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Digital Capability, Digital Orientation and Enterprise Innovation Performance

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Abstract: In this paper, the theory of digital capability reveals the impact path of digital capability on innovation performance from the perspective of digital orientation. The empirical data of Chinese enterprises are used to analyze the results. The results show that: digital capabilities help promote enterprise innovation performance; Digital capability can promote innovation performance by improving digital orientation; Competition intensity plays a positive regulatory role between digital orientation and enterprise innovation performance, and environmental uncertainty weakens the role of digital capability on enterprise innovation performance. Taking digital orientation as the key path, this study reveals the mechanism of digital capability on innovation performance improvement. The research results help to open the black box of the mechanism of digital capability on innovation performance improvement.

1. Introduction

With the rapid development of digital technology, a large number of new application scenarios are emerging, and "digital disruptive" changes are taking place in all walks of life. This disruptive force can create or destroy the entire product line overnight. Subversives may appear at any time, which is difficult for traditional enterprises to deal with, and the reshaping of enterprises by digital technology is inevitable. In addition, in order to meet the changing needs of the complex business environment and ensure their own competitive advantage in the market, more and more enterprises have opened the digital oriented road. And how to carry out transformation to really affect the improvement of enterprise performance is an important problem faced by enterprises. Based on this, this study will deeply explore the connotation, structural dimensions and value mechanism of digital capabilities. With the extension of the connotation of digitalization, scholars define it as various technological innovations realized through "connection", reconstructing the real world into a digital world [1]. At the same time, the industry and scholars have introduced the concept of digitalization into enterprise practice, put forward the concept of enterprise digitalization orientation, and achieved rich research results. With regard to digital orientation, The China Academy of information and Communications (2020) defines it as the comprehensive integration of enterprises and digital technology. To be precise, it refers to the process of using digital technology to optimize human, material and other resources of enterprises, promote all-round changes in enterprise

research and development, production and management, and realize the digitalization of both inside and outside enterprises. According to the research results of recent years, Quan [2] defines enterprise digital orientation as the process of using digital technology to realize enterprise cloud service functions and further promote the transformation of production, management, service and other business links. Digital capability is the core capability to promote enterprise transformation. Although digitalization has brought transformative effects to enterprises, enterprises also face challenges from personnel, management and technology to realize the commercial value of digitalization [3]. Therefore, companies need to establish organizational capabilities that can overcome challenges, create value for enterprises by using digitalization technology, improve professional production and manufacturing levels, effectively improve productivity and competitiveness, and maintain competitive advantages, Digital capability. The concept of digital capability is still in the early stage of research, and there is no unified definition and measurement dimension. The research on the definition and dimension of digital capability mainly focuses on two different disciplines of computer science and management science, including three different perspectives of resources, technology and management application: from the perspective of resource based view, digital resources are the premise of digital capability, Including digital talents and infrastructure platforms, data, and ways of thinking. Digital resources are the key internal factors to obtain competitive advantage [4]. From the perspective of technology centered perspective, digital capability represents a new generation of digital management and analysis technology. This technology integrates it and OT, which can enable manufacturing enterprises to shorten the production cycle, achieve flexible production, improve quality, improve production efficiency, and then open up a new business model. From the perspective of management application, digitalization capability is a "digitalization driven" capability. By using machines, analyzing the data of each stage, and judging the current optimal decision-making of enterprises according to the data analysis results, the full automation of decision-making can be achieved. digital capability will become the foothold for enterprises to implement intelligent upgrading and a necessary condition for realizing digital integration schemes efficiently [5,6].Through the first two sections of the digital, digital capabilities, digital orientation and other related research combing and In conclusion, it can be seen that the existing research has a certain understanding of the digitalization ability of enterprises, which has laid a solid theoretical foundation for this study. However, there are still some deficiencies in the existing research, which need to be further discussed. The research on the relationship between digital capability and enterprise performance needs to be further enriched. Through literature review, it can be found that most scholars agree that digital capabilities have a positive impact on enterprise performance, and this impact needs. It is produced by other factors, but what factors affect the process of digital ability affecting enterprise performance. Many scholars believe that it is necessary to carry out detailed development. Therefore, the relevant figures. There is still much room for exploration in the research on the relationship between chemical ability and enterprise performance.

2. Research Hypothesis

2.1. Digital Capability and Digital Orientation

The higher the level of complementary combination of active digital orientation and low digital capability, the higher the level of service digital orientation. Enterprises with high digital orientation and low digital ability attach great importance to digital orientation to grasp the opportunity of overtaking in curves, but they have not formed enough digital ability to transform, that is, they "want to turn" and "can't turn". Active digitalization orientation embeds data-driven concepts, methods and mechanisms in the overall development of enterprises, and guides enterprises to strive

to promote product digitalization orientation and service digitalization orientation through a series of decision-making activities. However, low digitalization ability means that it is unable to fully collect and utilize the data resource potential of products and services, and it is difficult to fully grasp user needs, which limits the content and depth of product and service digitalization orientation, In particular, it is more difficult to promote the digital orientation of products with relatively "rigid" and high innovation constraints. At the same time, active digital orientation emphasizes the use and deployment of digital technology [7], formulates long-term digital development plans, points out the development direction and focus of transformation in each period, drives enterprises to strive to find new ways under resource constraints, and strive to obtain the right to use basic digital technology with the help of external forces (such as financing or joining the Internet platform) to meet the most basic digital operation needs. Due to the weaker path dependence and resource constraints of service digitalization orientation, it can be moderately ahead of product digitalization orientation. At this time, enterprises will give priority to service digitalization orientation, develop new service components or models, establish emotional attribute trends and long-term business relationships with users, help users better use products or enjoy the utility brought by services, and expand the space for service value creation, Establish market differentiation advantages [8]. Therefore, digital orientation guides enterprises to promote the digital orientation of products and services, but limited by low digital ability, it is unable to fully stimulate the potential of data utilization, and it is difficult to promote the digital orientation of products with higher innovation requirements. The digital orientation of services with weaker development path dependence and resource constraints has become the first choice. Based on the above point of view, this paper will propose the following assumptions:

Hypothesis H1: Digital ability has a positive impact on digital orientation.

