

# *A Study of the Impact of Digital Technology Capabilities on Firm Performance—A Moderated Mediation Model*

Yanan Tang<sup>1,a,\*</sup>

<sup>1</sup>*Department of Psychology, School of Education Science, Hunan Normal University, Changsha, China*

<sup>a</sup>*tyn1318@163.com*

<sup>\*</sup>*Corresponding author*

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**Abstract:** Based on the dynamic capability theory and resource base theory, this study analyzes the mechanism of digital technology capability on enterprise performance with 556 questionnaires as data samples from grass-roots employees and middle managers in technology-based enterprises, and explores the mediating role of strategic flexibility and the moderating role of industry opportunities and organizational absorptive capacity. The study shows that: firstly, digital technology capability has a significant contribution to strategic flexibility and a significant contribution to enterprise performance; secondly, strategic flexibility has a mediating effect between digital technology capability and enterprise performance; thirdly, industry technological opportunities play a positive moderating role in digital technology capability and strategic flexibility; and fourthly, organizational absorptive capacity has a positive moderating role between strategic flexibility and enterprise performance. Fourth, organizational absorptive capacity has a positive moderating effect on the relationship between strategic flexibility and firm performance. By exploring the mechanism of digital technology capability and firm performance, this study is of great significance in guiding firms to improve their performance and emphasize organizational absorptive learning capability.

## 1. Introduction

The emergence of artificial intelligence, cloud computing, distributed and other underlying digital technology capabilities has fueled the rapid development of new forms of digital industry such as digital transformation, intelligent supply chain and intelligent manufacturing, and the industrial system has entered the era of digital economy. While digital technology provides support for the booming development of digital economy, it is also gradually introduced into production operations and daily management by enterprises. According to the theory of dynamic capability, in the face of the ever-changing external environment, enterprises must cultivate dynamic capabilities that can effectively respond to environmental changes and resource consumption in order to maintain competitive advantages. Relying on information technology and digital platforms, enterprise organizations can keep abreast of the environment and market information, and support

enterprises to quickly reorganize and optimize the allocation of resources to cope with the environmental changes, so as to enhance their competitive advantages and industry status [1]. Digital technology capability is based on digital technology and digital platform. Digital technology capability is an extended capability based on digital technology, specifically referring to the ability of enterprises to apply digital technology and management expertise in the process of developing new digital products [2]. Digital technology capability is an extended capability based on digital technology. At present, more and more enterprises utilize digital technology to improve enterprise performance. The research on the mechanism of digital technology capability and enterprise performance is still in the exploratory stage.

Digital technology capability has a driving effect on enterprise performance. Specifically manifested in the following aspects: first of all, digital technology capabilities to enhance the enterprise's access to external resources and the organization's internal individual information retrieval advantage, in the accelerated updating of the enterprise organization's internal knowledge accumulation at the same time vigorously promote the integration and coherence of knowledge accumulated in different fields[3] Secondly, digital technology capability has been greatly enhanced. Secondly, the vigorous promotion and application of digital technology can help enterprises and organizations to realize the sharing and flow of internal and external resources, thus avoiding problems such as the lack of core competitiveness and the lack of sustained capacity, and creating a new business development model [4]. The application of digital technology can help organizations realize the sharing and flow of internal and external resources, thus avoiding the problems of lack of core competitive advantages and lack of sustained capabilities, and by creating new business development models [4]. Finally, digital technology capabilities can reduce the hierarchical dispersion of enterprise organizations, create a flat structure, and provide a more flexible and efficient organizational management model for the business of enterprise organizations. Finally, the application of digital technology capabilities can penetrate deeper into the whole process of the supply chain, including upstream cooperative suppliers and downstream customers, and extend the trend of organizational performance to the entire supply chain, which not only helps enterprises to form new thinking modes and solutions in the process of development, but also points out the direction of the future growth of the enterprise and reduces the hindering factors. The greater the degree of development of digital technology, the greater the likelihood that an organization will create valuable products that will contribute to improved business performance.

