Journal of Organizational and End User Computing
Volume 34 • Issue 8

Digital Technology Adoption and Sustainable Development Performance of Strategic Emerging Industries:

The Mediating Role of Digital Technology Capability and the Moderating Role of Digital Strategy

Xing Li, Jiangsu Normal University, China
Ting Wu, Anyang University, China
Hongjuan Zhang, Wuhan University of Science and Technology, China*
https://orcid.org/0000-0003-3483-9560
Deyan Yang, Jiangsu Normal University, China

ABSTRACT

Although digital technology adoption has received more attention from researchers in the field of innovation management research, the micro mechanism of the impact of digital technology adoption on the sustainable development of enterprises has not been fully investigated. The objective of this study is to identify the existing relationships between digital technology adoption, digital technology capability, digital strategy, and sustainable development performance of strategic emerging industries. A theoretical conceptual model was developed that analyzed the primary data from 385 sample enterprises in strategic emerging industries. The results indicated that digital technology adoption had a positive influence on both enterprises' economic performance and environmental performance in strategic emerging industries. Digital technology capability played a mediating role in the relationship between digital technology adoption and enterprises' economic performance and environmental performance. And digital strategy strengthened the influence of digital technology adoption on enterprises.

KEYWORDS

Digital technology adoption, Digital technology capability, Digital strategy, Strategic emerging industries, Sustainable development performance

INTRODUCTION

In recent years, sustainable development has always been a major challenge that human beings need to face. All countries in the world are actively thinking about how to promote the transformation of national sustainable development in order to seek effective ways to solve economic, social, and environmental challenges at the same time. Therefore, in the context of facing the increasing depletion of resources, the worsening of ecological pollution, and the deepening of a new round of technological and industrial changes, strategic emerging industries—as a new engine and an important carrier to

DOI: 10.4018/JOEUC.315645
*Corresponding Author

promote the high-quality development of China's economy—are undoubtedly an important issue in terms of how to achieve sustainable development with new energy levels in the new development pattern. With their vigorous development and comprehensive penetration, digital technologies have become a new engine to promote the transformation and upgrading of enterprises, and to achieve quality and efficiency of the economy (Chen et al., 2020), thereby providing an unprecedented opportunity for strategic emerging industries to achieve sustainable development. More and more enterprises are applying digital technologies in their business management practices to effectively solve various problems encountered in innovation (Wang et al., 2022). The converging applications of digital technologies can break through enterprise boundaries and industry barriers, provide digital value cyberspace for enterprises through information structure adjustment, organizational structure change, and advanced production, and realize intelligent transformation management innovation (Liu et al., 2020). Therefore, the emergence and wide application of digital technologies has largely changed the intrinsic nature of innovation (Yan et al., 2021). In terms of the real situation, most enterprises in China are still in the exploration stage for the application of digital technologies and how to apply digital technologies to improve the sustainable development performance (SDP) of strategic emerging industries has become a hot issue of concern among managers and academics alike (Wang & Du, 2021).

It has been shown that digital technology adoption (DTA) increases innovation potential (Li et al., 2020; Martínez-Caro et al., 2020). Scholars generally agree that digital technologies create opportunities for innovation and entrepreneurship by changing the mechanisms of value creation and value capture (Bresciani et al., 2018; Brock & Von Wangenheim, 2019; Usai et al., 2021) and contribute positively to the improvement of innovation competitiveness (Li, 2022; Wang et al., 2022). Thus, the positive influence of DTA on innovation would appear incontrovertible. However, DTA may enhance competitive dynamics in the business environment while imposing environmental burdens on enterprises (Kiel et al., 2017); furthermore, how DTA affects enterprises' SDP is not well understood. Meanwhile, studies on DTA and enterprises' innovation performance have tended to focus on the direct influence of DTA on innovation performance (Hensen & Dong, 2019; Wang & Wang, 2019), while the underlying mechanisms by which DTA affects enterprises' SDP are not clear, yet.

Although digital technology itself is conducive to improving enterprise management efficiency, organizations must also have appropriate systems such as strategies and capabilities. Currently, although the development of digital technologies has reconfigured the process and coordination mechanism of enterprise innovation, it has become critical for enterprises to rapidly enhance their digital technology capabilities if they are to truly reap the innovative effects of digital technology (Wang et al., 2022). Digital technology capability (DTC) is important for achieving digital innovation and is an important prerequisite for enterprises to gain competitive advantage and sustainable performance (Annarelli et al., 2021). It has been found that limited capabilities are an important factor that hinders enterprises' processes of digital transformation (Sabai, 2019). As innovation resources continue to be digitized, enterprises' innovation must combine their own characteristics of digital technologies (Nambisan et al., 2019) and have the innovation ability of digital-related technologies (Nasiri et al., 2020). Although some studies support the relationship between technology capabilities and innovation from resource-based and dynamic capabilities theories, few studies have investigated how enterprises build digital technological capabilities. Only a few studies support the influence of digital capabilities on digital innovation, and the mechanism by which digital technology capabilities affect the enterprises' SDP is unclear (Tortora et al., 2021).

In addition, digital strategy (DS) has received increasing attention with the emergence of new and powerful digital technologies (Nambisan et al., 2019). The role of strategic orientation in improving the innovative performance of enterprises has been emphasized (Morgan & Anokhin, 2020), and it has been argued that digital strategies can help enterprises cope with changing economic conditions and improve the development and utilization of resources, thus achieving sustained competitive advantage through enhanced innovation potential (Ardito et al., 2021). However, in the complex

digital economy, DS is a core element in sustaining enterprises' competitive advantage—yet, existing research has not fully explored how it amplifies or inhibits the impact of the relationship between DTA and enterprises' SDP. In other words, scant literature has explored the impact of DTA on enterprises' SDP from the perspective of DS.

Therefore, this paper aims to focus on the links between DTA, DTC, digital strategies, and SDP of enterprises in strategic emerging industries, and tries to address the following research questions: Firstly, does DTA have an impact on the SDP of enterprises? What are the intrinsic mechanisms? Secondly, does DTC translate DTA into better SDP of enterprises? Thirdly, whether digital strategies can strengthen the contribution of DTA to the SDP of enterprises. This study adds new insights to the theory linking digital innovation and SDP. Firstly, this study integrates the relationship between DTA, DTC, DS, and SDP, providing a new conceptual framework for sustainable development research, expanding the breadth of this topic and clarifying the impact mechanisms of DTA empowering enterprises' SDP. Secondly, by introducing DTC and DS, we empirically test the relationship between DTA and enterprises' SDP and expand the boundary conditions of the relationship between them, and clarify the mechanism of the role of DTC and DS.

