doi:10.1509/jmkg.65.3.17.18331.

Hair, J. F., Jr., Sarstedt, M., Ringle, C. M.&, & Gudergan, S. P. (2017). *Aᴅᴠᴀɴᴄᴇᴅ ɪssᴜᴇs ɪɴ ᴘᴀʀᴛɪᴀʟ ʟᴇᴀsᴛ sQᴜᴀʀᴇs sᴛʀᴜᴄᴛᴜʀᴀʟ ᴇQᴜᴀᴛɪᴏɴ ᴍᴏᴅᴇʟɪɴɢ*. Thousand Oaks, CA, USA: SAGE publications.

Hamilton, B. H., & Nickerson, J. A. (2003). Correcting for endogeneity in strategic management research. *Strategic organization*, 1(1), 51–78. doi:10.1177/1476127003001001218.

Hardwick, J., & Anderson, A. R. (2019). Supplier-customer engagement for collaborative innovation using video conferencing: A study of SMEs. *Industrial Marketing Management*, 80, 43–57. doi:10.1016/j.indmarman.2019.02.013.

Henseler, J. (2017). Bridging design and behavioral research with variance-based structural equation modeling. *Journal of advertising*, 46(1), 178–192. doi:10.1080/00913367.2017.1281780.

Henseler, J., & Fassott, G. (2010). Testing moderating effects in PLS path models: An illustration of available procedures. In V. Esposito Vinzi, W. W. Chin, J. Henseler, H. Wang (Eds.), *Hᴀɴᴅʙᴏᴏᴋ ᴏꜰ ᴘᴀʀᴛɪᴀʟ ʟᴇᴀsᴛ sQᴜᴀʀᴇs: Cᴏɴᴄᴇᴘᴛs, ᴍᴇᴛʜᴏᴅs ᴀɴᴅ ᴀᴘᴘʟɪᴄᴀᴛɪᴏɴs* (Springer handbooks of computational statistics series) (pp. 713−735). Heidelberg, Dordrecht, London, New York: Springer.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2016). Testing measurement invariance of composites using partial least squares. *International Marketing Review*, 33(3), 405–431. doi:10.1108/IMR-09-2014-0304.

Henseler, J., & Schuberth, F. (2020). Using confirmatory composite analysis to assess emergent variables in business research. *Journal of Business Research*, 120, 147–156. doi:10.1016/j.jbusres.2020.07.026.

Heredia, J., Geldes, C., Kunc, M. H., & Flores, A. (2019). New approach to the innovation process in emerging economies: The manufacturing sector case in Chile and Peru. *Technovation*, 79, 35–55. doi:10.1016/j.technovation.2018.02.012.

Heredia, J., Rubiños, C., Vega, W., Heredia, W., & Flores, A. (2022). New strategies to explain organizational resilience on the firms: A cross-countries configurations Approach. *Sustainability*, 14(3), 1612. doi:10.3390/su14031612.

Höflinger, P. J., Nagel, C., & Sandner, P. (2018). Reputation for technological innovation: Does it actually cohere with innovative activity? *Journal of Innovation and Knowledge*, 3(1), 26–39. doi:10.1016/j.jik.2017.08.002.

Karimi, J., & Walter, Z. (2015). The role of dynamic capabilities in responding to digital disruption: A factor-based study of the newspaper industry. *Journal of Management Information Systems*, 32(1), 39–81. doi:10.1080/07421222.2015.1029380.

Khin, S., & Ho, T. C. (2019). Digital technology, digital capability and organizational performance: A mediating role of digital innovation. *International Journal of Innovation Science*. doi:10.1108/IJIS-08-2018-0083.

Kim, H. (2015). Acceptability engineering: The study of user acceptance of innovative technologies. *Journal of Applied Research and Technology*, *13*(2), 230–237. doi:10.1016/j.jart.2015.06.001.

Kohli, R., & Grover, V. (2008). Business value of IT: An essay on expanding research directions to keep up with the times. *Journal of the association for information systems*, *9*(1), 23–39.