Strategic flexibility is an enterprise's ability to flexibly mobilize and handle the allocation of internal resources and to construct agile production and operation processes, reflecting the ecological adaptability of an enterprise in a compact and changeable market competitive environment. With the intensification of competition in digital technology, strategic flexibility has become an important ability for enterprise organizations to deploy all kinds of internal resources. According to the resource base theory and dynamic capability theory, the technical capability of an enterprise is an important source of sustainable competitive advantage. In the face of the turbulent enterprise survival environment, if Chinese enterprises want to obtain more production materials, grasp a larger market share and reap excessive market profits in the process of survival and development, they have to improve their technical capability and form and maintain their own competitive ability, which requires them to reallocate resources and rapidly adapt to the changing market environment in a short time. This requires enterprises to reallocate their resources and quickly adjust their original strategies in a short period of time [5]. This requires the rapid reallocation of resources and the rapid adjustment of strategies. Therefore, the improvement of enterprise digital technology capability requires strategic flexibility, which can not only help enterprises to integrate and utilize various resources needed for internal and external survival, but also enable enterprises to utilize and configure social networks, and thus promote the formation of

their core competitiveness [6]. It also enables enterprises to utilize and configure social networks, thus promoting the formation of their core competitiveness. As a new type of knowledge and technology resources, digital technology capability can help enterprises try and develop various strategic approaches more conveniently. For enterprises, the digital technological capabilities acquired by enterprises must be flexibly adjusted by enterprises before they can be further transformed into performance-promoting dynamics [7]. The company's digital capabilities can be further transformed into performance-enhancing dynamics. Enterprises with high digital technological capabilities are able to combine their own resources for restructuring more quickly; at the same time, enterprises with high strategic flexibility can efficiently and timely adjust the state of enterprise organization according to different characteristics of the competitive market environment, so as to achieve performance improvement through resource integration. Therefore, this study hypothesizes that strategic flexibility plays a mediating role in digital technology capability and firm performance.

Industry technology opportunity refers to the degree of stability and performance reform that the entire industry in which a company is located can provide to the company when it comes to performance technology development and digital technology-related resource stockpiling, which influences the company's ability to recognize new technological capabilities ahead of time and the efficiency of carrying out corresponding performance activities [8]. In the case of an industry with low technological opportunities, the process of identifying cutting-edge digital technological capabilities and changes in the market environment will be slower, and the development of emerging digital technological capabilities and R&D investment will be hindered; in the case of a full of technological opportunities in the industry, the enterprise will be able to detect market technological trends in a timely and sharp manner, and make safe technological reserves for the relevant performance technologies and carry out corresponding performance technology activities. Digital technology capability can innovate the enterprise organization coordination ability, and in the background of industry technology opportunity degree is higher, the enterprise will be more sensitive to the development trend of digital technology capability, so as to increase its own digital technology capability for the coordination of the strategic flexibility of the use of the ability to [9]. The study hypothesizes that firms will be more sensitive to the development trends of digital technology capabilities in the context of a higher degree of industry technological opportunity. Therefore, this study hypothesizes that industry technological opportunities have a positive and significant moderating effect on the relationship between digital technology capabilities and strategic flexibility.

Organizational absorptive capacity refers to the ability of an organization to learn, absorb and transform the application of new technological capabilities by making use of its own relevant knowledge reserves or relevant resource advantages. Resource base theory and organizational learning theory suggest that enterprises can acquire resources with competitive advantages through organizational learning, the use of cutting-edge knowledge and technology, and the construction of resource-based external networks, and effectively manage the use of these special resources, so as to enable enterprises to have a better development advantage [10]. The organization will have a better development advantage by effectively managing and using these special resources. In order to make the resources and the organization more closely linked together, the enterprise needs to improve the organizational absorptive capacity, through organizational learning to link people and knowledge together, will be outside the organization of the advantageous type of resources for the enterprise's internal personal and organizational skills and reserves. Enterprises with strong absorptive capacity tend to have rich learning ability, flexible organizational structure, efficient absorption and conversion mechanism, and strong implementation of practical ability, which can improve the enterprise's ability to inspire the new technology and new products and performance

