

Research on the Impact of Digital Strategy on the Entrepreneurial Performance of Small and Medium sized Enterprises

Yupei Dua, Jiuping Xu*

School of Business, Sichuan University, Chengdu 610064, China

aduyupei@stu.scu.edu.cn *Corresponding author: xujiuping@scu.edu.cn

Abstract. Under the trend of anti-globalization, the development of small and medium-sized enterprises is facing a severe survival crisis due to market squeeze. However, the development of digital technology has alleviated the resource constraints and competitive disadvantages of small and medium-sized enterprises to a certain extent. More and more companies have found that digital strategies help them better cope with external shocks. This study explores whether digital strategies can provide new development opportunities for small and medium-sized enterprises, especially in terms of further leveraging their strengths. This study applied structural equation modeling to conduct empirical testing and proposed a dual-path model of the impact of digitalization strategy on entrepreneurial performance. The results showed that digitalization strategy had both direct positive effects on the entrepreneurial performance of small and medium-sized enterprises and indirect effects through knowledge integration as a partial mediating role. The relevant research conclusions expand the theoretical research on enterprise digitalization strategy, and also provide a reference for the improvement of the performance of small and medium-sized enterprises in their specialized development.:

Keywords: Digital strategy; Small and medium-sized manufacturing enterprises; Jingyi entrepreneurial performance; Knowledge integration

1 Introduction

The manufacturing sector serves as a crucial pillar for national competitiveness, with China emerging as the leading manufacturing nation globally. However, our world is currently undergoing major changes unprecedented in a century, creating a complex, dynamic, and challenging external environment for manufacturing firms. Factors such as geopolitical conflicts, technological blockades, and the backlash against globalization are significantly eroding the competitive edge of China's manufacturing sector. As high-end manufacturing shifts back to developed nations while low-end manufacturing relocates to countries with lower costs^[1], the shortcoming of China's manufacturing

being "large-scale yet undifferentiated" has become apparent, drastically narrowing the room for survival of small and medium-sized manufacturing enterprises. This "survival crisis" has emerged as a critical topic of research^[2].

However, in the research on small and medium-sized enterprises, both practitioners and academics have paid attention to a unique development approach of a group of small and medium-sized enterprises. In a changing environment, they concentrate on a specific professional field, investing their limited resources into core products or technologies, thereby building competitive advantages and evolving into hidden champions. Chen Mingzhe^[3] described this development strategy as "jingyi management", which involves enterprises focusing on particular market segments throughout their lifecycle, catering to specific customer needs within the industry^[4], and possessing specialized technical capabilities. Building on the process of business integration and leveraging resources to transform identified opportunities into entrepreneurial projects within the framework of specialization management, Ge Baoshan et al.^[5] identified this ability to manage specialization as an entrepreneurial skill.

Additionally, digital technologies, exemplified by artificial intelligence, have ushered in a new wave of technological revolution and accelerated industrial transformation, thereby presenting opportunities for small and medium-sized enterprises. The empowering impact of digitalization and intelligence on enterprise technology renewal and business transformation is evident; As data is recognized as the new production resource, digital capabilities have also become central to enterprises' competitive edge in the market. On one hand, the digital strategy of small and medium-sized enterprises incorporates data-driven thinking into management decision-making ^[5] to help interpret and track market demands and their dynamic shifts from the product development stage, thus better addressing segmented and diverse market needs. On the other hand, the digital strategy enables small and medium-sized enterprises to better integrate into innovation networks and facilitate the absorption of knowledge and resources flowing through the network ^[6]; It optimizes resource allocation through digital technology to uncover more entrepreneurial values and opportunities, aiding small and medium-sized enterprises in overcoming limitations related to scale and resource constraints ^[7,8].

The topic of digital strategies empowering small and medium-sized manufacturing enterprises with jingyi entrepreneurial capabilities has garnered attention. Existing literature primarily focuses on large corporations with digital resource advantages, overlooking the unique characteristics of small and medium-sized enterprises. Through digital transformation, small and medium-sized manufacturing enterprises can develop jingyi entrepreneurial approaches, produce advanced products in niche markets, meet evolving market demands, and maintain their core competitiveness. In this context, the ability to specialize in entrepreneurship is crucial for small and medium-sized enterprises.

In summary, this study seeks to explore whether and how digital strategies enhance the jingyi entrepreneurial performance of small and medium-sized enterprises. Utilizing a questionnaire survey of small and medium-sized enterprises, this research employs a structural equation model to examine the relationship and underlying mechanisms between digital strategies and the jingji entrepreneurial performance of these enterprises. It analyzes how digital strategies stimulate knowledge integration to enhance

entrepreneurial performance and explores the moderating role of digital capabilities in this process, aiming to provide theoretical support for the development of digital transformation strategies and specialized growth in small and medium-sized enterprises.