Kryzhanovskij, O. A., Baburina, N. A., & Ljovkina, A. O. (2021). How to make digitalization better serve an increasing quality of life? *Sustainability*, *13*(2), 611. doi:10.3390/su13020611.

Lee, S. M., & Trimi, S. (2018). Innovation for creating a smart future. *Journal of Innovation & Knowledge*, *3*(1), 1–8. doi:10.1016/j.jik.2016.11.001.

Leung, T. Y., Sharma, P., Adithipyangkul, P., & Hosie, P. (2020). Gender equity and public health outcomes: The COVID-19 experience. *Journal of Business Research*, *116*, 193–198. doi:10.1016/j.jbusres.2020.05.031.

Loureiro, R., Ferreira, J. J., & Simões, J. (2021). Approaches to measuring dynamic capabilities: Theoretical insights and the research agenda. *Journal of Engineering and Technology Management*, *62*, 101657. doi:10.1016/j.jengtecman.2021.101657.

Lyytinen, K., Yoo, Y., & Boland, R. J., Jr (2016). Digital product innovation within four classes of innovation networks. *Information Systems Journal*, *26*(1), 47–75. doi:10.1111/isj.12093.

Malhotra, A., Mathur, A., Diddi, S., & Sagar, A. D. (2021). Building institutional capacity for addressing climate and sustainable development goals: Achieving energy efficiency in India. *Climate Policy*, 1–19. doi:10.1080/14693062.2021.1984195.

Malik, A. B. (2020). Gig economy, 4IR and artificial intelligence: Rethinking strategic HRM. Human & technological resource management (HTRM): New insights into revolution 4.0. Emerald Publishing Limited. doi:10.1108/978-1-83867-223-220201005.

Martínez-Caro, E., Cegarra-Navarro, J. G., & Alfonso-Ruiz, F. J. (2020). Digital technologies and firm performance: The role of digital organisational culture. *Technological Forecasting and Social Change*, *154*, 119962. doi:10.1016/j.techfore.2020.119962.

Medase, S. K., & Abdul-Basit, S. (2020). External knowledge modes and firm-level innovation performance: Empirical evidence from sub-Saharan Africa. *Journal of Innovation and Knowledge*, *5*(2), 81–95. doi:10.1016/j.jik.2019.08.001.

Mithani, M. A. (2020). Adaptation in the face of the new normal. *Academy of Management Perspectives*, *34*(4), 508–530. doi:10.5465/amp.2019.0054.

Moretti, F., & Biancardi, D. (2020). Inbound open innovation and firm performance. *Journal of Innovation and Knowledge*, *5*(1), 1–19. doi:10.1016/j.jik.2018.03.001.

Motiwalla, L. F., Albashrawi, M., & Kartal, H. B. (2019). Uncovering unobserved heterogeneity bias: Measuring mobile banking system success. *International Journal of Information Management*, *49*, 439–451. doi:10.1016/j.ijinfomgt.2019.07.005.

Müller, T., Schuberth, F., & Henseler, J. (2018). PLS path modeling − a confirmatory approach to study tourism technology and tourist behavior. *Journal of Hospitality and Tourism Technology*, *9*(3), 249–266. doi:10.1108/JHTT-09-2017-0106.

Nitzl, C., Roldan, J.L., .& Cepeda, G. (2016). Mediation analysis in partial least squares path modelling, Helping researchers discuss more sophisticated models. *Industrial Management and Data Systems*, 116(9), 1849–1864. https://doi.org/10.1108/IMDS-07-2015-0302

Apedo-Amah, M. C., Avdiu, B., Cirera, X., Olczyk, M., & Kuc-Czarnecka, M. E. (2021). Determinants of COVID-19 impact on the private sector: A multi-country analysis based on survey data. *Energies*, *14*(14), 4155. doi:10.3390/en14144155.

Osmonbekov, T., Bello, D. C., & Gilliland, D. I. (2002). Adoption of electronic commerce tools in business procurement: Enhanced buying center structure and processes. *Journal of Business & Industrial Marketing*. doi:10.1108/08858620210419781.