awareness, and then converted into high efficiency and sustainable profits [5]. The strategic flexibility of a company determines its own strategic flexibility. The strategic flexibility of an enterprise determines the degree of flexibility and coordination of digital technology capabilities, and the absorptive capacity affects the efficiency of the enterprise in converting digital technology capabilities into performance effectiveness. The stronger the absorptive capacity, the more the enterprise is able to dismantle and analyze the digital technology capabilities, the greater the breakthrough effect on performance improvement, and the higher the enterprise's ability of corporate performance [2]. Therefore, this study hypothesizes that organizational absorptive capacity has a positive and significant moderating effect on the relationship between strategic flexibility and corporate performance.

In summary, this paper focuses on the following issues: exploring the impact of digital technology capabilities on enterprise performance with strategic flexibility as a mediating variable; to study the moderating effect of industry opportunity on the relationship between digital technology capability and strategic flexibility from the perspective of industry opportunity; and to explore the moderating effect of organizational absorptive capacity on the relationship between strategic flexibility and enterprise performance with organizational absorptive capacity as the entry point to enrich the theoretical results and provide references and lessons to the practice of enterprise performance enhancement. The research model of this paper is shown in Figure 1. The research model of this paper is shown in Figure 1:

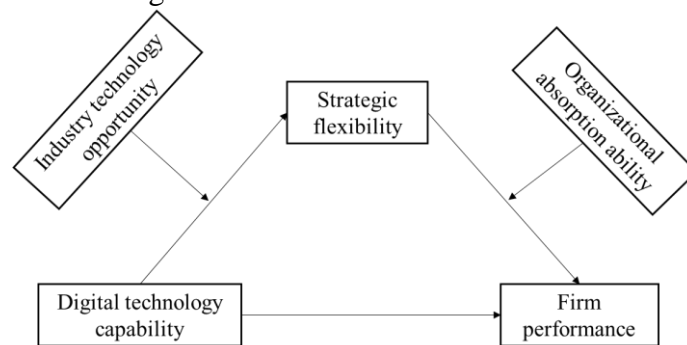


Figure 1: Research model.

## 2. Research Design

### 2.1. Sample Characteristics

To reduce the potential impact of common methodological bias, this study adopted a two-stage longitudinal research design with data collection at two time points, March 2023 and June 2023, respectively, and this research utilized an on-site. All questionnaires were distributed on-site and returned on the spot. At time point 1 (March 2023), we invited research respondents to evaluate digital technology capabilities, strategic flexibility, and firm performance, and to report demographic variables. A total of 675 questionnaires were distributed and 612 valid questionnaires were returned, which is a valid return rate of 90.67%. Two months later, at time point 2 (June 2023), in order to obtain data on technological opportunities and organizational absorptive capacity in the industry of the research sample, we again distributed questionnaires containing the variables of technological opportunities and organizational absorptive capacity in the industry to the 612 respondents who had completed the first questionnaire. In the end, 556 valid questionnaires were obtained, and the validity rate of the questionnaires was 90.85%.

## 2.2. Measurement of Variables

The questionnaires in this study were based on well-established domestic and international scales, and the variables were measured on a classic Likert 5-point scale, with "1" meaning "not at all consistent" and "5" meaning "1" means "not at all" and "5" means "fully conform".

Digital technology capability (DTC) adopts Zhang's The Digital Technology Competency Scale developed with 5 question items [8]. Cronbach's  $\alpha = 0.912$ .

Industry technology opportunities (ITO) adopted Yu's The Industry Technology Opportunities Scale developed by 4 question items [10]. Cronbach's  $\alpha = 0.873$ .

Strategic flexibility (SF) adopts the five-item Strategic Flexibility Scale developed with Chen et al. [11]. Cronbach's  $\alpha = 0.934$ .

Firm performance (FP) adopts Xu's Enterprise Performance Scale was developed with 4 question items [12]. Cronbach's  $\alpha = 0.846$ .