2.2. Digital Orientation and Enterprise Innovation Performance

Ilona et al. [9] believe that digital orientation is a process in which enterprises use digital technologies such as big data to promote the transformation and innovation of enterprise production service operation mode. Golzer, Fritzsche [6] for enterprises that have implemented digital orientation, taking advantage of the convenience of information, computing and communication of digital technologies such as big data can strengthen the collaborative relationship between different participants inside and outside the enterprise to reduce production costs, improve production and operation efficiency [10] and improve the innovation performance of enterprises. Vial [11] in the mechanism of reducing production costs and improving efficiency brought about by digitalization, enterprises implementing digitalization can quickly and effectively use production and consumption data to optimize production processes and build new transaction or business models. He & Liu [12] believe that innovation is a key factor affecting the long-term healthy development of enterprises. The existing research mainly analyzes the direct impact of digital orientation on enterprise innovation performance, but there is a lack of in-depth and detailed discussion on how this impact mechanism occurs. Based on the above point of view, this paper will propose the following assumptions:

Hypothesis H2: digital orientation has a positive impact on enterprise innovation performance.

2.3. Digital Capability and Enterprise Innovation Performance

Digitalization is a transformative process, which needs to pay more innovation costs. In this process, it is affected by organizational inertia. Based on the avoidance of uncertainty and risk, new retail enterprises may rely on existing capabilities or businesses rather than carry out innovation activities. In contrast, entrepreneurial orientation is a willingness to innovate and take risks, as well

as a tendency to actively identify market opportunities. In this case, a high level of entrepreneurial orientation can provide new retail enterprises with the power to overcome organizational inertia. It is mainly explained from two aspects. First, digital technology combination can improve the entrepreneurial spirit of new retail enterprises. Implement innovative activities that match entrepreneurial orientation by using new digital capabilities. Digital capabilities can realize investment in market opportunities with great potential by configuring entrepreneurial orientation for new retail enterprises. Second, entrepreneurial orientation can accelerate the digital ability of new retail enterprises. Due to the influence of organizational inertia, new retail enterprises are difficult to accurately grasp market opportunities. Entrepreneurial orientation breaks this organizational inertia relative to digital capabilities and realizes regular self-renewal. Strong entrepreneurial orientation helps new retail enterprises integrate digital technology into their organizational strategies and create an appropriate corporate culture to implement digital capabilities. Based on the above point of view, this paper will propose the following assumptions:

Hypothesis H3: digital capability has a positive impact on enterprise innovation performance.

2.4. The Intermediary Role of Digital Orientation

In the context of the new industrial revolution, changes in the technological environment such as big data and cloud computing have brought great impact to many traditional industries. In order not to be annihilated by the flood of the times and occupy a place in the market competition, traditional enterprises in manufacturing, retail and other industries have seized the opportunities of digital technology and committed to digital oriented strategic updates such as digital product / service innovation and digital channel expansion [13]. Digital oriented renewal refers to the digital Oriented Innovation Activities in the product market field such as digital product development and digital channel expansion carried out by traditional enterprises in order to comply with the trend of digital economy. For traditional enterprises, how to realize digital oriented renewal has become a key issue. Recent studies have examined the role of dynamic capabilities in the strategic renewal of traditional enterprises and the strategic renewal path for traditional enterprises to enter the e-commerce field [14]. Scholars only discuss the influencing factors of strategic renewal from the level of resources, capabilities and other single elements. However, the digital oriented strategic renewal of traditional enterprises represents a comprehensive transformation, which means mobilizing the strategic practice from CEO to middle-level managers, and then to grass-roots managers [15]. Only from the perspective of resource capacity, it cannot well analyze the practical activities of participants at the micro level. Is strategizing and strategy as practice are regarded as emerging theories that examine the daily practical activities of organizations in the digital context to shape strategic results [16]. Digital transformation means the entrepreneurial process of using digital technology to develop new products or markets [17]. The digitalization of traditional enterprises emphasizes top-down entrepreneurial oriented activities initiated by senior management. On the other hand, the changing external environment makes it difficult for enterprises to follow the established plan. They have to rely on organizational improvisation, that is, the way in which planning and implementation occur simultaneously to creatively take advantage of opportunities to carry out digital activities [18]. However, considering that micro practical research in the digital context is just emerging, and at the same time, there is a lack of research on how top-down and bottom-up strategic activities can achieve digital oriented renewal.