2 Theoretical Background and Research Hypothesis

2.1 The Impact of Digital Strategy on Jingyi Entrepreneurial Performance

The term "Jingyi" is derived from the Book of History's "Only the essence, and allow to hold the point," signifying a focus on objectives, inner steadfastness, clarity of mind, and resilience in the face of external turbulence. Chen Mingzhe further interprets the "one" as a monistic principle, proposing the "Jingyi strategy" as a result of companies' dedication to excellence in a single domain [3]. Compared to corporate specialization and focus strategies, the Jingvi strategy is an operational level strategy that emphasizes maintaining a steadfast commitment to specific market segments and building competitive advantages through advanced proprietary technologies. The performance of Jingyi entrepreneurship epitomizes the level of specialized development within the enterprise, where the "Jingyi" aspect represents the enterprise's proficient technical capabilities, which must be continuously enhanced to maintain a leading position; the "One" aspect denotes the enterprise's capability in market segmentation, focusing on a unique market segment and adeptly utilizing resources to cultivate its specialized market [4]. This paper defines Jingyi entrepreneurial performance as the outcome of enterprises concentrating on a specific product (service) and market, proactively engaging in entrepreneurial activities, continuously innovating, and developing new business ventures.

In the context of anti-globalization, significant impacts have arisen in both the internal and external environments of manufacturing enterprises. Owing to limitations such as small scale, limited capital, and high costs of trial and error, small and medium-sized enterprises face challenges competing and surviving in a highly dynamic environment. Developing and implementing the right digital transformation strategies has emerged as a robust response to digital challenges [9]. Digitalization (Digital Technology), built upon the ICT (Information and Communication Technology) system, enables rapid encoding, storage, and distribution of information, effectively enhancing operational efficiency and responsiveness to customer needs, thus improving corporate performance. However, Warner and Wager [10], from a strategic management perspective, argue that the essence of corporate digital transformation lies not in technological advancements but in deeper strategic decision-making.

Digital transformation strategies effectively integrate the sharing of key corporate knowledge and accelerate the optimal allocation of internal and external resources. In line with the resource-brokering theory, new entrepreneurial opportunities can be identified by leveraging existing resources under constraints. By implementing digital strategies and combining these resources with digital technology, SMEs can effectively mitigate resource constraints, align with organizational changes and technological upgrades to achieve strategic objectives, and enhance their entrepreneurial performance. Therefore, corporate digital transformation can generate innovative entrepreneurial solutions and offer advanced products to meet the evolving market demands. For

manufacturing enterprises, technology orientation is an important factor that can not be ignored in their innovation. Digital transformation based on digital technology, optimizing the allocation of entrepreneurial resources and cultivating competitive innovative products can effectively strengthen their entrepreneurial performance. Based on this, the following research hypotheses are proposed:

Hypothesis 1: digital transformation strategy has a significant positive effect on Jingyi's entrepreneurial performance.

2.2 The Impact of Digital Strategy on Knowledge Integration

Digital technology has had a significant impact on the internal and external environments of traditional manufacturing enterprises. Large enterprises can implement their digital strategies through the collective efforts of their employees and subordinate units. However, due to their small size, limited funds, and the high costs of trial and error, developing and implementing the right digital transformation strategies has become a crucial response to the digital challenges for small and medium-sized enterprises [9]. Warner and Wager [10] noted that the essence of enterprise digital transformation lies not in technological upgrades but in strategy formulation. Knowledge integration is the process by which enterprises share, integrate, apply, and create acquired knowledge [11]. For small and medium-sized enterprises to sustainably survive and develop, it is insufficient to rely solely on their internal information and knowledge; they must also assimilate and integrate new knowledge from the external environment.