Organizational absorption ability (OAA) used the five-item Organizational Absorptive Capacity Scale developed with Wang et al. Cronbach's  $\alpha = 0.852$ .

## 2.3. Analysis of Results

### 2.3.1. Descriptive Statistics

Pearson's coefficient was utilized to indicate the correlation between the variables, and the specific correlation coefficients are shown in Table 1. As can be seen in Table1, digital technology capabilities are associated with strategic flexibility ( $\beta = 0.479$  ,  $p < 0.01$ ), corporate performance ( $\beta = 0.481$  ,  $p < 0.01$ ) with significant positive correlation, meanwhile, strategic flexibility and enterprise performance ( $\beta = 0.460$  ,  $p < 0.01$ ) has a significant positive correlation. The results of the above correlation analysis provide preliminary evidence for the subsequent hypothesis testing.

Table 1: Descriptive statistics and correlation analysis.

	DTC	SF	FP	ITO	OAA
DTC	1				
SF	0.479**	1			
FP	0.481**	0.460**	1		
ITO	0.043	0.047	-0.086*	1	
OAA	-0.059	0.046	0.053	0.497**	1
M	3.212	3.252	3.213	3.726	3.695
SD	0.952	1.004	0.974	0.900	1.020

Note: \*\* is  $p < 0.01$ , DTC is Digital Technology Capability, ITO is Industry Technology Opportunity, SF is Strategic Flexibility, FP is Firm Performance, and OAA is Organizational Absorptive Ability, below.

### 2.3.2 Validity Analysis

Validity reflects whether the measurement instrument accurately measures the construct to be measured. In this study, convergent validity was tested by validated factor analysis (CFA) with Mplus8. The factor loadings of each scale on each question item were derived from CFA, and the combined reliability (CR) and average extracted variance value (AVE) of each scale were calculated to determine the convergent validity, as shown in Table 2 below. The combined reliability (CR) of all variables was above the acceptable level of 0.80, and the average extracted variance value (AVE) also satisfied the acceptable level of 0.50. Therefore, the measurement question items of each variable reflect the same construct and the aggregation validity of the

variables is good.

Table 2: Convergent validity.

	CR	AVE
DTC	0.913	0.679
SF	0.934	0.741
FP	0.847	0.582
ITO	0.875	0.585
OAA	0.853	0.593

In testing the discriminant validity among the variables, this study used the validated factor analysis of Mplus8 to compare the different factor models to determine the goodness of fit of the data. The results of the comparison are shown in Table 3 below. Compared with the four-factor model, three-factor model, two-factor model, and one-factor model, the five-factor model has the best goodness-of-fit, with a  $\chi^2/df$  of 1.549, which is less than 3. The values of CFI and TLI are 0.985, 0.982, which are greater than 0.9; the values of RMSEA and SRMR are 0.031, respectively, 0.027, which are less than 0.08. Therefore, the five-factor model has the best goodness-of-fit and good discriminant validity among the variables.

Table 3: Distinctive validity.

Mould	$\chi^2/df$	CFI	TLI	RMSEA	SRMR
Five-factor model: DTC, SF, FP, ITO, OAA	1.549	0.985	0.982	0.031	0.027
Four-factor model: DTC+SF, FP, ITO, OAA	7.677	0.810	0.786	0.110	0.087
Three-factor model: DTC+SF, FP+ITO, OAA	14.074	0.624	0.580	0.153	0.165
Two-factor model: DTC+SF, FP+ITO+OAA	18.048	0.505	0.453	0.175	0.185
Single factor model: DTC+SF+FP+ITO+OAA	20.559	0.429	0.372	0.188	0.188

