Firm Performance and the Factors That Influence the Adoption of Digital Innovations

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Abstract: Despite the growing importance of digital innovation—defined as new digital products and services that allow digital transformation of firms across industries, empirical research on digital innovation drivers is still limited, resulting in a knowledge gap. This study looks at how digital capacity and digital orientation affect digital innovation as well as how digital innovation functions as a mediator in the link among digital orientation and digital capability and firm performance. This study centres on IT firms that operate within the ICT sector of India and also utilized a quantitative methodology to evaluate the connections between digital innovation, orientation, capability and firm performance, specifically employing a sample size of 105 SMEs. The findings indicate a noteworthy positive influence of digital capability and digital orientation on digital innovation. Furthermore, it was discovered that digital innovation serves as a mediator in the connection between digital orientation and firm performance as well as between digital capability and firm performance. These results emphasize the significance of cultivating a culture that prioritizes digitalization and enhancing digital competencies in order to stimulate digital innovation, thereby resulting in enhanced financial and non-financial performance for IT firm operating in ICT sector. In order to ensure that the workforce is ready for the digital age, policymakers are urged to fund rescaling programmes and introduce digital education at an early age.

Keywords: Digital Capability, Technology, Firm, Performance, Innovation.

INTRODUCTION

The emergence of digitalization in business firms across various industries has been facilitated by the adoption of new digital technologies, including the big data analytics, AI, cloud computing, and IoT (Bisht et al., 2022). In order to achieve significant advancements in various aspects of their business, such as optimising operations, developing novel business models and improving customer engagement and experience, firms must effectively adopt digital technology-driven transformations. Failure to do so may result in their vulnerability to competitive threats and potential demise (Gupta et al., 2020). In order for Corporations to implement digitalization within their service, business function or product, it is imperative for them to incorporate novel digital solutions. One such solution involves the utilisation of Market monitoring technologies employs technology based on computational intelligence (AI) to discern prevalent trends among the target customer base (Huang & Rust, 2021). This enables organisations to tailor their product offerings in a manner that aligns with the identified trends.

Tesco outlets in South Korea have implemented a custom mobile application as a digital solution (Rigby, 2011). Customers may easily scan the barcodes of virtual groceries inside virtual shops using this application as they wait at railway stops. The groceries are subsequently transported to the residences of the buyer. The implementation of this digital solution significantly increased the online sales of Tesco (Andal-Ancion et al., 2003). Given the advantages presented by digitalization, advanced solutions in technology are considered essential facilitators of business digitalization across industries in diverse areas including customer service, marketing, logistics, production and human resource management (Ageron & Gunasekaran, 2020). Hence, in the absence of adopting cutting-edge digital systems, support and solutions offered by IT companies that hold a significant position in the digital ecosystem, business firms remain ill-prepared for the process of digital transition.

In this context, digital innovation can be defined as the implementation of inventive information technology solutions that incorporate newly developed technologies for digital communication to facilitate the process of digital transformation in non-technical sectors such as healthcare, banking, retail, and manufacturing. In conjunction with the growing significance of digitalization, there has been a corresponding increase in the prominence of digital innovation as a subject of research. This can be attributed to the escalating demand for innovative digital solutions. Despite the increasing scholarly attention towards digital innovation, the existing body of literature on this topic remains relatively nascent. The majority of research conducted on digital innovation primarily focuses on architectural, information system or technical aspects (Lyytinen et al., 2016), neglecting the managerial perspective.

Furthermore, it is important to note that the studies primarily focus on general industries rather than the field of information technology (Pencarelli, 2020). Therefore, this study adopts a distinct perspective on digital innovation by focusing on the IT domain. It aims to examine the process through which IT solutions or products evolve into creative and cutting-edge digital solutions or products, which in turn bring about transformations in traditional businesses, products, services, and even foster the emergence of new enterprises. Furthermore, a comprehensive examination of existing literature revealed a dearth of studies that elucidate the strategies employed by IT enterprises in harnessing digital technologies to develop novel digital offerings and services. Numerous scholarly investigations have explored the determinants of innovation across diverse industries (Bogers et al., 2017). However, there

exists a dearth of scholarly literature pertaining to the key drivers of innovation specifically within the realm of digital products in the IT industry. This study aims to fill the gaps in the existing literature by posing the following research question:

Research Question 1: What are the factors that contribute to the advancement of DI?