Knowledge transfer theory posits that to establish and sustain a competitive edge, enterprises must generate and update knowledge promptly in response to environmental shifts. The adoption of digital transformation strategies by enterprises not only breaks down barriers to organizational learning but also broadens the scope and depth of knowledge acquisition, thereby augmenting the enterprise's knowledge base and providing ample raw materials for enhancing knowledge integration capabilities. The interconnected and shared nature of digital technology enables enterprises to effectively tap into the knowledge held by various entities within the external competitive landscape. Additionally, digital transformation optimizes the internal organizational structures and business processes of small and medium-sized enterprises [12], transitioning the organizational structure from hierarchical to networked, enabling swift responses to the needs of various segments, departments, and modules, preventing the emergence of "knowledge islands," and removing barriers to knowledge integration. In the context of the digital transformation of the manufacturing industry, Chen Han [12] posits that the digitization of enterprise processes, using digital technology to upgrade procedures, facilitates the integration of internal and external information and knowledge, thereby enhancing the enterprise's capacity for knowledge integration. Digital transformation not only extracts new information and knowledge but also stimulates the enterprise's knowledge creation process, leading to further knowledge integration and application. Thus, the following research hypothesis is proposed:

H2: Digital strategy significantly and positively influences knowledge integration.

2.3 The Impact of Knowledge Integration on Jingyi Entrepreneurial Performance

In manufacturing enterprises, knowledge integration processes involve employees extensively searching for external knowledge and deeply exploring internal information to update and supplement the existing knowledge system [13]. Enterprises continually innovate in their specialized products and markets through the integration, reconstruction, and creation of knowledge resources. On one hand, a comprehensive knowledge integration mechanism assists enterprises in assimilating and utilizing new knowledge from the external environment, continuously updating the knowledge base, solidifying the knowledge foundation, and converting external resources into controllable assets [14]. These assets expedite product innovation and market expansion, thereby enhancing the jingyi entrepreneurial performance of manufacturing enterprises. On the other hand, by integrating dispersed knowledge within the enterprise, the company can focus on strategic priorities in digital transformation, establish a unique knowledge system, avoid imitation challenges and path dependence, and spark greater innovation and entrepreneurship. Some scholars have also noted that knowledge integration significantly and positively impacts enterprise innovation performance [15]. A robust knowledge integration system not only lays the foundation for continuous innovation and transformation but also enhances the enterprise's expertise in niche markets. Based on this, the following research hypothesis is proposed:

H3: Knowledge integration has a significant positive effect on jingyi entrepreneurial performance.

2.4 The Mediating Effect of Knowledge Integration on Digital Strategy and Jingyi Entrepreneurial Performance

The implementation of digital strategies offers an effective means to enhance entrepreneurial performance, though a direct correlation may not always exist. Resource orchestration theory suggests that digital technologies assist small and medium-sized enterprises in gaining more information and knowledge resources than their competitors. However, without effective allocation methods, these resources cannot achieve their full value. During the digital technology upgrade process, enterprises can synergize and fully utilize this information and knowledge through knowledge integration. Digital strategies rely on organizational changes and technological advancements to achieve strategic objectives, which can expose enterprises to challenges such as knowledge disparities among employees and high costs of acquiring knowledge. The knowledge integration system can assist enterprises in better addressing these challenges by fostering knowledge sharing and integration across departments. Research by Jiang Liqin et al. [13] indicates that knowledge integration mediates between cross-border searches and corporate innovation performance. Cross-border searches involve enterprises seeking information, knowledge, and other resources from external environments [15], aiding manufacturing firms in understanding segmented market dynamics, achieving complementary and shared cross-border resources, and further advancing the digital economy. Based on this, the following research hypothesis is proposed:

H4: Knowledge integration mediates between digital strategies and Jingyi entrepreneurial performance.

3 Research Design

3.1 Sample Selection and Data Collection

The data in this paper are obtained in the form of questionnaire survey. The questionnaire includes two parts: the first part is the basic information of the surveyed enterprises, including the age, size, ownership, and industry of the enterprises; The second part is the item of variable measurement, including the respondents' perception of the digital strategy, knowledge integration and Jingyi entrepreneurial performance of their enterprises, which is filled in in the form of a scale. The sample industries include but are not limited to electronic information manufacturing, home appliance manufacturing, automobile manufacturing, aerospace, etc. The basic characteristics of sample enterprises and respondents are shown in Table 1. The descriptive statistics and correlation analysis are shown in Table 2.

3.2 Variable Measurement

This study mainly measures the digital strategy, Jingyi entrepreneurial performance and knowledge integration of small and medium-sized enterprises. In order to ensure the quality of the scale, the variables were measured from mature mainstream scales at home and abroad, and a number of scholars in the field of strategic management jointly completed the translation back translation process; Finally, it is modified and adjusted according to the research situation. All scales are calibrated with Likert 5-level scale, with values ranging from 1 "very inconsistent" to 5 "very consistent".