With the help of digital technology, enterprises with strong digital ability share information and resources with network members, promote knowledge acquisition and creation of enterprises, realize the improvement of digital orientation, and then master more new knowledge and resources through continuous search, discovery, experiment and innovation, create new technologies, new

products, explore new markets, seek new market opportunities, and then realize the improvement of innovation performance [5]. Specifically, digital orientation helps enterprises use digital technology to search and collect new external knowledge and resources, especially data resources, and mine the potential value of digital resources obtained through data analysis. Big data predicts future market trends and customer needs, helps enterprises find new opportunities, and maintains a new state of development in the unpredictable digital market environment, And then realize the improvement of innovation performance [19, 20]. Enterprises give play to digital orientation, try to sublimate new value from existing knowledge and resources, improve the depth and breadth of existing knowledge, especially use advanced digital technology to deeply mine the commercial value behind existing data, create new digital products and services, meet new market needs, improve the market position of enterprises, and help to achieve innovation performance improvement [21].

To sum up, this paper believes that digital orientation is the key path of the relationship between digital capability and innovation performance improvement. Therefore, this study proposes the following assumptions:

H4: Digital capability promotes innovation performance by improving digital orientation.

2.5. Regulation of Competition Intensity

When the competition intensity is high, the price, promotion, product imitation and other competitive activities in the industry are fierce, and customer preferences change rapidly, so it is difficult for managers to accurately grasp the speed and direction of market changes. At this time, digital oriented service enterprises that are keen on exploratory learning are more likely to break through the original activity paradigm for comprehensive innovation, complete resource reconstruction and strategic asset renewal, capture new opportunities in technology and market disturbances, and take the lead in launching new service products to obtain future development. When the competition intensity is low, the information transmitted by the market to enterprises is clear and clear [22]. External environmental factors such as customer preferences, technological changes and competitor behavior are in a stable and controllable state. Service enterprises can effectively predict the future development prospects of the existing market and make correct decisions. In this context, the urgent task of enterprises is to shift from carrying out exploratory and breakthrough innovation activities that need to bear a lot of costs and risks to carrying out digital oriented and progressive digital oriented innovation activities with much less costs and risks as much as possible. At this time, market-oriented enterprises that tend to carry out utilization learning are more able to allocate limited resources to the above activities, and fully develop those opportunities that already exist within the enterprise but are easy to be ignored [23]. Based on the above discussion, this study proposes assumptions:

H5: competition intensity plays a positive regulatory role between digital orientation and enterprise innovation performance.

2.6. Regulation of Environmental Uncertainty

External environmental pressure will not only affect the allocation of enterprise capability resources, but also affect the acquisition of external resources. The most influential factor among the external environmental factors is the uncertainty of the environment, which is also a significant feature of the external environment. Digital ability will change due to internal factors, such as organizational culture, senior leaders' decision-making, etc; It will also indirectly affect the level of enterprise performance due to changes in the external environment. Environmental uncertainty refers to the instability or change of the environment caused by changes in customer preferences, new product development, new technologies and market competition. Environmental uncertainty is

mainly manifested in two aspects: first, the market demand, customer preference and competitor's strategy are difficult to predict due to market dynamics; Second, technological dynamism represents the uncertainty brought about by the breakthrough of information technology and its impact on the existing digital capabilities of enterprises, which will affect the relationship between digital capabilities and enterprise performance . Du et al. [24] found through research that the dynamic change and competitiveness of the environment will change the process in which enterprise digital capabilities affect performance. Therefore, if the enterprise is facing a complex and changeable external environment, the impact of digital capability on enterprise performance is more significant. Stoel and Muhanna [25] believe that the complexity, variability and diversity of the environment will affect the interaction between digital capability and performance. Under the environmental background of different characteristics, the process of enterprise digital capability affecting enterprise performance will also have corresponding differences. Based on the above discussion, this study proposes the following assumptions:

H6: environmental uncertainty weakens the effect of digital capability on enterprise innovation performance.

To sum up, based on the theory of digital capability and digital orientation, this paper believes that digital capability is conducive to enterprises to obtain knowledge and resources between networks, promote knowledge creation within enterprises, and form a digital orientation to cope with complex environments, so as to achieve the improvement of enterprise innovation performance. In the turbulent environment of rapid technological development, environmental uncertainty, as an important external environmental factor, will affect the effect of digital capabilities on innovation performance. Therefore, the theoretical research model constructed in this paper is shown in Figure 1.

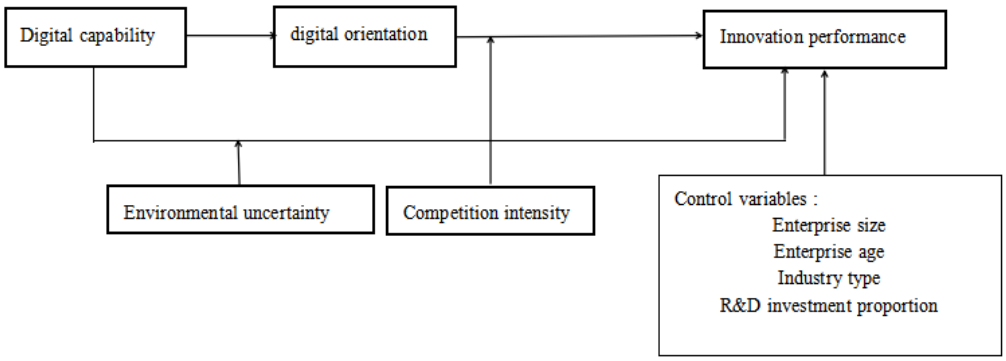

Figure 1: Theoretical research model.