Furthermore, the presence of digital capability serves as a valuable complement to a firm's digital orientation (Kopalle et al., 2020). This is due to the fact that only those firms possessing the necessary skills to effectively manage emerging technologies will be adequately prepared to embrace and successfully implement these technologies, ultimately transforming them into innovative products. Similarly, firms that possess digital capabilities must demonstrate a strong commitment and preparedness to adopt emerging technologies in order to innovate and create new products that confer a competitive edge (Seethamraju, 2015; Miller & Le Breton-Miller, 2005). Therefore, it is our assertion that DO and DC are harmonious and mutually reinforcing in the pursuit of creation of new products. This is supported by previous research indicating that innovation is stimulated by a focus on technology (Swaans et al., 2014) and facilitated by technological proficiency (Aubert, 2005).

Previous studies have provided evidence for the association between technological innovation and capability, as well as technology innovation and orientation (Madanmohan et al., 2004; Heredia et al., 2022; Guzman et al., 2018). In contrast, a substantial body of literature has provided evidence for the positive correlation between organisational performance and innovation (Dobni, 2011; Prakash & Gupta, 2008; Singh et al., 2018). Limited evidence was discovered regarding the correlation between digital innovation and organisational performance within the realm of digital technology. Bughin and Zeebroeck (2017) provide empirical support for the notion that companies that actively strive to leverage their complete digital capabilities achieve superior performance outcomes, surpassing those of the average firm. This advantage is observed in terms of both technology orientation and technology capability. Hence, it is plausible to suggest that the impact of digital orientation and digital capability on organisational performance may be mediated by innovation, rather than being a direct influence.

This inquiry gives rise to our second research question:

RQ2. Can the implementation of digital innovation (DI) lead to improved firm performance (FM) by effectively incorporating digital capability (DC) and digital orientation (DO)?

Furthermore, the empirical evidence regarding the correlation between digital technology factors and performance remains limited, particularly within the context of digital technology. Thus this study aims to address the research questions by pursuing two main objectives.

1. to investigate the direct impact of digital capability and orientation on innovation.
2. to investigate how digital innovation mediates the connection between digital orientation, capability and performance in organisations.

This investigation is conducted within the context related to IT firms operating in the ICT sector of India. IT firms primarily consist of SMEs that specialise in delivering digital products and services encompassing hardware, IT services and software. The ICT sector's noteworthy contribution to the economy, as measured by its impact on the GDP, was reported to be 16.2 percent in the year 2016. In India, there has been a notable emergence of innovative digital solutions, including fin tech, health tech, and business analytics. These solutions have begun to facilitate the digitalization of various industries.

RESEARCH METHODOLOGY

In order to meet the study's goals and answer its research questions, this study employed quantitative methodologies to investigate the associations between variables. This was achieved through the collection and analysis of survey data. The primary focus of investigation in this study is the IT firm that actively participates in the utilisation of digital technology.

Sample

In order to analyse the associations between the variables, a dataset consisting of cross-sectional data was gathered from 105 SMEs operating in the ICT industry in India. IT firms were chosen based on two distinct motives. One compelling factor lies in India's transition towards a digital economy, where IT companies and their advanced digital solutions assume significant roles in facilitating the digital transformation of various industries. An additional factor to consider is the urgent necessity check out the potential impact of DI on the operational effectiveness of IT companies, leading to enhanced business outcomes and subsequently contributing to the growth of the gross domestic product and the digital economy.

Sampling Technique

The present study employs a convenience sampling technique.

Sample Size

Out of a total of 375 prospective firms to which we dispatched questionnaire, the survey elicited responses from only 105 firms, resulting in a response rate of 28 percent.

Inclusion Criteria

Companies who met the requirements for responding were required to be locally owned SMEs operating in the ICT industry, and either have a sales turnover of less than 50 crore or have less than 75 full-time employees.

Data Collection

The primary method employed for data collection was a survey conducted through a web-based platform. The contact information of the firms was obtained. Initially, telephone communication was employed to ascertain suitable participants from the organisations and to obtain their email addresses. Subsequently, electronic mail containing an introduction letter and the web-based hyperlink to the questionnaire were dispatched to the prospective participants. Among the 375 prospective firms to which we dispatched emails, a mere 105 firms exhibited a response to the survey, resulting in a response rate of 28 percent.