LITERATURE BACKGROUND AND HYPOTHESES DEVELOPMENT

Digital Technology

As digital technologies become more deeply embedded in enterprises' management process, academics are gradually beginning to focus on enterprises' digital transformation (Xiao & Qi, 2019). Some scholars also propose that digital technology refers to products or services embedded in information and communication technologies or integrating information technology (Fitzgerald et al., 2014). Digital technology is a key foundation for acquiring, utilizing, and managing data, a core means to reduce business costs, reduce duplication of effort, and enhance productivity, and an important tool for resource allocation, organizational boundary reconfiguration, and business model innovation (Liu et al., 2022). Currently, digital technologies have fundamentally changed business strategies, corporate capabilities, and products and services in extended business networks, and largely altered the innovation logic, innovation models, and innovation processes of various innovation agents (Meng et al., 2021).

It has been shown that DTA helps to improve enterprises' economic performance (ECP). DTA can help enterprises optimize their organizational structure, promote rapid business service-oriented changes, and create a flexible and efficient governance environment for their production and operations (Li, 2022). The accurate use of digital technologies by enterprises can help optimize their operational processes and improve the efficiency of organizational operations (Mubarak & Petraite, 2020), and further shorten the product development and production cycle. The use of digital technology and the platforming of digital innovation achieve more efficient production management (Huang et al., 2019), improve the resource efficiency and information transfer in the process of digital management (Qi & Xiao, 2020), break the geographical limitation of digital innovation agents (Yan et al., 2021), and reduce the enterprises' market transaction costs, communication and coordination costs, and operation costs. Using cloud computing and big data technology, enterprises can effectively collect the massive volume of available product and market information and better predict market trends and movements to respond to dynamic market changes (Blichfeldt & Faullant, 2021). At the same time, by using digital technology to continuously focus on consumers' potential needs, competitors' dynamics, and industry frontier information (Jiao, 2020), enterprises can achieve accurate capture of users' diverse needs and promote product innovation toward a more personalized and differentiated trend (Li, 2022). In addition, digital technology enhances the ability of enterprises to transfer and reorganize knowledge and absorb external heterogeneous knowledge in an open posture (Wang & Du, 2021), and enables internal knowledge to be reorganized by analyzing and organizing massive data to realize the transformation from knowledge discovery to value creation, which in turn enables scientific management decisions (Liu et al., 2020). Ultimately, this leads to the transformation of enterprises

from traditional innovation networks to innovation ecosystems with complementarities, thus affecting their competitive advantage (Ren & Deng, 2022). Therefore, we proposed the following hypothesis:

Hypothesis One: DTA has a positive impact on enterprises' ECP.

It has been shown that there is a positive relationship between DTA and environmental performance (ENP). Some researches show that improving the DTA can more effectively allocate enterprise resources, promote organizations' environmental awareness and innovation ability, and enable enterprises to more actively adjust value chain activities. This allows enterprises to obtain competitive advantages while voluntarily reducing environmental pollution, thereby realizing sustainable development (Tao et al., 2017).

In addition, the use of digital technologies provides an effective solution for enterprises' green development. Enterprises can use digital technology to collect, analyze, and process market information to formulate a green development strategy for market demand (Jabbour et al., 2018). Also, they can use digital technology to achieve automatic optimization of production processes, improve resource efficiency throughout production and operation management (Dubey et al., 2019), and better control various energy consumption and unexpected output in the production and operation process (Gobbo et al., 2018), thereby reducing the damage to the environment caused by enterprises. Thus, digital technologies tend to improve ENP by developing environmentally friendly products and enabling green manufacturing processes (Li et al., 2020; Stock et al., 2018). Therefore, we proposed the following hypothesis:

Hypothesis Two: DTA has a positive impact on enterprises' ENP.

Digital Technology Capability

To succeed and be competitive in the digital economy, enterprises need technical and organizational capabilities. Enterprises have started to optimize and improve process efficiency through digital tools to ensure business continuity. Therefore, DTC is becoming increasingly popular due to the changing and turbulent environment (Zhen et al., 2021). According to Boland et al. (2016), digital technology capabilities are those that enable organizations to create opportunities to support their competitive advantage. Sebastian et al. (2017) suggest agility, rapid innovation, accessibility, efficiency, scalability, predictability, reliability, and integration as sources of DTC. Wang et al. (2020) consider DTC as the skills, talents, and expertise that support enterprises to manage digital technologies related to the enterprises, which can be flexibly adapted to different domains and specific needs. Liu et al. (2022) consider DTC to be the core of digital technology, consisting of three dimensions: digital foundation capabilities, digital integration capabilities, and digital empowerment capabilities. DTC helps enterprises to perceive and seize opportunities and coordinate digital innovation. Therefore, DTC is crucial in transforming traditional enterprises into high-performing enterprises in the process of adopting digital technology (Weill & Woerner, 2018).

Dong and Yang (2019) argue that DTC helps organizations acquire and reorganize knowledge to create new knowledge and succeed in the innovation process. Khin and Ho (2019) confirm the positive impact of DTC on enterprise performance. Wang et al. (2020) argue that DTC focuses on leveraging underdeveloped resources to uncover new potential demand, which, in turn, leads to new product combinations and breakthroughs. Wang et al. (2022) argue that, when digital capabilities are utilized and managed, they help integrate and invoke digital technologies to accelerate the improvement of enterprise performance. Marchiori et al. (2022) argue that IT capabilities positively impact organizational innovation and can improve organizational performance. Heredia et al. (2022) argue that digital capabilities contribute to organizational performance by reducing costs and increasing

flexibility, thus positively influencing the ECP of enterprises. Therefore, we proposed the following hypothesis:

Hypothesis Three: DTC plays a mediating role between DTA and enterprises' ECP.

Amidst growing environmental problems, enterprises must meet stakeholders' increasing demands for environmental sustainability and continuously improve their ENP. Previous studies tested the correlation between DTC and ENP (Ghobakhloo, 2020; Pappas et al., 2018). Enterprises with strong DTC can facilitate the flow of information at a lower cost, coordinate all resources in the operation and production process, and improve the efficiency of resource utilization. Xiao and Qi (2019) argue that DTC reduces the limitation of information asymmetry on the transfer of resources, information and other elements to achieve intra-firm optimization of resource allocation to achieve intra-firm optimization of resource allocation, which helps enterprises to further improve the efficiency of resource utilization. In addition, enterprises with strong DTC can use digital technology to effectively assess resource waste and pollutant recovery potential, and to reduce the negative impact on the environment during business production (Ou, 2021). Beier et al. (2018) argue that more transparent and real-time data information can increase the sustainable management of enterprises in the business production process and reduce the negative impact on the environment. Therefore, we proposed the following hypothesis:

Hypothesis Four: DTC plays a mediating role between DTA and enterprises' ENP.