3. Research Design

3.1. Study Samples and Data Collection

This paper uses interview and questionnaire survey methods to collect data, mainly for middle and senior managers who have worked in the enterprise for more than three years. Firstly, this paper designs a questionnaire according to the existing maturity scale and the characteristics of enterprises; Then, choose 76 business owners as a small sample to test, analyze the reliability and validity of the questionnaire, and modify the questionnaire in combination with the interview; Finally, a simple random sampling method was used to select 400 business owners for a questionnaire survey, and the survey objects were entrepreneurs. The questionnaire survey time is from February 2022 to June 2022. A total of 300 questionnaires were distributed in this survey, 238 were recovered, and 27 samples with incomplete and missing options were excluded, of which 211 were valid. The

effective rate reached 70.03%. It can be seen from the description of enterprise scale that 125 enterprises with less than 100 employees (59.24%), 46 enterprises with 100-500 employees (21.80%), 13 enterprises with 500-1000 employees (6.16%), 7 enterprises with 1000-2000 employees (3.32%), and 20 enterprises with more than 2000 employees (9.48%). As shown in Table 1:

Table 1: Characteristics of valid samples (N=211).

Characteristics	Category	Number of enterprises	Percentage (%)
Enterprise size	1-100 persons	125	59.24%
	100-500persons	46	21.80%
	500-1000persons	13	6.16%
	1000-2000persons	7	3.32%
	More than2000persons	20	9.48%
Enterprise age	Within 3 years	50	23.70%
	4-6 years	46	21.80%
	7-10 years	34	16.11%
	10-20 years	55	26.07%
	More than 20 years	26	12.32%
Industry type	State owned enterprises	41	19.43%
	Collective enterprises	5	2.37%
	Private enterprises	96	45.50%
	Foreign invested enterprises	5	2.37%
	Joint stock enterprise	26	12.32%
	cooperative enterprise	10	4.74%
	other	28	13.27%
Principal business	Clothing, textile	25	11.85%
	Metals	9	4.27%
	Medicine	11	5.21%
	Material Science	6	2.84%
	Furniture	10	4.74%
	Architecture	11	5.21%
	Mould	3	1.42%
	Leather products	1	0.47%
	Automobile	3	1.42%
	Mechanics	12	5.69%
	Electronics	6	2.84%
	other	114	54.03%
R&D investment proportion	Less than 1%	61	28.91%
	1%-3%	51	24.17%
	3%-5%	39	18.48%
	5%-8%	29	13.74%
	More than 8%	31	14.69%
Asset size	Within 3 million	63	29.86%
	300-500 million	20	9.48%
	500-1000 million	29	13.74%
	1000-3000 million	30	14.22%
	Above 3000 million	69	32.7%

3.2. Variable Measurement

In order to ensure the reliability and validity of the measurement results, this study uses the measurement research variables of the maturity scale at home and abroad for reference, and uses the two-way translation method to translate and proofread the existing maturity scale repeatedly until the Chinese and English versions show few substantive differences. Before the formal survey, 76 digital enterprises were presurveyed, and the questionnaire was revised according to the feedback of the survey results to form the final questionnaire and measurement items.

1) Digital capability. In terms of digital capability, this study adopts the method of Khin S, hot C [26]. Five of them are the capabilities of digital cameras, which are measured by Richter's 7-point scale, ranging from 1= "strongly disagree" to 7= "strongly agree", to self-evaluate the capabilities and technologies of the surveyed companies related to the application of digital technologies.

2) Dual capability. The dual capability of digital enterprises reflects the underlying logic of simultaneous exploration and utilization in digital capability activities [27]. Therefore, this paper uses the research of Li [28] and Guo et al [21] for reference to measure the dual capability from the two aspects of exploration capability and utilization capability, including 5 items respectively. Measure with seven-point Likert-like scale, ranging from 1= "strongly disagree" to 7= "strongly agree".

3) Enterprise innovation performance. Innovation performance is mainly based on the research of Peng et al., [29]. It is obtained by using 5 items and measured by seven-point Likert-like scale, ranging from 1= "strongly disagree" to 7= "strongly agree".

4) Environmental uncertainty. Zhu [30] and Peng [31] used 4 items of the level 7 scale to measure the change characteristics of environmental turbulence. For the external environment analyzed in this paper, four items are used to measure environmental uncertainty by referring to the items of the above scale. Measure with seven-point Likert-like scale, ranging from 1= "strongly disagree" to 7= "strongly agree".

5) Competition intensity. Peng et al. [29] used four items of the level 7 scale to measure the characteristics of environmental turbulence. The external competition intensity analyzed in this paper uses the items of the above scale for reference, and uses four items to measure environmental uncertainty. Use seven-point Likert-like scale, ranging from 1= "strongly disagree" to 7= "strongly agree".

6) Control variables. Previous studies have shown that the scale, establishment years, nature and R&D investment of enterprises may affect the innovation performance of enterprises. In this paper, the enterprise scale, establishment years, Industry type and R&D investment are included in the model as control variables.

4. Empirical Analysis and Results

4.1. Reliability Analysis

Cronbach's α Coefficient tests the reliability of the scale. The test results are shown in Table 2. Cronbach's of each variable α The coefficients are greater than 0.7, which meets the standard requirements of reliability test, indicating that all variables show good internal consistency, and the stability of the scale is good.

Table 2: Test results of scale items, variable reliability and validity.