Research tool

After conducting an extensive review of relevant scholarly literature and engaging in interviews with IT professionals who possess significant expertise in the field of digital technology and innovations, the survey instrument was developed. The questionnaire items were adjusted to better suit the requirements and characteristics of the digital environment. The present study employed the metrics created by Zhou et al. (2005) to evaluate digital orientation, which were derived from the original evaluates constructed by Gatignon and Xuereb (1997). The questionnaire evaluates a company's dedication to utilising digital technologies in the process of developing new products, as well as their inclination to seize digital opportunities. The digital orientation survey consisted of four items. This study also utilised the measures of Paladino (2007) in relation to digital capability. This scale consisted of five items and allowed participants to self-assess their firm's capability in applying digital technology. The scale's options ranged from "very low" to "very high." There were a total of six items to assess digital innovation adapted from Paladino, 2007 and were modified to align with the specific research context pertaining to digital innovation. The present study employed a combination of financial and non-financial indicators to assess the performance of the organisation. The satisfaction levels were assessed using Likert-like scales with five points, ranging from 1 (indicating no satisfaction) to 5 (indicating high satisfaction). The financial measures evaluate the degree of satisfaction pertaining to net profit, cash flow and sales, while the non-financial measures evaluate the degree of satisfaction pertaining to market share, employee turnover and customer satisfaction.

Data Analysis and Interpretation

The present study employed SPSS Version 20 to conduct data screening, profile the respondent firms, and address the issue of common method variance. In order to answer research questions, the researchers employed the SmartPLS software, which was developed by Ringle et al. (2005) and utilised a structural equation model (SEM) based on the partial least squares (PLS) approach.

RESULTS

I. Characteristics of Participating Companies and Respondents

The participating companies were engaged in the utilisation of diverse software and hardware solutions across various industries such as retail, insurance, manufacturing, education, health care and banking. In terms of firm size, a significant majority of 94 percent had a workforce of fewer than fifty employees. The data regarding the age of the firms indicates that a majority, specifically 66.67 percent, had been in operation for a duration ranging from 5 to 10 years, while the remaining firms had been in operation for less than 5 years. The survey results revealed that a significant proportion of the participants identified themselves as business owners (43.81%), while a slightly smaller percentage held positions as directors (25.7%). The remaining respondents reported being managers.

II. CMV- Common Method Variance

The present analysis commences by evaluating the CMV. CMV refers to the variance that can arise due to the measurement method employed (Podsakoff et al., 2003). When multiple constructs are measured using the same method, it can result in correlations between the constructs that are either inflated or deflated (Bagozzi & Yi, 1990). To deal with this, the single factor test developed by Harman was employed. The results of this experiment show that a total of five different factors accounted for 72 percent of the variation. The first component explained 34% of the data variability, indicating that there is no significant issue of common method bias in this study.

III. The Measurement Model

An evaluation of both the discriminant validity and the convergent validity of the measurement model was done in order to prove its validity. Convergent reliability was evaluated by looking at the accuracy of the indicators (outer loadings), AVE, and individual reliability (CR), as presented in Table 1. Most item's loadings were higher than the cutoff value of 0.4. 3 items (1 from DC, 2 from Inno) were excluded from the analysis due to their loadings falling below the threshold of 0.4, as recommended by Hair et al. (2021). The AVE values, as reported by Henseler et al. (2009), and Hair et al. (2010) were found to be greater than 0.5, thus providing confirmation of convergent validity. Subsequently, the application of CR was employed to evaluate the dependability of the measurements, as it assigns priority to the measures

depending on respective levels of reliability. All of the composite reliability (CR) values exceeded the threshold of 0.7, suggesting that the measures used in the study were deemed reliable. Hair et al. (2014) propose that Cronbach's alpha is a measure of reliability that is calculated based on the inter-correlations among the indicators of a variable. In contrast, composite reliability is determined by considering the individual indicators themselves. Discriminant validity was determined by looking at the correlations between the square root of the AVE values and latent variables, as outlined by Fornell and Larcker (1981) and Hair et al. (2014). The square roots of the average variance extracted for each construct exhibited higher values compared to the correlation values observed for other constructs within this study, thereby providing confirmation of the discriminant validity of the constructs (Table 2).

Table 1 Construct Validity And Reliability

No.	Construct	Count	Items removed	Factor loading	AVE	CR
1	DO	4	0	0.854 0.847 0.799 0.856	0.704	0.891
2	DC	5	1	0.888 0.849 0.876 0.768	0.716	0.909
3	DI	6	2	0.826 0.851 0.573 0.699	0.555	0.839
4	FP	3	0	0.871 0.901 0.892	0.788	0.921
5	NFP	3	0	0.815	0.727	0.837

				0.872		
				0.871		

Table 2 Discriminant Validity

	1	2	3	4	5
FP	***0.888***				
DI	0.349	***0.745***			
NFP	0.585	0.445	***0.853***		
DC	0.379	0.618	0.487	***0.846***	
DO	0.461	0.590	0.514	0.579	***0.839***

The entries in italics, bold within the matrix represent the square root of the AVE, whereas the remaining entries denote the correlations.