Pérez, J. A. H., Yang, X., Bai, O., Flores, A., & Heredia, W. H. (2019). How Does Competition By Informal Firms Affect The Innovation In Formal Firms? *International Studies of Management & Organization*, *49*(2), 173–190. doi:10.1080/00208825.2019.1608402.

PNUD. (2020). *Informe sobre desarrollo humano 2020*. Madrid: Ediciones Mundi-Prensa.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management*, *12*(4), 531–544. doi:10.1177/014920638601200408.

Ramírez-Alesón, M., & Fernández-Olmos, M. (2021). Which intermediate import source is best for innovation in MNEs? *Baltic Journal of Management*, *16*(4), 564–581. doi:10.1108/BJM-09-2020-0348.

Ringle, C. M., & Sarstedt, M. (2016). Gain more insight from your PLS-SEM results: The importance-performance map analysis. *Industrial management & data systems*, *16*(9), 1865–1886. doi:10.1108/IMDS-10-2015-0449.

Ringle, C. M., Sarstedt, M., & Straub, D. W. (2012). A critical look at the use of PLS-SEM in MIS quarterly. *MIS quarterly*, *36*(1). doi:10.2307/41410402 iii-xiv.

Rocha, L. A. (2021). The Covid-19 pandemic and its impact on the performance of firms: An analysis based on world bank microdata. *The Journal of Developing Areas*, 411–433. doi:10.1353/jda.2021.0072.

Rolstadås, A. (1998). Enterprise performance measurement. *International Journal of Operations & Production Management*, *18*, 989–999. doi:10.1108/01443579810225577.

Ross, C. E., & Wu, C. L. (1996). Education, age, and the cumulative advantage in health. *Journal of health and social behavior*, *37*(1), 104–120. doi:10.2307/2137234.

Salomo, S., Talke, K., & Strecker, N. (2008). Innovation field orientation and its effect on innovativeness and firm performance. *Journal of product innovation management*, *25*(6), 560–576. doi:10.1111/j.1540-5885.2008.00322.x.

Sarstedt, M., Henseler, J., & Ringle, C. M. (2011). Multigroup analysis in partial least squares (PLS) path modeling: Alternative methods and empirical results. *Advances in International Marketing*, *22*(2011), 195–218. doi:10.1108/S1474-7979(2011)0000022012.

Skare, & Soriano (2021). How globalization is changing digital technology adoption: An international perspective. *Journal of Innovation & Knowledge*, *6*(4), 22–223. doi:10.1016/j.jik.2021.04.001.

Soluk, J., Miroshnychenko, I., Kammerlander, N., & De Massis, A. (2021). Family influence and digital business model innovation: The enabling role of dynamic capabilities. *Entrepreneurship Theory and Practice*, *45*(4), 867–905. doi:10.1177/1042258721998946.

Soto-Acosta, P. (2020). COVID-19 pandemic: Shifting digital transformation to a high-speed gear. *Information Systems Management*, *37*(4), 260–266. doi:10.1080/10580530.2020.1814461.

Srivastava, S. C., & Shainesh, G. (2015). Bridging the service divide through digitally enabled service innovations. *Mis Quarterly*, *39*(1), 245–268. doi:10.25300/MISQ/2015/39.1.11.

Sutherland, W.&. (2018). The sharing economy and digital platforms: A review and research agenda. *International Journal of Information Management*, *43*, 328–341. doi:10.1016/j.ijinfomgt.2018.07.004.

Taherdoost, H. (2016). Validity and reliability of the research instrument; How to test the validation of a questionnaire /survey in a research hamed taherdoost to cite this version : HAL Id : Hal-02546799 validity and reliability of the research instrument ; How to test the. *International Journal of Academic Research in Management*, *5*(3), 28–36 http://dx.doi.org/10.2139/ssrn.3205040.

Tan, B., Pan, S. L., & Hackney, R. (2010). The strategic implications of web technologies: A process model of how web technologies enhance organizational performance. *IEEE Transactions on Engineering Management*, *57*(2), 181–197. http://10.1109/TEM.2009.2023130.

Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations. *Strategic Management Journal*, *28*(13), 1319–1350. doi:10.1002/smj.640.

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.

Torres, R., Sidorova, A., & Jones, M. C. (2018). Enabling firm performance through business intelligence and analytics: A dynamic capabilities perspective. *Information & Management*, *55*(7), 822–839. doi:10.1016/j.im.2018.03.010.

Troise, C., Corvello, V., Ghobadian, A., & O'Regan, N. (2022). How can SMEs successfully navigate VUCA environment: The role of agility in the digital transformation era. *Technological Forecasting and Social Change*, *174*, 121227. doi:10.1016/j.techfore.2021.121227.

Twigg, D. E., Kutzer, Y., Jacob, E., & Seaman, K. (2019). A quantitative systematic review of the association between nurse skill mix and nursing-sensitive patient outcomes in the acute care setting. *Journal of advanced nursing*, *75*(12), 3404–3423. doi:10.1111/jan.14194.

Umar, M., Xu, Y., & Mirza, S. S. (2021). The impact of Covid-19 on Gig economy. *Economic Research-Ekonomska Istraživanja*, *34*(1), 2284–2296. doi:10.1080/1331677X.2020.1862688.

Usai, A., Fiano, F., Petruzzelli, A. M., Paoloni, P., Briamonte, M. F., & Orlando, B. (2021). Unveiling the impact of the adoption of digital technologies on firms' innovation performance. *Journal of Business Research*, *133*, 327–336. doi:10.1016/j.jbusres.2021.04.035.

Vega-Muñoz, A., Bustamante-Pavez, G., & Salazar-Sepúlveda, G. (2019). Orange economy and digital entrepreneurship in Latin America: Creative sparkles among raw materials. *HANDBOOK OF RESEARCH ON DIGITAL MARKETING INNOVATIONS IN SOCIAL ENTREPRENEURSHIP AND SOLIDARITY ECONOMICS* (pp. 182−203). IGI Global.

Wang, C. L. (2007). Dynamic capabilities: A review and research agenda. *International journal of management reviews*, *9*(1), 31–51. doi:10.1111/j.1468-2370.2007.00201.x.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal*, *5*(2), 171–180. doi:10.1002/smj.4250050207.

Westhead, P., Wright, M., & Ucbasaran, D. (2001). The internationalization of new and small firms: A resource-based view. *Journal of business venturing*, *16*(4), 333–358. doi:10.1016/S0883-9026(99)00063-4.

Wilden, R., & Gudergan, S. P. (2015). The impact of dynamic capabilities on operational marketing and technological capabilities: Investigating the role of environmental turbulence. *Journal of the Academy of Marketing Science*, *43*(2), 181–199. doi:10.1007/s11747-014-0380-y.

Williams, L. J., Vandenberg, R. J., & Edwards, J. R. (2009). 12 structural equation modeling in management research: A guide for improved analysis. *Academy of Management Annals*, *3*(1), 543–604. doi:10.5465/19416520903065683.

Yoo, Y., Boland, R. J., Jr, Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization science*, *23*(5), 1398–1408. doi:10.1287/orsc.1120.0771.

Zhen, Z., Yousaf, Z., Radulescu, M., & Yasir, M. (2021). Nexus of digital organizational culture, capabilities, organizational readiness, and innovation: Investigation of SMEs operating in the digital economy. *Sustainability*, *13*(2), 720. doi:10.3390/su13020720.

Zhou, & Wu, F. (2010). Technology capability, strategic flexibility and product innovation. *Strategic Management Journal*, *31*(5−6), 547–561. doi:10.1002/smj.830.

Zhou, X., Cai, Z., Tan, K. H., Zhang, L., Du, J., & Song, M. (2021). Technological innovation and structural change for economic development in China as an emerging market. *Technological Forecasting and Social Change*, *167*, 120671. doi:10.1016/j.techfore.2021.120671.

Zollo, M., & Winter, S. G. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science*, *13*(3), 339–351. doi:10.1287/orsc.13.3.339.2780.