Variable name	Questionnaire items	Factor Loading	AVE	CR
Digital capability	The enterprise has a high level of capability in acquiring important digital technologies	0.820	0.687	0.917
	The enterprise has a strong ability to identify new digital opportunities	0.840		
	The enterprise can well cope with digital transformation	0.841		
	The enterprise has mastered the most advanced digital technology	0.824		
	The enterprise can make good use of digital technology to develop innovative products / services / processes	0.820		
Digital orientation	The enterprise is committed to using digital technology to develop new solutions	0.821	0.656	0.884
	The enterprise's solutions include excellent digital technology	0.812		
	The organization of this enterprise is easy to accept new digital technology	0.809		
	The enterprise has been looking for opportunities to use digital technology in innovation	0.798		
Competition intensity	The core foundation of enterprise competitiveness is constantly changing	0.832	0.646	0.879
	The core foundation of enterprise competitiveness is constantly changing	0.830		
	Competition can bring many market resources to enterprises	0.800		
	Price war is a common marketing strategy of enterprises	0.750		
Innovation performance	Compared with peers, the company often takes the lead in launching new products / services in the industry	0.847	0.723	0.929
	Compared with peers, the company often takes the lead in applying new technologies in the industry	0.862		
	Compared with peers, the company has a very good market response to product improvement and innovation	0.833		
	Compared with peers, our products contain first-class advanced technologies and processes	0.864		
	Compared with peers, the success rate of new product development of our company is strongly agree	0.846		
Market uncertainty	The products (or services) in this industry are updated quickly	0.802	0.619	0.866
	The technology in this industry has made rapid progress	0.797		
	The industry is increasingly competitive in product quality and innovation	0.820		
	The demand of customers in this industry is getting higher and higher	0.724		

4.2. Exploratory Factor Analysis

In this paper, SPSS is used to conduct exploratory factor analysis on the questionnaire data. Five factors are extracted through principal component analysis to explain 88.478% of the total variation, which are digital capability, digital orientation, digital orientation, environmental uncertainty and enterprise innovation performance improvement. The KMO value of the questionnaire is 0.816, and Bartlett's spherical test (χ^2=6888.569; Df=276, p<0.01) showed that the data were suitable for factor analysis.

4.3. Confirmatory Factor Analysis

First, Amos is used to test the discriminant validity between variables, as shown in Table 3. The results of confirmatory factor analysis show that the relevant fitting index values of each variable

basically meet the requirements, which further verifies that the scale in this paper has good structural validity. All indicators have reached an acceptable level. Secondly, the study tested the aggregate validity by calculating the mean variance extraction value (AVE) and the combined reliability (CR). As shown in Table 2, the factor load of each measurement item is greater than 0.6, and the ave and Cr values of all variables are greater than the critical values of 0.5 and 0.7, indicating that the aggregate validity between variables is good. In addition, as shown in Table 3, the ave square root values of all variables (BOLD numbers on the diagonal of the table) are greater than the correlation coefficients of their rows or columns, which further indicates that the discrimination validity between variables is good.

Table 3: Confirmatory factor analysis results.

Model	χ^2/df	IFI	TLI	CFI	RMSEA	SRMR
Digital capability	2. 227	0. 931	0. 941	0. 944	0. 063	0. 073
Digital orientation	2. 406	0. 938	0. 962	0. 925	0. 068	0. 058
Competition intensity	2. 387	0. 930	0. 943	0. 933	0. 074	0. 054
Innovation performance	2. 710	0. 941	0. 940	0. 977	0. 068	0. 048
Market uncertainty	2.515	0.913	0.909	0.903	0.071	0. 072

4.4. Common Method Deviation Inspection

In this study, measures are taken to reduce the common method deviation in both procedural control and statistical control. In terms of procedure control, the questionnaire data are only used for academic research, and the anonymity of respondents is protected. All proper terms are explained. In terms of statistical control, this paper first uses Harman's single factor test method to conduct non rotating principal component analysis on all items. The results show that the variance of the first principal component interpretation extracted by factor analysis is 40% lower than the critical point, indicating that there is no serious common method deviation in this study.

4.5. Descriptive Statistical Analysis and Correlation Test

Table 4: Correlation analysis results of sample data.

	1	2	3	4	5	6	7	8	9
Enterprise size	1								
Established age	0.485**	1							
Industry type	-0.168*	-0.004	1						
R&D investment	0.282**	0.174*	-0.086	1					
Digital capability	0.192**	0.110	-0.043	0.318**	0.823				
Digital orientation	0.140*	0.100	-0.039	0.306**	0.790**	0.809			
Competition intensity	0.073	0.088	-0.030	0.283**	0.740**	0.794**	0.803		
Innovation performance	0.089	0.010	-0.056	0.335**	0.796**	0.741**	0.838**	0.850	
Market uncertainty	0.028	0.072	-0.018	0.272**	0.696**	0.745**	0.837**	0.788**	0.787
mean	1.830	2.830	3.510	2.620	4.672	4.832	4.899	4.837	5.210
S.D.	1.276	1.375	1.873	1.406	1.598	1.493	1.413	1.534	1.390

Note: ** at Significant correlation at level 01 (bilateral)* significant correlation at level 0.05 (bilateral).