### 2.3.3 Hypothesis Testing

To test the mediating role of strategic flexibility, model 4 of the SPSS macro program PROCESS was used to test the mediating role of strategic flexibility between digital technological capabilities and firm performance, and the results showed that digital technological capabilities significantly predicted strategic flexibility,  $a=0.505$ ,  $SE=0.039$ ,  $p<0.001$ ; digital technological capabilities and strategic flexibility entered the regression equation simultaneously, digital technological capability significantly predicts firm performance,  $c'=0.346$ ,  $SE=0.138$ ,  $p<0.001$ , and strategic flexibility significantly predicts firm performance,  $b=0.289$ ,  $SE=0.039$ ,  $p<0.001$ . The bias-corrected percentile Bootstrap method test indicates that strategic flexibility plays a significant role in the overuse of and firm performance is significantly mediated,  $ab=0.146$ ,  $Boot SE=0.029$ , with a 95% confidence interval of [0.091, 0.206]. The mediating effect as a proportion of the total effect  $ab/(ab+ c') = 29.61\%$ .

Second, model 21 of the SPSS macro program PROCESS was used to test the moderating role of organizational absorptive capacity and technological opportunities in the industry. None of the variance inflation factors of all the predictor variables in this study are higher than 5, indicating that there is no problem of multicollinearity. As shown in Table 4, Equation 1 is significant that digital technological capabilities and industry technological opportunities can significantly and positively predict strategic flexibility, with  $\beta = 0.572$ ,  $SE=0.028$ ,  $p<0.001$ , indicating that industry technology opportunity positively moderates digital technology capability and strategic flexibility. Equation 2 is significant that strategic flexibility and organizational absorptive capacity can significantly and positively predict firm performance, with  $\beta = 0.469$ ,  $SE = 0.021$ ,  $p<0.001$ , indicating that organizational absorptive capacity positively moderates in strategic flexibility and firm

performance.

Table 4: Results of hypothesis testing.

variant	Equation 1			Equation 2		
	(Efficacy standard: SF)			(Efficacy label: FP)		
	$\beta$	SE	t	$\beta$	SE	t
DTC	0.569	0.030	18.880***	0.154	0.032	4.898***
SF				0.475	0.030	15.882***
ITO	0.048	0.032	1.528			
ITO*DTC	0.572	0.028	20.111***			
OAA				0.074	0.025	2.982**
SF *OAA				0.469	0.021	22.213***
R2	0.556			0.633		
F	230.179***			237.272***		

Note: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

In order to explain more clearly the essence of the interaction effect between digital technology capabilities and industry technology opportunities, industry technology opportunities were divided into high and low subgroups according to the mean plus or minus one standard deviation, a simple slope test was performed and a simple effect analysis plot was drawn (Figure 2). The results show that for the low subgroup, i.e., low industry technological opportunities, digital technological capability positively predicts strategic flexibility significantly ( $B_{simple}=0.153$ ,  $SE=0.035$ ,  $p<0.001$ ); and for the high subgroup, i.e., high industry technological opportunities, digital technological capability has a significant and increasing positive predictive effect on strategic flexibility ( $B_{simple}=1.068$ ,  $SE=0.41$ ,  $p<0.001$ ).

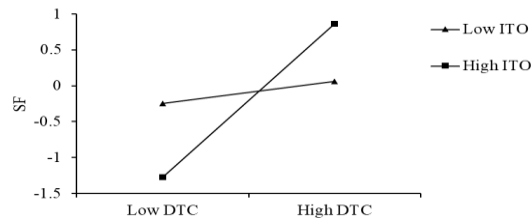


Figure 2: The moderating role of industry technology opportunities.

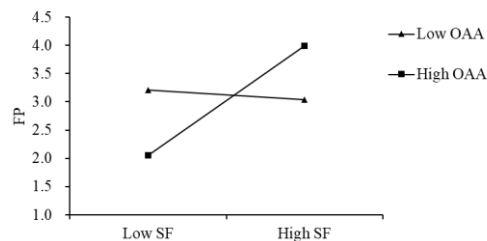


Figure 3: Regulatory role of tissue absorptive capacity.