Digital Strategy

The wave of digitalization is radically expanding the relationships among key enterprises in business networks, and IT strategies are merging with business strategies to form digital business strategies (Luo & Zhao, 2022). DTA has penetrated into a wider range of organizations beyond the existing traditional business boundaries, requiring enterprises to develop a DS to coordinate the entire transformation in conjunction with their strengths, including a digital action agenda and vision for the future to achieve set goals and enhance competitiveness (Matt et al., 2015; Wang et al., 2022). Bouncken and Barwinski (2020) point out that digital technologies are best implemented when enterprises have a clear and consistent strategic direction to share digital commitments. Bharadwaj et al. (2013) argue that DS is the strategic underpinning of all digital initiatives and that, to maintain DS, enterprises should comprehensively gather the required information for strategic planning and identify risks and opportunities in a timely fashion. Matt et al. (2015) argue that DS involves the transformation of products and services. Wang et al. (2022) argue that DS emphasizes the application of digital technologies and methods in products/services, processes, and business models, which provides guidelines for digital transformation objectives, processes, and control systems.

Because innovation activities through digital technologies are considered dynamic and challenging, DS has become one of the important factors necessary for enterprises to implement digitalization (Wan, 2022). Established research shows that enterprises which implement a DS are usually tolerant of risk and open to change, which facilitates the exploitation of potential digital opportunities and thus stimulates innovation potential. In contrast, enterprises that lack a DS often make poor decisions and waste resources (Hess et al., 2016). Enterprises that promote a DS tend to adopt digital technologies across all their business areas, connecting previously unrelated product areas through digital technologies, which in turn leads to new product combinations and increased profit sources (Wang et al., 2022). Nambisan et al. (2019) argue that pursuing a digital direction has an impact on the development and acquisition of new skills, competencies and knowledge, which are important resources that contribute to the introduction of new products or processes. Therefore, deploying a DS can help enterprises effectively manage scarce resources such as new skills and knowledge, which

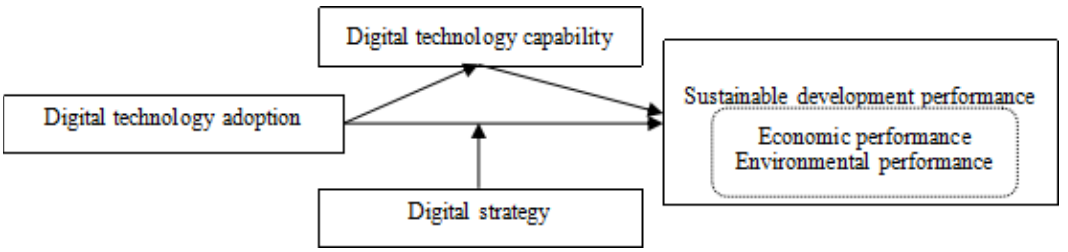
can in turn improve internal workflows and advance product or service innovation, thereby positively impacting corporate innovation (Wang et al., 2022). A DS will promote the application of digital technology for value creation and innovation activities because of its strategic innovation, which can in turn enhance the innovation capability of enterprises and significantly contribute to innovation performance (Xiao & Li, 2020).

Of course, the DS will also strengthen the environmental orientation of enterprises in the process of applying digital technologies and reduce the negative impact of enterprises on the environment through digital commitment. By applying digital technology, enterprises are guided to continuously improve their resource and energy efficiency and productivity, and to reduce the impact of various production activities on environmental quality. At the same time, by effectively regulating and assessing the environmental impact of the production process, the emission of additional environmental pollutants is reduced or even curbed, thus bringing great potential for achieving sustainable development (Ou, 2021). Therefore, we proposed the following hypotheses:

Hypothesis Five: The impact of DTA on enterprises' ECP is moderated by DS.
Hypothesis Six: The impact of DTA on enterprises' ENP is moderated by DS.

In this sense, Figure 1 shows a theoretical model of the above hypotheses.

Figure 1. Theoretical Model



METHODOLOGY

Sample and Data Collection

To achieve the research objectives and answer the research questions, in this study we used a questionnaire to collect data and tested the relationship between variables by analyzing the survey data to test the hypotheses. During the scale design process, we tried to select measurement scales with high reliability and validity that have been widely accepted and applied by drawing on relevant research results that have been published in authoritative journals. At the same time, we invited several scholars and industry experts to conduct a discussion, and we revised the scale to form the final research questionnaire based on the feedback results.

We conducted this study online. We distributed the link to the questionnaire online, and we selected enterprises of strategic emerging industries, mainly from Jiangsu Province in China. Because the questionnaire deals with digital innovation and enterprises' SDP, this research mainly targets the middle and senior managers of the strategic planning department and information department to ensure that they have a more accurate understanding of the digital innovation of enterprises. We obtained valid research questionnaires from 439 enterprises; 13 enterprises did not apply digital technology

and 41 enterprises' industry types did not belong to the strategic emerging industries, so we finally selected 385 enterprises' research questionnaires as the data source for the study.

Table 1. *Descriptive Statistics*

Variable	Attribute	Frequency	Percentage
Age	<3 years	5	1.3%
	4–7 years	153	39.74%
	8–10 years	156	40.52%
	>10 years	71	18.44%
Number of employees	<100 employees	47	12.21%
	101–500 employees	150	38.96%
	501–1000 employees	121	31.43%
	1001–1500 employees	46	11.95%
	>1501 employees	21	5.45%
Industry	Energy conservation and environmental protection industry.	52	13.50%
	A new generation of information technology industry.	41	10.65%
	High-end equipment manufacturing industry.	57	14.80%
	New energy automotive industry.	44	11.43%
	Biology industry.	39	10.13%
	New material industry.	53	13.77%
	Digital creative industry.	46	11.95%
	New energy industry.	53	13.77%

Measures

To ensure the reliable reliability of the measured variables (table 1), we optimized all the questions based on the developed scales, combined with case study results. We measured all the variables in this paper with a five-point Likert scale, ranging from 1 "strongly disagree" to 5 "strongly agree" as used by Pan (2018) and Zhang and Zhang (2022).