IV. Structural Model

In the present study, the variables of firm age and size are included as control variables, as they are potentially influential factors in the hypothesised relationships. There was no observed significant impact of firm size and age on digital innovation. Hence, the suggested relationships are validated irrespective of the dimensions of firms' size and age. In order to address the research inquiries, an evaluation of the structural model was conducted to assess the interrelationships among the variables. The results presented in Table 3 and Figure 1 indicate that there is a significant and positive direct effect of DO ($b = 0.349$, $p < 0.01$) and DC ($b = 0.418$, $p < 0.01$) on DI. Therefore, thus DC and DO shows positive effect on DI. The R2 coefficient, depicted in Figure 1, indicates that 45.6% of the variability observed in digital innovation can be accounted for by the combined influence of digital capability and digital orientation.

Table 3 Results of structural model

Direct effect			**Path coefficient**	**SE**	***t*-value**
DO – product innovation			0.349**	0.106	3.283
DC – product innovation			0.418**	0.099	4.222
Mediating effect	Path Coefficient	Path co efficient B	Indirect effect	SE	*t*-value
DO –DI–FP	0.349	0.352	0.122*	0.055	2.218
DC –DI –FP	0.418	0.352	0.147**	0.049	3.000
DO – DI –NFP	0.349	0.443	0.154*	0.068	2.265
DC –DI– NFP	0.418	0.443	0.185**	0.058	3.190

Significant data are shown as * at p 0.01 and ** at p 0.05.

Following that, the impact of mediation was calculated. For the purpose of assessing the importance of the mediating effect, this study followed the non-parametric path modelling approach advocated by Preacher and Hayes (2008) and Henseler et al. (2009) and utilised a bootstrapping procedure based on PLS-SEM. Through the use of the following formula: t-values = indirect impact divided by standard error, the mediation effect was calculated. To assess how much digital innovation acts as a mediator, we calculated t-values for the indirect impact.

The beta coefficients for the mediating role of product innovation between digital orientation and financial and nonfinancial performance are shown in Table 3 and Figure 1. The findings indicate that there is a significant indirect effect, DO on FP (b = 0.122; t-values = 2.218), DO on NFP (b = 0.154; t-values = 2.265), DC on FP (b = 0.147; t-values = 3.000), and DC on NFP (b = 0.185; t-values = 3.190). These findings were confirmed since the t-values were larger than the threshold of 1.645 at the 95% confidence level.

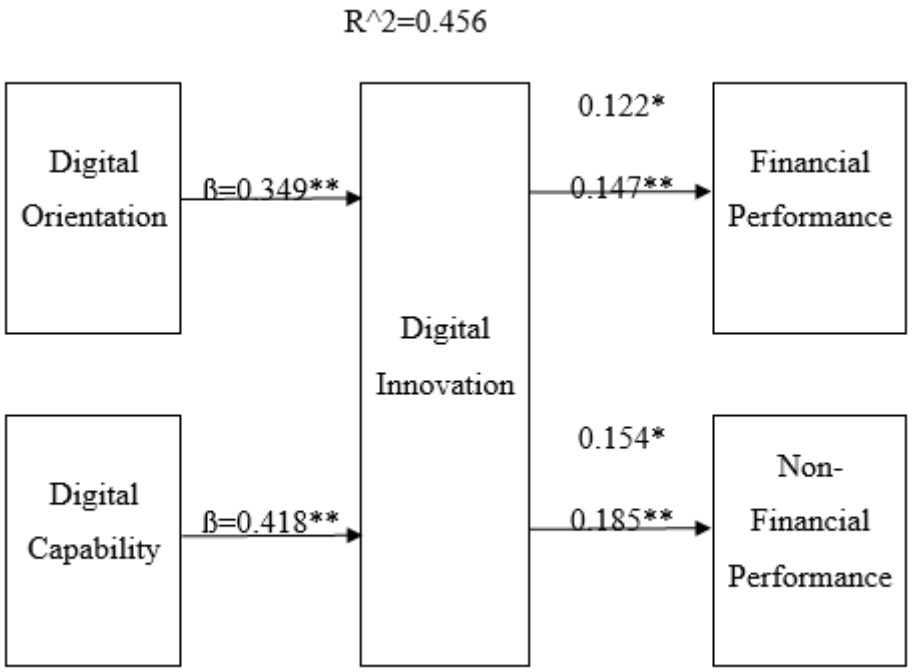

Figure 1 Role of Digital innovation on firm performance

Significant data are shown as * at p 0.01 and ** at p 0.05.