The descriptive statistical analysis and correlation coefficient test of main variables are shown in

Table 4: the mean value of each variable is between 1.830-5.210, and the standard deviation is between 1.276 -1.873. The correlation coefficient is between 0.496-0.738 ($p<0.01$). The pairwise correlation coefficient between variables shows that digital capacity, exploration capacity, utilization capacity, environmental uncertainty and the improvement of enterprise innovation performance are significantly correlated. These results are basically consistent with the assumption direction of this study, providing a preliminary basis for hypothesis testing.

4.6. Hypothesis Test

Based on Baron & Kenny [32], Wen et al. [33], Lin & Yu [34] and Liu et al. [35] on the intermediary role test steps, the interaction mechanism between binary ability and innovation performance is tested, as shown in Table 5. This paper first tests the variance expansibility factors of model1-model4 variables in Table 5. Through the test, it is found that the range of variance expansibility factors of model1-model6 variables is between (0, 5). Therefore, it can be considered that there is no serious problem of multiple collinearity between model1-model6variables.

Table 5: Regression analysis results of digital capability on innovation performance.

Variable	Innovation performance		Digital orientation		Innovation performance	
	Model1	Model2	Model5	Model6	Model5	Model6
Constant	4.074*** (11.653)	1.425*** (5.365)	3.870*** (11.247)	0.931*** (4.676)	0.818** (3.267)	0.831** (3.376)
Enterprise size	0.021 (0.225)	-0.078 (-1.315)	0.051 (0.547)	-0.060 (-1.335)	-0.022 (-0.404)	-0.040 (-0.764)
Established age	-0.064 (-0.760)	-0.072 (-1.351)	0.031 (-0.370)	-0.023 (-0.568)	-0.090 (-1.898)	-0.086+ (-1.841)
Industry type	-0.020 (-0.364)	-0.020 (-0.572)	-0.006 (-0.106)	-0.005 (-0.209)	-0.015 (-0.492)	-0.016 (-0.536)
R&D investment	0.369*** (4.904)	0.126* (2.555)	0.306*** (4.139)	0.037 (0.993)	0.111* (2.522)	0.120+ (2.357)
Digital capability		0.747*** (17.699)		0.828*** (26.182)		0.218** (2.805)
Digital orientation					0.842*** (20.998)	0.638*** (7.721)
R^2	0.116	0.653	0.097	0.795	0.722	0.733
Adjust R^2	0.098	0.645	0.080	0.789	0.715	0.725
F	6.637***	76.127***	5.478***	156.262***	105.001***	91.786***

Note: 1*** Indicates $p<0.001$, * * indicates $p<0.01$, * indicates $p<0.05$, + indicates $p<0.1$ two tailed test; 2. the values in brackets are t values; 3. the regression coefficients in the Table are all non standardized regression coefficients

In Table 5, in model 1, the regression analysis takes enterprise size, enterprise age, enterprise nature, R & D investment as independent variables and innovation performance as dependent variables. On the basis of model1, the regression analysis of model2 with enterprise size, enterprise age, enterprise nature, R & D investment and digital capability as independent variables and innovation performance as dependent variables shows that the results of model2 show that digital capability has a positive impact on innovation performance($\beta= 0.747$, $p<0.001$), which verified the hypothesis HL; On the basis of Model3, the regression analysis of model4 takes enterprise size, enterprise age, enterprise nature, R & D investment and digital ability as independent variables and digital orientation as dependent variables, which shows that the results of model4 show that digital ability has a positive impact on digital orientation($\beta= 0.828$, $p<0.001$), which verifies the hypothesis that H2 in Model5 takes enterprise size, enterprise age, enterprise nature, R & D investment, digital

orientation as independent variables and innovation performance as dependent variables. The regression analysis shows that the results of Model5 show that digital orientation has a positive impact on innovation performance(β= 0.842, p<0.001), which verified the hypothesis H3; Model6 takes enterprise size, enterprise age, enterprise nature, R & D investment, digital ability, digital orientation as independent variables and innovation performance as dependent variables. Regression analysis shows that the results of Model5 show that digital ability has a positive impact on innovation performance(β= 0.218,P<0.001); Digital orientation has a positive impact on innovation performance(β= 0.638,P<0.001); It shows that digital orientation is improved. Compared with model2, the coefficient of digital ability is reduced, from β =0. 747 (p<0.001) decreased to β= 0.218 (p<0.01). Based on the research results of Baron & Kenny [32] and Wen et al. [33], digital orientation plays a partial intermediary role between digital capability and innovation performance, which verifies the hypothesis H4.

Table 6: Regression results of regulatory effect.

Variable	Model7	Model8	Model9	Model10
Constant	0.209 (0.927)	0.178 (0.782)	0.271 (1.041)	0.952 (1.668)
Enterprise size	0.017 (0.367)	0.013 (0.292)	0.006 (0.115)	0.003 (0.052)
Established age	-0.108** (-2.644)	-0.104+ (-2.546)	-0.100 (-2.241)	-0.094 (-2.082)
Industry type	-0.013 (-0.495)	-0.016 (-0.593)	-0.017 (-0.583)	-0.021 (-0.716)
R&D investment	0.083+ (2.194)	0.084* (2.235)	0.084* (2.004)	0.087 (2.071)
Digital capability			0.450*** (9.219)	0.274* (1.960)
Digital orientation	0.476*** (8.756)	0.467*** (8.760)		
Competition intensity	0.495*** (8.682)	0.483*** (8.354)		
Digital orientation× Competition intensity		0.107* (2.601)		
Market uncertainty			0.492*** (8.823)	0.363*** (3.273)
Digital capability× Market uncertainty				-0.098*** (-8.231)
R^2	0.798	0.810	0.752	0.861
Adjust R^2	0.792	0.796	0.735	0.826
F	132.287***	153.575***	101.413***	205.649***