Independent Variable

According to Eller et al. (2020), the measurement of DTA consists of five questions, which mainly reflect enterprises' adoption of technologies such as the Internet of things, 5G networks, big data, cloud computing, and digital twin.

Dependent Variable

According to Ren et al. (2017), Raguseo and Vitari (2018), and Maroufkhani et al. (2020), ECP is measured by five questions that capture the gains in revenue, sales growth, market share, and customer satisfaction. According to Li et al. (2020) and Aftab et al. (2022), ENP is also measured by five questions, which mainly reflect the achievements in reducing energy costs and emissions, and waste.

Moderating Variable

According to Khin and Ho (2019), Dong (2021), and Liao et al. (2022), the measurement of DTC consists of six questions, which mainly reflect the ability of enterprises to acquire digital technology and the ability of enterprises to apply digital technology in developing products/services/processes, discovering new markets, and improving the efficiency of resource utilization.

Mediating Variable

According to Khin and Ho (2019), and Eller et al. (2020), the measurement of DS consists of five questions, which mainly reflect the strategic orientation of enterprises in applying digital technologies in the innovation process, environmental governance, improving customer experience, and enhancing innovation capabilities.

Control Variable

To exclude the interference of enterprise characteristics on the research results, in this paper we used enterprise age and size as control variables. The length of time an enterprise has been established is divided into four levels, with "1" indicating that the enterprise has been established for less than three years and "4" indicating that the enterprise has been established for more than 10 years. The size of the enterprise is divided into five levels according to the number of employees, with "1" indicating that the number of employees is less than 100 and "5" indicating that the number of employees is more than 1501.

Reliability and Validity

Table 2 shows the factor loadings, average variance extracted (AVE), composite reliability (CR), and Cronbach's α on all variables. We applied a factor loading above 0.6, a Cronbach's α and CR above 0.7, and AVE above 0.5 (Eller et al., 2020; Zhang & Zhang, 2022). The Cronbach's α values for DTA, DTC, DS, ECP, and ENP are 0.824, 0.8908, 0.87, 0.894, and 0.946, respectively, indicating that the reliability of the data is good. The factor loadings are all greater than 0.6, CR is all greater than 0.8, and AVE is all greater than 0.5, indicating the good convergent validity of the model.

Table 2. *Reliability and Validity Analysis of the Scale*

	Measures	EFA	α	CR	AVE
	DTA		0.824	0.880	0.595
DTA1	We have used the Internet of Things.	0.76			
DTA2	We have used a 5G network.	0.82			
DTA3	We have used big data.	0.81			
DTA4	We have used cloud computing.	0.77			
DTA5	We have used digital twins.	0.69			
	DTC		0.908	0.937	0.713
DTC1	We can obtain important digital technologies.	0.86			
DTC2	We can use digital technology to support the enterprise development strategy.	0.81			
DTC3	We can use digital technology to develop innovative products/services/processes.	0.93			
DTC4	We can use digital technology to discover and respond to new market demands.	0.91			

Table 2 continued on next page

Table 2 continued

	Measures	EFA	α	CR	AVE
DTC5	We can use digital technology to assess the potential of resource waste and pollutant recovery.	0.75			
DTC6	We can use digital technology to improve the efficiency of resource utilization.	0.79			
	DS		0.870	0.910	0.671
DS1	We are committed to using digital technology to develop our new solutions.	0.85			
DS2	We are always looking for opportunities to use digital technology in innovation.	0.77			
DS3	We use digital technology to improve customer experience and engagement.	0.86			
DS4	We use digital technology to improve the innovation ability.	0.85			
DS5	We pay close attention to the application of digital technology in environmental governance.	0.76			
	ECP		0.894	0.923	0.707
ECP1	We can get more substantial benefits.	0.87			
ECP2	We can launch new products or services faster.	0.85			
ECP3	We have a better market share.	0.87			
ECP4	We can improve customer satisfaction.	0.78			
ECP5	We have better sales growth.	0.83			
	ENP		0.946	0.959	0.823
ENP1	We have reduced energy costs.	0.83			
ENP2	We have reduced environmental impacts and risks to the public.	0.86			
ENP3	We have reduced exhaust emissions.	0.95			
ENP4	We have reduced waste (wastewater and solid pollutants) emissions.	0.95			
ENP5	We have reduced the consumption of harmful/toxic substances.	0.94			

RESULTS

Descriptive Statistics and Correlations

Table 3 shows the descriptive statistics and correlations of the variables. We found that DTA (β=0.776, $p<0.01$), DS (β=0.724, $p<0.01$), ECP (β=0.552, $p<0.01$), and ENP (β=0.494, $p<0.01$) are significantly and positively correlated. DTC is positively related to ECP (β=0.605, $p<0.01$) and ENP (β=0.556, $p<0.01$). DS is also significantly and positively correlated with ECP ($\beta = 0.720$, $p<0.01$) and ENP (β=0.641, $p<0.01$), which provides preliminary evidence to test the hypothesis of the subsequent study.

Table 3. *Descriptive Statistics and Correlations of the Variables*

Variable	Mean	SD	DTA	DTC	DS	FP	EP	AGE	SIZE
DTA	3.73	0.57	1.000						
DTC	4.03	0.52	0.776***	1.000					
DS	3.94	0.44	0.724***	0.771***	1.000				
FP	3.96	0.38	0.552***	0.605***	0.720***	1.000			
EP	4.03	0.41	0.494***	0.556***	0.641***	0.631***	1.000		
AGE	2.76	0.76	0.361***	0.234***	0.284***	0.236***	0.167***	1.000	
SIZE	2.59	1.03	0.387***	0.431***	0.296***	0.228***	0.204***	0.539***	1.000

Note. ***p<0.01.

Hypothesis Testing

To test the research hypotheses we proposed in this paper, we analyzed the influence of DTA on the SDP of strategic emerging industries using stata15, taking into account the mediating effect of DTC, the moderating effect of DS, and the effect brought by firm age and firm size.