DISCUSSIONS

The findings indicate that both digital orientation and capability exert a direct and positive influence on DI. Therefore, these findings address the first research question that DO and DC are significant factors of digital innovation. The previous research conducted by Dobni, 2011 and Prakash & Gupta, 2008, which identified a positive correlation between production and DO, is in line with the notion that digital orientation has a consistently positive influence on digital innovation. This discovery suggests that the adoption of digital orientation prompts IT firms to prioritise the integration of digital technologies in order to effectively meet the evolving digital demands of both businesses and consumers. This enables them to provide digital solutions that have the potential to revolutionise business models and enhance consumers' experiences. Hence, it is imperative for IT companies to cultivate a digital mindset. This entails acknowledging the disruptive capabilities of digital technology in various industries, as well as harnessing its vast potential to develop innovative digital solutions that can bring about benefits to both industries and society as a whole. This type of digital mind-set can assist companies in developing a DO that demonstrates their dedication to and embrace of emerging digital technologies.

The observed positive impact of DC on DI implies that IT firms should prioritise the enhancement of their digital skills in order to effectively develop new digital products that cater to the evolving demands of customers. This discovery aligns with the research conducted by Zhou et al. (2005) and Bughin and Zeebroeck (2017), which posits that a focus on technology is advantageous for fostering innovation in technology-driven contexts. Given the significance of digital capability, it is imperative for IT firms to allocate their resources effectively in order to optimise their inherent capabilities. This can be achieved through various means such as engaging in training programmes, outsourcing certain tasks, or forming collaborations or partnerships with more robust industry participants. Digital capability can be developed through the acquisition of skills, talent, knowledge, and experience in the realm of managing digital technologies. Therefore, it is imperative for IT companies to acquire and attract highly skilled digital professionals. In addition, it is recommended that organisations establish internal programmes and units dedicated to the cultivation of digital skills in order to address any deficiencies in this area. In order to effectively retain and attract individuals with digital expertise, Lewis et al. (2004) propose that human resources professionals should create novel reward systems that align with the values and practises of the digital culture. Regarding policy makers, the results indicate that it would be advisable for government agencies to establish initiatives aimed at reskilling and upskilling the existing workforce. Additionally, it is recommended that efforts be made to introduce younger generations to digital learning at the level of primary school or as soon as is practical in order to prepare them for the future employment. In addition, it is advisable for governments to contemplate allocating additional financial resources towards the enhancement of digital upskilling programmes for small and medium-sized enterprises (SMEs).

The outcomes of this study suggest that firms that actively adopt digital technologies and enhance their ability to effectively manage these technologies are increased propensity for creating novel technological advances. These solutions, in turn, have a positive impact on the overall performance of the organisation. In the ICT industry, characterised by rapid technological advancements and the swift obsolescence of products, it has become imperative for IT firms to cultivate a digitally oriented culture. This is necessary in order to effectively respond to the constant push of technology and maintain competitiveness within the industry. The mediation effect of digital innovation is particularly noteworthy, as it underscores the instrumental role of digital innovation in facilitating the translation of digital capability and

digital orientation into improved non-financial and financial outcomes. In general, the discovery emphasises the importance of utilising a firm's digital capabilities to drive digital innovation, which in turn has the potential to enhance the firm's overall performance.

CONCLUSION

This research provides insight into the crucial significance of digital capability (DC) and digital orientation (DO) in facilitating DI within information technology (IT) firms operating in the ICT sector of India. The significance of digital capability (DC) and digital orientation (DO) in driving DI underscores the imperative for IT companies to adopt emerging digital technologies and augment their digital competencies in order to meet the evolving needs of both consumers and businesses. Moreover, the presence of DI as a mediator in the association between digital orientation, digital capability, and organisational performance highlights the significant importance of digital innovation in converting digital-oriented practises and capabilities into concrete business results. This research offers valuable insights for information technology (IT) companies, policymakers, and industry stakeholders. It highlights the importance of investing in digital upskilling programmes, cultivating a digital mind-set, and effectively leveraging digital technologies. These actions are crucial for promoting innovation and improving overall organisational performance in the ever-changing digital landscape of the information and communication technology (ICT) industry.

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