Note: 1*** Indicates p<0.001, * * indicates p<0.01, * indicates p<0.05, + indicates p<0.1 two tailed test; 2. the values in brackets are t values; 3. the regression coefficients in the table are all non standardized regression coefficients

As shown in Table 6. The first step is to test the variance Expansibility Factor of the variables of model7-model10 in Table 6. Through the test, it is found that the range of the variance Expansibility Factor of the variables of model7-model10 is between (0, 5), so it can be considered that there is no serious multicollinearity problem between the variables of model7-model10.

In Model 7, the regression analysis takes enterprise size, enterprise age, enterprise nature, R& D investment, digital orientation, competition intensity as independent variables and enterprise innovation performance as dependent variables. On the basis of Model7, the regression analysis of

model8 with the interaction between digital orientation and strong competition as the independent variable and enterprise innovation performance as the dependent variable shows that the results of model8 show that the interaction between digital orientation and strong competition has a positive impact on enterprise innovation performance(β= 0.107, p<0.01), indicating that competition intensity plays a positive regulatory role between digital orientation and enterprise innovation performance, which verifies the hypothesis H5 is true.

Model 9 adds market uncertainty on the basis of Model5. The regression shows that market uncertaintyβ= 0.492 (p<0.001) has a statistically significant impact on innovation performance. Model10 is based on model9 by adding the interactive items of digital capabilities and market uncertainty. The regression shows that: interactive items β=-0.098 (p<0.001) has a statistically significant impact on innovation performance. It shows that environmental uncertainty weakens the role of digital capabilities on enterprise innovation performance, and verifies the hypothesis H6.

Based on the research results of MacKinnon et al. [36], using the process developed by preacher & Hayes [37], bootstrap method is used to test the robustness of mediation. Bootstrap method is a non parametric estimation method, which does not rigidly require that the sampling samples must obey the normal distribution. Different from the test methods based on the assumption of normal distribution (such as multiple regression analysis), bootstrap method estimates the confidence interval of mediation through repeated sampling. When its confidence interval does not include 0, it is considered that the mediation is significant. At present, many scholars recommend this method [38], and the test results are shown in Table 7.

Based on 211 enterprise samples collected through formal research, this paper tests the intermediary role of digital orientation between digital capability and innovation performance through 5000 resampling runs of SPSS plug-in process. Under the 95% confidence interval, if the confidence interval of digital orientation intermediary role does not include 0, it can be considered that the intermediary role of digital orientation is statistically significant. It can be seen from table 7 that the mediation test between digital orientation and innovation performance shows that 0 is not included in the confidence interval (LLCI=0.365,ULCI=0.719), so the mediation is statistically significant.

Table 7: Bootstrap mediation test.

Mediation influence path	**Point estimation**	**SE(boot)**	**95%CI**	
			lower	**upper**
Digital capability-Digital orientation-Innovation performance	0.543	0.089	0.365	0.719

5. Conclusions

In the wave of digitalization, new generation information technologies such as big data, cloud computing and artificial intelligence have improved the digitalization level of enterprises. The improvement of enterprise innovation performance is an important driving force for China's digital economic growth and enterprise strategy is the guiding direction for the future survival and development of enterprises. In order to deeply explain the relationship between digital capability and the improvement of enterprise innovation performance, this paper reveals the mechanism and boundary conditions based on digital capability theory and digital orientation theory.

Specifically, this study found that: (1) digital capabilities have a positive direct impact on the improvement of enterprise innovation performance. (2) Digital capability promotes the improvement of enterprise innovation performance by improving digital orientation. (3) Environmental uncertainty weakens the positive effect of digital orientation on the growth of digital start-ups. (4) Competition intensity plays a positive regulatory role between digital orientation and

enterprise innovation performance.

References

[1] Chen CH, Zhu L, Zhong H. Innovative research on the practical perspective of digital survival management of Chinese enterprises. Journal of management science, 2019, 22 (10): 8.

[2] Quan L. Analysis of common problems in setting up the directory for the UFIDA U8 project. Modern Economic Information, 2019 (9): 2. DOI: CNKI: SUN: XDJZ.0.2019-09-173.

[3] Hu H X. Digital archives management and its application in the cloud era. International public relations, 2020 (3): 2.

[4] Coreynen W, Vanderstraeten J, Witteloostuijn AV. What drives product-service integration? An abductive study of decision-makers' motives and value strategies. Journal of Business Research, 2020, 117:189-200.

[5] Zimmer M P. Improvising digital transformation: Strategy unfolding in acts of organizational improvisation. Twenty fifth Americas Conference on Information Systems, 2019.

[6] Golzerp, Fritzsche E A. Data-driven operations management: organisational implications of the digital transformation in industrial practice. Production planning&control, 2017, 28 (16): 1332-1343.

[7] Saleh A A, Al-Najjar F J. The Impact of Organizational Ambidexterity on Strategic Orientations: The Mediating Role of Organizational Innovation in Private Hospitals in Jordan. European Journal of Scientific Research, 2020, 156(1):58-77.

[8] Luo J Q, Jiang Q W. Product and service innovation under the influence of digital technology: overview and outlook. Scientific and technological progress and countermeasures, 2020, 37 (24): 9.