Table 4. *Regression Results for Mediation Effect and Moderation Effect*

Dependent variable	DTC	ECP			ENP		
	Model1	Model2	Model3	Model4	Model5	Model6	Model7
Constant	1.482*** (13.58)	2.578*** (23.64)	2.048*** (16.49)	0.526* (1.84)	2.737*** (22.34)	2.048*** (16.49)	0.579* (1.69)
AGE	-0.109*** (-4.25)	0.021 (0.84)	0.060** (2.47)	0.035 (1.64)	-0.136 (-0.48)	0.026 (0.92)	0.001 (0.03)
SIZE	0.116*** (6.07)	-0.013 (-0.07)	-0.429** (-2.29)	-0.007 (-0.42)	0.011 (0.50)	-0.031 (-1.47)	0.005 (0.30)
DTA	0.682*** (21.89)	0.354*** (11.39)	0.111** (2.53)	0.406*** (4.31)	0.350*** (10.02)	0.104** (2.09)	0.425*** (3.75)
DTC			0.357*** (7.47)	0.851*** (10.73)		0.361*** (6.63)	0.831*** (8.74)
DS				0.796*** (9.2)			0.760*** (7.34)
DTA*DS				0.093*** (4.19)			0.095*** (4.57)
R^2	0.637	0.301	0.389	0.526	0.239	0.316	0.425
F	225.34	56.06	62.04	89.67	41.22	45.38	57.77

Note. ***p<0.01, **p<0.05, and *p<0.1.

Impact of Digital Technology Adoption on Sustainable Development Performance of Strategic Emerging Industries

We conducted multiple regression analysis with DTA as the independent variable, ECP and ENP as the dependent variables, and enterprise age and size as the control variables (table 4). Model2 shows the impact of DTA on ECP; the results show that DTA has a significant positive impact on ECP (β=0.354, t=11.39, p<0.01) and Hypothesis One is supported. Model4 is the effect of DTA on ENP; the results of the study show that DTA also has a significant positive effect on ECP (β=0.350, t=10.02, p<0.01) and Hypothesis Two is supported. Therefore, we conclude that DTA has a positive impact on the SDP of strategic emerging industries.

Mediating Effect of Digital Technology Capability

We added DTC to Model2 and applied Model3 to test the mediating role of DTC between DTA and ECP; the results showed that DTA was significantly and positively related to DTC (β=0.682, t=21.89, p<0.01), and that DTC also had a significant positive impact on ECP (β=0.357, t=7.47, p<0.01). In addition, we also found that although the effect of DTA on ECP remained significant after adding DTC (β=0.111, t=2.53, p<0.05); the correlation coefficient decreased from 0.354 to 0.111, which indicates that DTC plays a partially mediating role between DTA and ECP, and Hypothesis Three was supported.

We added DTC to Model5 and applied Model6 to test the mediating role of DTC between DTA and ENP, and the results showed that DTC had a significant positive effect on ENP (β=0.361, t=6.63, p<0.01). In addition, we found that although the effect of DTA on ENP remained significant after adding DTC (β=0.104, t=2.09, p<0.05), the correlation coefficient decreased from 0.350 to 0.104, which also indicates that DTC plays a partially mediating role between DTA and ENP, and Hypothesis Four was supported. Therefore, we believe that DTC plays a mediating role between DTA and SDP of strategic emerging industries.

Moderating Effect of Digital Strategy

We added the interaction term between DTA and DS in Model3 and applied Model4 to test the moderating effect of DS between DTA and ECP; the results showed that the interaction between DTA and DS had a significant effect on ECP (β=0.093, t=4.19, p<0.01). In addition, we found that the significance of DTC affecting ECP was enhanced by the inclusion of DS (β=0.851, t=10.73, p<0.01) and its correlation coefficient increased from 0.357 to 0.851. The significance of DTA affecting ECP was similarly enhanced (β=0.406, t=4.31, p<0.01), with its correlation coefficient increasing from 0.354 to 0.406, which indicates that DS strengthens not only the impact between DTC on ECP, but also the impact of DTA on ECP, and Hypothesis Five is supported.

We added the interaction term between DTA and DS in Model6 and applied Model7 to test the moderating effect of DS between DTA and ENP; the results showed that the interaction between DTA and DS had a significant effect on ENP (β=0.095, t=4.57, p<0.01). In addition, we found that the significance of DTC affecting ENP was enhanced by the inclusion of DS (β=0.831, t=8.74, p<0.01), and its correlation coefficient increased from 0.361 to 0.831. The significance of DTA affecting ENP was also enhanced (β=0.425, t=3.75, p< 0.01), and its correlation coefficient increased from 0.350 to 0.425, which indicates that DS not only strengthens the impact between DTC and ENP, but also the impact of DTA on ENP, and Hypothesis Six is supported. Therefore, we believe that DS can strengthen the impact of DTA on the SDP of strategic emerging industries.

Robustness Test

To further clarify the mediating relationship between DTC in DTA and SDP of strategic emerging industries, we applied the bootstrap method to test the robustness of the mediating role. We set the sample size at 1000 and the confidence level is 95% (table 5).

Table 5. *Results for Robust Test*

Dependent variable	DTC	ECP	ENP
Constant	1.377*** (12.36)	2.159*** (18.24)	2.261*** (16.89)
AGE	-0.109*** (-4.25)	0.060** (2.47)	0.026 (0.92)
SIZE	0.116*** (6.07)	-0.043** (-2.29)	-0.031 (-1.47)
DTA	0.710*** (24.08)	0.137*** (3.26)	0.112*** (2.35)
DTC		0.319*** (6.96)	0.336*** (6.49)
Robustness test		Ind_eff Std Err 95%CI 0.227 0.058 [0.120, 0.351] Dir_eff Std Err 95%CI 0.137 0.070 [0.005, 0.277] Tot_eff Std Err 95%CI 0.364 0.046 [0.279, 0.457]	Ind_eff Std Err 95%CI 0.239 0.653 [0.114, 0.375] Dir_eff Std Err 95%CI 0.112 0.079 [0.044, 0.270] Tot_eff Std Err 95%CI 0.351 0.051 [0.251, 0.464]

Note. ***p<0.01 and **p<0.05.

With ECP as the dependent variable, the indirect effect of DTA through DTC on ECP was 0.227 with a 95% confidence interval of [0.120, 0.351] excluding 0. The direct effect was 0.137 with a 95% confidence interval of [0.005, 0.277] excluding 0. The total utility was 0.364 with 95% confidence interval of [0.279, 0.457] excluding 0. In addition, we found that DTC still had a significant positive effect on ECP (β=0.319, t=6.96, p<0.01), and the significance of DTA affecting ECP was also reduced (β=0.137, t=3.26, p<0.01), which suggests that DTC plays a partially mediating role between DTA and ECP.