- (1) Jingyi entrepreneurial performance. entrepreneurial ability. This study refers to and revises the scale of Ge Baoshan and Zhao Liyi [4,5], including three items to measure the potential variable of Jingyi's entrepreneurial performance, which mainly measures the R&D investment and R&D ability of enterprises in their market segments and professional fields.
- (2) Digital strategy. The measurement of digital transformation strategy in this paper refers to and revises the scale of Hess et al. [16], including four items to measure the potential variable of digital transformation strategy, including various ways of digital technology application in enterprises.
- (3) Knowledge integration. The measurement of this variable refers to and revises the scale of jiangliqin et al. ^[13], including five items to measure the potential variable of knowledge integration, including various ways for enterprises to integrate internal knowledge.

The questionnaire further collected the establishment years, size, ownership, and industry of the enterprise.

Table 1. Basic Information of Sample Enterprises

	Category	Fre- quent	%	Industry	Fre- quent	%
Em- ployee	Middle- level	138	56.33	Electronic information manufacturing	63	25.72
Posi- tion	Senior manager	107	43.67	Manufacturing of metal products and metal minerals	7	2.86
	Private	154	62.86	Food processing and manufacturing related	34	13.88
Own-	Foreign	20	8.16	Building materials and furniture manufacturing	21	8.57
ership	State- owned	65	26.53	Home appliance manufacturing	5	2.04
	Other	6	2.45	Rubber and plastic manufacturing	4	1.63
	1<	4	1.63	Chemical raw materials and chemical products manufacturing	7	2.86
	1-3	23	9.39	Manufacturing of general equipment and special equipment	14	5.71
Age	4-6	47	19.18	Electrical machinery and equipment manufactur- ing	14	5.71
	7-10	59	24.08	Non metallic mineral manufacturing	3	1.22
	>10	112	45.72	Automotive manufacturing	5	2.04
	<20	15	6.12	Biomedical manufacturing	18	7.35
	20-100	44	17.96	Processing of petroleum, coal and other fuels	3	1.22
Size	100-300	77	31.43	Resources and environment	24	9.8
	300-500	46	18.78	New energy and energy efficiency	13	5.31
	500-1000	63	25.71	New materials	3	1.22
				Aerospace	7	2.86
Total		245	100		245	100

Table 2. Descriptive Statistics and Correlation Analysis

	Max	Min	Mean	SD	Digital Strategy	Knowledge Integration	Entrepreneur- ial Perfor- mance
Digital Strategy	1.00	5.00	4.025	0.760	1		
Knowledge Integration	1.60	5.00	3.948	0.704	0.638**	1	
Entrepreneurial Performance	1.00	5.00	3.768	0.827	0.718**	0.686**	0.730**

Table 3. Reliability Test and Convergence Validity Test (n=245)

Construct	Items	Standard- ized Coef- ficient	SMC	Cronbach` s α	CR	AVE
Digital Strategy	The company uses digital technology to transform and upgrade existing products, services and processes	0.758	0.575	0.843	0.815	0.525

	The company comprehensively promotes					
	digital design, manufacturing and manage-	0.727	0.529			
	ment					
	The company actively develops digital	0.762	0.581			
	products and services	0.702	0.501			
	The company is willing to vigorously pro-					
	mote and publicize digital skills and man-	0.645	0.416			
	agement knowledge					
	The company conducts learning activities	0.655	0.429			
	through regular formal records and reports	0.055	0.429			
	The company conducts face-to-face discus-					
	sions by setting up a cross departmental	0.66	0.436			
	team					
Knowledg	The company will formally analyze the	0.582	0.339			
e Integra-	failed product R&D projects	0.362	0.557	0.794	0.778	0.413
tion	The company will formally analyze success-	0.612	0.375			
	ful product R&D projects	0.012	0.575			
	The company coordinates and integrates					
	knowledge among different departments	0.698	0.487			
	and individuals through experts and consult-	0.070	0.407			
	ants					
	By deeply exploring the needs of segmented					
	customers, the company developed new	0.671	0.45			
	products to meet the existing customer base					
	and attract potential customers					
Jingyi En-	By increasing the investment in technology					
trepre-	research and development in its field, the					
neurial	company has broken through the bottleneck	0.643	0.413	0.722	0.727	0.471
Perfor-	of key technologies and reached the interna-			0.722	0.727	0.171
mance	tional first-class level					
manec	The company is committed to providing					
	customers with cutting-edge products in the					
	segmentation field by taking into account	0.741	0.549			
	the improvement of market segmentation					
	ability and professional technical ability					

3.3 Data Analysis and Results

We used SPSS statistics 26.0 to analyze the reliability of the samples, and the cronbach's α coefficients of each structural plane were greater than 0.7 (see Table 2), ensuring the good reliability of this study, as shown in Table 3. Amos 28.0 was used to conduct confirmatory factor analysis on the samples, and the results showed that χ 2=694.843, df =326, χ 2/df =2.131, IFI=0.941, TLI =0.931, CFI =0.941, RMSEA =0.068. All the indicators meet the standard, indicating that the model of this study is well adapted. In this study, Harman univariate test was used. Without rotation, the interpretation rate of the first common factor was 21.945%, which was far lower than 40%, indicating that there was no common method deviation in this study.