[9] Ilona I, Stefan T, Markus M. Reconciling digital transformation and knowledge protection: a research agenda. Knowledge management research & practice, 2018, 16 (2): 235-244.

[10] Qi Y D, Cai C W. The nature of digital enterprises: economic interpretation. Research on financial issues, 2019 (5): 121-129.

[11] Vial G. Understanding digital transformation: A review and a research agenda. The Journal of Strategic Information Systems, 2019, 28(2): 118-14.

[12] He F, Liu H X. Performance improvement effect evaluation of digital transformation of real enterprises from the perspective of digital economy. Reform, 2019 (4): 137-148.

[13] Warnerk S R, Wage R M. Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal Long Range Planning, 2019, 52(3): 326-349.

[14] Xiao D D, Zhu G L Research on the relationship between cross-border search, digital orientation structure and performance--from the perspective of innovation capability structure. Economic management, 2017 (3): 15.

[15] Xiao J H, Xie K, Wu Y. Supply chain transformation from partner oriented to consumer oriented-a double case study of e-commerce enterprise supply chain. Management world, 2015 (4): 137-154.

[16] Xiao J, Wu Y, Xie K, et al. Managing the e-commerce dis-ruption with IT-based innovations: Insights from strategic re-newal perspectives. Information & Management, 2019, 56(1): 122-139.

[17] Chanias S, Myers M D, HESS T. Digital transformation strategy making in predigital organizations: The case of a financial services provider. The Journal of Strategic Information Systems, 2019, 28(2): 17-33.

[18] Cenamora J, Parida V, WincentT J. How entrepreneurial SMEs compete through digital platforms: The roles of digital plat-form capability, network capability and ambidexterity. Journal of Business Research, 2019, 100 (Jul): 196 -206.

[19] Ma Q, Li X L, LJ, et al. Research on the influence mechanism of data resources on the strategic choice of enterprises' competition and cooperation--a multi case study based on platform theory. Economic management, 2018, 40 (2): 18.

[20] Chi M M. How to improve the performance of new product development in small and medium-sized manufacturing enterprises in China--from the perspective of digital empowerment. Nankai management review, 2020, 23 (3): 63-75.

[21] Guo R P, Han M Y, Shao T T. Opportunity development mechanism of digital orientation enterprises from an ecological perspective--a double case study based on Haier and Suning. Foreign economy and management, 2021, 43 (9): 43-67.

[22] Wang T, Chen J L. Research on the role of market orientation in value creation under environmental uncertainty. Nankai management review, 2011 (6): 10.

[23] Cui M, Zhou X X. Incumbents' capability building and strategic renewal towards digitalization: A qualitative meta analysis. R & D Management, 2021, 33(1): 39-52.

[24] Du W, Si Y H, Wen P C. It capability, knowledge management strategy and performance: the impact of the environment. Scientific research management, 2010 (1): 12.

[25] Stoel M D, Muhanna W A. IT capabilities and firm performance: A contingency analysis of the role of industry and

IT capability type. Information & Management, 2009, 46(3): 181-189.
[26] Khin S, Ho T C. Digital technology, digital capability and organizational performance: A mediating role of digital innovation. International Journal of Innovation Science, 2018, 11(6). DOI: 10.1108/IJIS-08-2018-0083.
[27] Wu T, Chen B B, Shao Y X, et al. Enable digital transformation: Entrepreneurial leadership, ambidextrous learning and organisational performance. Technology Analysis & Strategic Management, 2021, 33 (12): 1389-1403.
[28] Li F. Digital transformation of business models in creative industries: emergence of the portfolio model. Logs engineering and management, 2017, 46(1): 58-64.
[29] Peng Z Z, Gu Y , Zhang J. Research on the relationship between alliance competition and cooperation, governance mechanism and innovation performance in a dynamic environment. Managing the world, 2020, 36 (3): 16.
[30] Zhu L J. Research on the Relationship between IT Capability, Digitalization Orientation, and Enterprise Performance. Liaoning University, 2018.
[31] Peng X M. Research on the evolution relationship between enterprise network and organizational learning from the perspective of technological innovation--Taking Haitian company as an example // China enterprise management case forum Renmin University of China, 2009.
[32] Baron R M, Kenny D A. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of personality and social psychology. 1986, 51(6): 1173.
[33] Wen Z L, Zhang L, Hou JT et al. Mediation test procedure and its application. Journal of psychology, 2004b, 36 (5): 614-620.
[34] Lin Y, Yu A. The influence of entrepreneurial cognition on the foresight of enterprise strategic change: the intermediary role of knowledge creation process is clear. Nankai management review 2016, 19(1): 120-133.
[35] Liu X M, Geng Z Z, Zhu R. Strategic orientation and Organizational Creativity--the intermediary role of three types of organizational learning Research and development management 2013, 25(4): 104-115.
[36] MacKinnon D. P., Lockwood C. M. & Williams J. Confidence limits for the indirect effect: Distribution of the product and resampling methods. Multivariate Behavioral Research. (2004), 39, 99-128.
[37] Preacher K J, Hayes A F. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior research methods. 2008, 40(3): 879-891.
[38] Sui Y, Chen Y Y, Wang Hui. Innovative atmosphere, innovative efficacy and team innovation: the regulatory role of team leaders Journal of psychology 2012, 44(2): 237-248.