With ENP as the dependent variable, the indirect effect of DTA affecting ENP through DTC is 0.239 with a 95% confidence interval of [0.114, 0.375] excluding 0. the direct effect is 0.112 with 95% confidence interval of [0.004,0.270] excluding 0. The total utility is 0.351 with a 95% confidence interval of [0.251,0.464] excluding 0. In addition, we found that DTC still had a significant positive effect on ENP (β=0.336, t=6.49, p<0.01), and the significance of DTA affecting ENP was also reduced (β=0.112, t=2.35, p<0.01), indicating that DTC plays a partially mediating role between DTA and ENP.

DISCUSSION AND CONCLUSION

Main Findings

Sustainability has always been an important challenge for enterprises, and digital transformation offers the possibility to enhance enterprises' search for effective ways of addressing economic, social, and environmental challenges simultaneously. Furthermore, enterprises with strong digital technologies can better balance the relationship between the economy, society, and the environment. At the same time, enterprises with strong digital capabilities can integrate the concept of sustainability into their business strategies, which offers great potential for achieving sustainable development (Ou, 2021). This study aimed to deepen the understanding of digital technology and sustainability. Specifically, the purpose of this paper was to analyze the relationship between DTA, DTC, DS, and SDP of enterprises.

This is a topic that deserves to be explored in depth, considering the global climate change issue and the important role that digital technologies may play in achieving sustainable development.

In this paper, we collected 385 data samples from enterprises in strategic emerging industries through a questionnaire, and we conducted an empirical study on the relationship between DTA, DTC, DS, and SDP, revealing the mechanism of the impact of DTA on SDP, the mediating effect of DTC, and the moderating effect of DS. We found that DTA has a positive impact on enterprises' ECP as well as ENP in strategic emerging industries. This means that, by strengthening R&D investment and R&D intensity in digital technology, enterprises can promote the renewal and upgrading of their digital technology, which in turn lays the foundation for effectively improving their SDP. After the introduction of DTC, we found that the intensity of the positive impact of DTA on the enterprises' ECP and ENP decreases, which indicates that DTC plays a mediating role in the relationship between DTA and SDP. It also implies that enterprises need to focus on improving the flexibility of their digital capabilities, guaranteeing the integration and coordination of digital technologies with their systems through effective screening and analysis of the adopted digital technologies, and continuously improving and managing the ability to use digital technologies. In addition, after the introduction of DS, we found that the intensity of the impact of DTA on economic and ENP has increased, which indicates that DS strengthens the impact of DTA on SDP. It also indicates that enterprises need to proactively analyze the changing market trends and seize the first opportunity of digital transformation to design their digital strategies in a forward-looking manner (Wang et al., 2022).

Management Implications

From the perspective of enterprises, firstly, they should actively promote the development and implementation of DS. Enterprises should fully recognize the new dynamic power of digital technology for sustainable development, seize the opportunity of digital transformation, and actively deploy their digital strategies. By vigorously promoting the process of DS, enterprises should strengthen their investment in the development and application of digital technology, so as to effectively enhance their DTC. Secondly, enterprises should give full play to the innovative empowering effect of DTA and realize the transformation and upgrading based on digital technology. Enterprises should continuously promote the transformation and wide application of digital technologies while promoting the digital conversion and upgrading of internal production and operation, management mode, and support technology. They should guarantee the integration of digital technologies with complex business ecological scenarios and actively use digital technologies to enhance data value creation (Li, 2022). Finally, enterprises should actively build advanced DTC, fully develop the potential value of advanced digital technologies, proactively use digital technologies to carry out digitally enabled innovation activities, and make full use of digital technologies to help achieve sustainable performance (Yang et al., 2022).

On the government level, on the one hand, the government should create a good digital infrastructure environment to provide a resource base for enterprises' sustainable development practices. Special measures include increasing the investment in digital infrastructure, realizing digital participation between different sectors, guiding enterprises to actively carry out digital transformation, creating conditions for the digital development of industries, and promoting intelligent transformation between different industries and different enterprises (Yang et al., 2022; Li and Wang, 2022). On the other hand, the government should strengthen policy support for enterprises. Indeed, the government should actively develop relevant policy measures to provide support for the construction of digital technology and the development of digital innovation. We recommend that the government develop financing, taxation, and subsidy policies that meet the needs of small and medium enterprises' digital transformation and solve various problems they faced in managing digital change (Liu et al., 2021). The government should also improve relevant legal policies, strengthen the protection of data while focusing on appropriate open sharing, mobilize the enthusiasm of enterprises for technological innovation, break down digital barriers, and improve the efficiency of resource utilization (Li, 2022).

Limitations and Future Research Directions

Although the findings of this study provide some implications for theory and practice, it still has some deficiencies. Firstly, in this study we mainly used the questionnaire survey method to obtain cross-sectional data; a better way to reveal the dynamic impact of DTA on SDP in depth may be to conduct a longitudinal case study of digital technology enabling sustainable development of enterprises. At the same time, the limited number of samples we obtained, types of enterprises, and sample distribution areas may limit the generalizability of the research results. Secondly, in this study we focused only on ECP and ENP, which are the two dimensions of enterprises' SDP. In the future, we can include the social dimension of sustainable development to fully explore the relationship between DTA and the SDP of strategic emerging industries. Thirdly, in this study we did not break down DTA, DTC, and DS; future research can introduce more variables and contextual factors into the research framework. Mediating variables such as knowledge-based dynamic capabilities can also be included in the estimation model to dissect in detail the micro-mechanisms by which DTA affects the sustainable development of enterprises.

ACKNOWLEDGMENT

This work was supported by the National Natural Science Foundation of China [No. 72064003], MOE (Ministry of Education in China) Project of Humanities and Social Science (No. 18YJCZH234), Research Project of Philosophy and Social Sciences of Department of Education of Hubei Province [No.20D017], High-Level Project Plan of Wuhan University of Science and Technology [No. W201804], Humanities and Social Science Foundation Project of Ministry of Education [No. 20YJC630185], and Social Science Foundation of Jiangsu Province [No.19GLB003].