To explain the essence of the interaction effect between strategic flexibility and organizational absorptive capacity, organizational absorptive capacity was divided into high and low subgroups according to the mean plus or minus one standard deviation, a simple slope test was conducted and



a simple effect analysis plot was drawn (Figure 3). The results showed that for the low grouping, i.e., enterprises with low organizational absorptive capacity, the negative prediction of strategic flexibility on enterprise performance was significant ( $B_{\text{simple}}=-0.085$ ,  $SE=0.033$ ,  $p<0.01$ ); for the high grouping, i.e., enterprises with high organizational absorptive capacity, the positive prediction of strategic flexibility on enterprise performance was significant ( $B_{\text{simple}}=0.970$ ,  $SE=0.042$ ,  $p<0.001$ ).

### 3. Conclusion

On the basis of existing studies based on digital technology capabilities and firm performance, this study explores the direct influence mechanism of digital technology capabilities with strategic flexibility and firm performance respectively, and further explores the moderating role of industry technology opportunities and organizational absorptive capacity in it. Based on the empirical research, this paper obtains the following research conclusions: (1) Digital technology capability has a significant contribution to strategic flexibility. (2) Digital technology capability has a significant contribution to firm performance. (3) Strategic flexibility has a mediating effect on the relationship between digital technology capabilities and firm performance. (4) Industry technology opportunities positively moderated digital technology capabilities and strategic flexibility. (5) Organizational learning capability significantly and positively moderates the effect of strategic flexibility on firm performance.

### 4. Research Significance and Outlook

Based on the dynamic capability theory, this study constructs a theoretical relationship model of digital technology capability on enterprise performance, confirms the facilitating effect of digital technology capability on enterprise performance, and thus enriches the research on the consequence variables of digital technology capability and broadens the research on the antecedent variables of enterprise performance. Based on the resource-based theory, we systematically and completely analyze the transmission mechanism of strategic flexibility between digital technology capability and enterprise performance from the perspective of rational resource allocation research, strategic flexibility is the ability of enterprises to effectively allocate and coordinate resources, and it is also a means for enterprises to better cope with the external environment full of uncertainty, and we find that the mediating role played by strategic flexibility has certain theoretical significance in explaining the influence path of digital technology capability on enterprise performance activities. It has certain theoretical significance in explaining the influence path of digital technology capabilities on enterprise performance activities, and provides a more complete analytical and explanatory framework for the subsequent research on the influence effect of digital technology capabilities. Finally, this study also considers industry opportunities as an external factor and organizational absorptive capacity as an internal factor as the important boundary conditions of digital technology capabilities affecting enterprise performance, and empirically examines their moderating roles in the process of digital technology capabilities affecting enterprise performance, which helps to further deepen the understanding of the issue of when and why digital technology capabilities affect enterprise performance.

For future research, this paper makes the following outlook: knowledge and technology are important capabilities for today's enterprises to be undefeated in the competitive marketplace, and questions about how enterprises can adequately absorb new digitally based capabilities and how to convert knowledge and technology into competitive advantage[13]. The issues of how enterprises can fully absorb the new digitalization-based capabilities and how to convert knowledge and technology into competitive advantages. It has been explored for a long time in the academic



community and will be a future research hotspot in the field of business administration and will receive further attention from relevant scholars. In addition, the continuous development of enterprises in the complex and changing market environment, the pursuit of efficiency and performance will lead to endless problems and challenges, which requires the joint attention and efforts of academics and industry experts as well as enterprise management [14]. Secondly, digital technology capabilities have a significant impact on firms. Secondly, the economic benefits of digital technology capabilities to enterprises have not been paid attention to in this paper, and it is worthwhile to examine whether the economic benefits generated by the introduction of digital technology can offset the costs incurred in purchasing the technology and allocating related resources in the early stage [15]. The paper also discusses the economic benefits of the introduction of digital technology. Finally, this paper mentions the process of continuous change in the internal and external environment of the organization during the decision-making process of the firm, but it does not sufficiently consider the environmental turbulence, so future research could further explore the strategic change of firms in the context of turbulent environments through technological and product performance as well as the adoption of performance-based decision-making and proactive behaviors.

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