REFERENCES

Aftab, J., Veneziani, M., Sarwar, H., & Ishaq, M. I. (2022). Organizational ambidexterity, firm performance, and sustainable development: Mediating role of entrepreneurial orientation in Pakistani SMEs. *Journal of Cleaner Production*, *367*, 132956. doi:10.1016/j.jclepro.2022.132956

Annarelli, A., Battistella, C., Nonino, F., Parida, V., & Pessot, E. (2021). Literature review on digitalization capabilities: Co-citation analysis of antecedents, conceptualization and consequences. *Technological Forecasting and Social Change*, *166*(3), 120635. doi:10.1016/j.techfore.2021.120635

Beier, G., Niehoff, S., & Xue, B. (2018). More sustainability in industry through industrial Internet of Things? *Applied Sciences (Basel, Switzerland)*, *8*(2), 219. doi:10.3390/app8020219

Blichfeldt, H., & Faullant, R. (2021). Performance effects of digital technology adoption and product & service innovation: A process-industry perspective. *Technovation*, *105*, 102275. doi:10.1016/j.technovation.2021.102275

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

Bouncken, R., & Barwinski, R. (2020). Shared digital identity and rich knowledge ties in global 3D printing: A drizzle in the clouds? *Global Strategy Journal*, *55*(2), 1–28.

Bresciani, S., Ferraris, A., & Del Giudice, M. (2018). The management of organizational ambidexterity through alliances in a new context of analysis: Internet of Things (IoT) smart city projects. *Technological Forecasting and Social Change*, *136*, 331–338. doi:10.1016/j.techfore.2017.03.002

Brock, J. K. U., & Von Wangenheim, F. (2019). Demystifying AI: What digital transformation leaders can teach you about realistic artificial intelligence. *California Management Review*, *61*(4), 110–134. doi:10.1177/1536504219865226

Chen, J., Huang, S., & Liu, Y. H. (2020). Operations management in the digitization era: From empowering to enabling. *Management World*, *36*(2), 117–128.

Dong, J. Q., & Yang, C. H. (2019). Information technology and innovation outcomes: Is knowledge recombination the missing link? *European Journal of Information Systems*, *28*(6), 612–626. doi:10.1080/0960085X.2019.1627489

Dong, Z. (2021). Research on the impact of digital capabilities of new enterprises on business model innovation [Unpublished doctoral dissertation, Jilin University, China].

Dubey, R., Gunasekaran, A., Childe, S. J., Papadopoulos, T., Luo, Z., Wamba, S. F., & Roubaud, D. (2019). Can big data and predictive analytics improve social and environmental sustainability? *Technological Forecasting and Social Change*, *144*, 534–545. doi:10.1016/j.techfore.2017.06.020

Eller, R., Alford, P., Kallmünzer, A., & Peters, M. (2020). Antecedents, consequences, and challenges of small and medium-sized enterprise digitalization. *Journal of Business Research*, *112*, 119–127. doi:10.1016/j.jbusres.2020.03.004

Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2014). Embracing digital technology-a new strategic imperative. *MIT Sloan Management Review*, *55*(2), 1–12.

Ghobakhloo, M. (2020). Industry 4.0, digitization, and opportunities for sustainability. *Journal of Cleaner Production*, *252*, 119869. doi:10.1016/j.jclepro.2019.119869

Gobbo, J. A., Busso, C. M., Gobbo, S. C. O., & Carreão, H. (2018). Making the links among environmental protection, process safety, and industry 4.0. *Process Safety and Environmental Protection*, *117*, 372–382. doi:10.1016/j.psep.2018.05.017

Hensen, A., & Dong, J. Q. (2019). Hierarchical business value of information technology: Toward a digital innovation value chain. *Information & Management*, *57*(4), 103209. doi:10.1016/j.im.2019.103209

Heredia, J., Castillo-Vergara, M., Geldes, C., Gamarra, F., & Heredia, W. (2022). How do digital capabilities affect firm performance? The mediating role of technological capabilities in the "new normal.". *Journal of Innovation & Knowledge*, *7*(2), 100171. doi:10.1016/j.jik.2022.100171

Hess, T., Matt, C., Benlian, A., & Wiesböck, F. (2016). Options for formulating a digital transformation strategy. *MIS Quarterly Executive*, *15*(2), 123–139.

Huang, Q. H., Yu, Y. Z., & Zhang, S. L. (2019). Internet development and manufacturing productivity improvement: Internal mechanism and China's experience. *China's Industrial Economy*, (8), 5–23.

Jabbour, A. B. L. D., Foropon, C., & Godinho Filho, M. (2018). When titans meet. Can industry 4.0 revolutionise the environmentally-sustainable manufacturing wave? The role of critical success factors. *Technological Forecasting and Social Change*, *132*, 18–25. doi:10.1016/j.techfore.2018.01.017

Jiao, Y. (2020). Digital economy enables the transformation of manufacturing industry: From value reshaping to value creation. *Economist*, (6), 87–94.

Khin, S., & Ho, T. C. (2019). Digital technology, digital capability, and organizational performance: A mediating role of digital innovation. *International Journal of Innovation Science*, *11*(2), 177–195.

Kiel, D., Müller, J. M., Arnold, C., & Voigt, K. (2017). Sustainable industrial value creation: Benefits and challenges of industry 4.0. *International Journal of Innovation Management*, *21*(8), 1740015.

Laa, B. Sr. (2021). The duality of digital and environmental orientations in the context of SMEs: Implications for innovation performance. *Journal of Business Research*, *123*, 44–56. doi:10.1016/j.jbusres.2020.09.022

Li, W. H., & Wang, F. (2022). Digital innovation, strategic flexibility and enterprise intelligence transformation: Considering the regulatory effect of environmental. *Complexity Scientific research*.

Li, X. Y. (2022). *Research on the impact and mechanism of digital technology driving enterprise innovation*. East China Normal University.

Li, Y., Dai, J., & Cui, L. (2020). The impact of digital technologies on economic and environmental performance in the context of industry 4.0: A moderated mediation model. *International Journal of Production Economics*, *229*, 107777. doi:10.1016/j.ijpe.2020.107777

Liao, M. C., Jiao, Y. S., & Jin, J. M. (2022). *Digital innovation capability of enterprises under innovation ecosystem: connotation reconstruction and scale development*. Soft Science.

Liu, S. C., Yan, J. C., Zhang, S. X., et al. (2021). Can the digital transformation of enterprise management improve the input-output efficiency. *Management World*, (5), 170-190+13.

Liu, X. X., Yang, Y. Q., & Sun, Z. J. (2022). *The construction and evolutionary development of enterprise digital capabilities: A multi-case exploratory study based on leading digital*. Enterprises Reform.

Liu, Y., Dong, J. Y., & Wei, J. (2020). Digital innovation management: Theoretical framework and future research. *Management World*, *36*(7), 198–217.

Liu, Y. Z., Sun, J. S., et al. (2020). Value discovery of big data: 4C model. *Management World, 36*(2), 129-138+223.

Luo, B. Y., & Zhao, S. H. (2022). Research on the impact of digital transformation on the innovation performance of manufacturing enterprises. *Innovative Technology*, (3), 57–68.

Marchiori, D. M., Rodrigues, R. G., Popadiuk, S., & Mainardes, E. W. (2022). The relationship between human capital, information technology capability, innovativeness, and organizational performance: An integrated approach. *Technological Forecasting and Social Change*, *177*, 121526. doi:10.1016/j.techfore.2022.121526

Maroufkhani, P., Tseng, M.-L., Iranmanesh, M., Ismail, W. K. W., & Khalid, H. (2020). Big data analytics adoption: Determinants and performances among small to medium-sized enterprises. *International Journal of Information Management*, *54*, 102190. doi:10.1016/j.ijinfomgt.2020.102190

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

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & Information Systems Engineering*, *57*(5), 339–343. doi:10.1007/s12599-015-0401-5

Meng, Q. S., & Yu, J. (2021). Impact mechanism of digital technology innovation on new generation of information technology industry upgrading. *R & D Management*, *33*(1), 90–100.

Morgan, T., & Anokhin, S. A. (2020). The joint impact of entrepreneurial orientation and market orientation in new product development: Studying firm and environmental contingencies. *Journal of Business Research*, *113*, 129–138. doi:10.1016/j.jbusres.2019.06.019

Mubarak, M. F., & Petraite, M. (2020). Industry 4.0 technologies, digital trust, and technological orientation: What matters in open innovation? *Technological Forecasting and Social Change*, *161*, 120332. doi:10.1016/j.techfore.2020.120332

Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress challenges and key themes. *Research Policy*, *48*(8), 103773. doi:10.1016/j.respol.2019.03.018

Nasiri, M., Saunila, M., & Ukko, J. (2020). Shaping digital innovation via digital-related capabilities. *Information Systems Frontiers*, 1–18.

Ou, Y. Y. (2021). *Research on the impact of digital maturity of construction enterprises on environmental performance*. Chang'an University.

Pan, H. L. (2018). The impact of entrepreneurial absorptive capacity and dual innovation strategy on the growth performance of naturally internationalized enterprises. Science of Science and Management of Science and Technology, (12), 94–110.

Pappas, I. O., Mikalef, P., Giannakos, M. N., Krogstie, J., & Lekakos, G. (2018). Big data and business analytics ecosystems: Paving the way towards digital transformation and sustainable societies. *Information Systems and e-Business Management*, *16*(3), 479–491. doi:10.1007/s10257-018-0377-z

Qi, Y. D., & Xiao, X. (2020). Enterprise management reform in the digital economy era. Management World, (6), 135-152

Raguseo, E., & Vitari, C. (2018). Investments in big data analytics and firm performance: An empirical investigation of direct and mediating effects. *International Journal of Production Research*, *56*(15), 5602–5221. doi:10.1080/00207543.2018.1427900

Ren, S. J.-F., Wamba, S. F., Akter, S., Dubey, R., & Childe, S. J. (2017). Modelling quality dynamics, business value and firm performance in a big data analytics environment. *International Journal of Production Research*, *55*(17), 5011–5026. doi:10.1080/00207543.2016.1154209

Ren, Z. Z., & Deng, F. (2022). Digital technology, factor structure transformation, and high-quality economic development. *Soft Science*, (9), 1–10.

Sabai, K. (2019). Digital technology, digital capability, and organizational performance: A mediating role of digital innovation. *International Journal of Innovation Science*, *11*(2), 177–195. doi:10.1108/IJIS-08-2018-0083

Sebastian, I. M., Ross, J. W., Beath, C., Mocker, M., Moloney, K. G., & Fonstad, N. O. (2017). How big old enterprises navigate digital transformation. *MIS Quarterly Executive*, *16*(3), 197–213.

Stock, T., Obenaus, M., Kunz, S., & Kohl, H. (2018). Industry 4.0 as enabler for a sustainable development: A qualitative assessment of its ecological and social potential. *Process Safety and Environmental Protection*, *118*, 254–267. doi:10.1016/j.psep.2018.06.026

Tao, J., Liu, L., & Zhang, W. G. (2017). The impact of information technology capabilities on enterprise sustainable development performance. *Soft Science*, (10), 10–14.

Tortora, D., Chierici, R., Farina Briamonte, M., & Tiscini, R. (2021). "I digitize so i exist:" Searching for critical capabilities affecting firms' digital innovation. *Journal of Business Research*, *129*, 193–204. doi:10.1016/j.jbusres.2021.02.048

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

Wan, M. F. (2022). *Research on the impact of digital technology adoption on dual innovation of enterprises*. Shandong University of Finance and Economics.

Wang, H. H., & Du, M. (2021). Digital technology, employee participation, and enterprise innovation performance. *Research and Development Management*, (1), 138–148.

Wang, H. H., Li, Y., & Tan, Y. Y. (2022). The impact of digital transformation on enterprise performance based on meta-analysis. *Journal of System Management*, (1), 112–123.

Wang, Q., Wang, C., & Liu, Y. Q. (2020). Retail digital transformation mechanism from the perspective of digital capabilities and value creation capabilities-multi case study of new retail. *Research and Development Management*, *32*(6), 50–65.

Wang, W. L., & Wang, J. (2019). Research on the trend and promotion policy of China's digital economy development. *Economic Aspect*, (1), 69–75.

Weill, P., & Woerner, S. (2018). *What's your digital business model? Six questions to help you build the next-generation enterprise*. Harvard Business Review Press.

Xiao, J. H., & Li, W. T. (2020). The Impact of intelligent manufacturing on enterprise strategic change and innovation: A study from the perspective of resource based change. *Research on Financial Issues*, (2), 38–46.

Xiao, X., & Qi, Y. D. (2019). Value dimension and theoretical logic of industrial digital transformation. *Reform*, (8), 61–70.

Yan, J. Z., Ji, W. Y., & Xiong, Z. (2021). Overview and prospect of digital innovation research. *Scientific Research Management*, (4), 11–20.

Yang, J., Wang, T., Wang, X., & Pang, H. W. (2022). Information technology enabling entrepreneurship: The impact of IT capabilities on entrepreneurial performance. *Scientific Research*, (9), 1649–1660.

Zhang, M. T., & Zhang, S. T. (2022). the influence of relationship network on organizational resilience: The mediation of dual innovation. *Scientific Research Management*, (7), 163–170.

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