3.4 Direct Effect Test

First, the main effect test of the whole model is carried out: (1) the digital strategy has a significant positive impact on Jingyi entrepreneurial performance (β =0.483, p<0.001), and H1 is verified; (2) Digital strategy has a significant positive impact on Knowledge Integration (β =0.268, P=0.016), and H2 has been verified; (3) Knowledge integration (β =0.264, P=0.016) had a significant positive impact on the entrepreneurial performance of Jingyi. According to preliminary speculation, knowledge integration may have a partial mediating effect between digital strategy and Jingyi entrepreneurial ability.

3.5 Mediating Effect Test

We also use bootstrapping to test the mediating effect of knowledge integration. Set the number of resampling for bootstrapping to 5000. See Table 4 for the mediation analysis results. The results show that knowledge integration plays a significant intermediary role in the relationship between digital strategy and Jingyi entrepreneurial performance (the upper and lower confidence intervals do not contain 0). Therefore, H4 is supported.

Path		Effect	BootLLCI	BootULCI
Digital strategy→Knowledge Integra-	Direct Effects	0.4734	0.3699	0.5768
tion→Jingyi entrepreneurial perfor- mance	Indirect Effects	0.8167	0.0387	0.2387

Table 4. Test Results of Direct and Indirect Effects

4 Research Conclusion and Discussion

4.1 Research Conclusion

This paper focuses on the digital strategy and Jingyi entrepreneurial performance of small and medium-sized manufacturing enterprises based on their own unique market and technology, and discusses the relationship between the two. This paper constructs a theoretical model for small and medium-sized enterprises to promote knowledge integration through digital strategy and further improve the performance of Jingyi entrepreneurship. The empirical results show that the digital strategy of small and medium-sized enterprises is conducive to improving the entrepreneurial performance of Jingyi, and knowledge integration plays a partial intermediary role in the relationship between the two; Secondly, the knowledge integration system of the enterprise also has a positive impact on the entrepreneurial performance of Jingyi. The relevant research conclusions provide a theoretical reference for the development of digital transformation and refinement.

4.2 Management Discussion

This paper provides some practical enlightenment on how to improve the entrepreneurial performance of Jingyi for small and medium-sized enterprises implementing digital transformation from the aspects of enterprise management and policy-making.

Firstly, this paper empirically proves the positive impact of digital strategy on the performance of small and medium-sized enterprises. Therefore, the digital strategy is an important driving force for small and medium-sized enterprises to break through resource constraints and improve their professional ability. Especially for enterprises that focus on entrepreneurship in a certain field, digital transformation can positively affect their entrepreneurial performance. From the perspective of strategic management, digital transformation is not only the update of digital technology, but also involves the comprehensive transformation of enterprise strategy. This paper provides a more clear reference direction on whether SMEs should try digital transformation and how to understand digital transformation.

Second, knowledge integration plays an important role between digitalization and enterprise Jingyi entrepreneurial performance. Therefore, enterprises need to actively acquire internal and external knowledge, and integrate, apply, and create it, which can help enterprises identify opportunities and threats, and shape the knowledge base of product development. However, whether new knowledge can be transformed into innovation ability also depends on the knowledge integration of enterprises. This is also an important factor affecting the success or failure of competition and sustainable development. Therefore, enterprises should actively promote the knowledge flow within the organization by means of internal meetings and cross departmental teams, and improve the integration efficiency by improving the internal mechanism. In this way, enterprises can make better use of internal and external resources and transform knowledge into innovation ability, so as to better adapt to and lead market changes and achieve sustainable development.

4.3 Research Limitation and Future Prospects

This paper has certain limitations. Firstly, it primarily examines the impact of digital strategies on the performance of specialized entrepreneurship in small and medium-sized enterprises (SMEs), establishing causality through empirical data. However, the dynamic process of the impact mechanism requires additional research methods in the future to enrich the conclusions, such as case studies and simulations. Secondly, despite the use of rigorous procedures for questionnaire collection, including testing for common method biases and the reliability of the survey, sample limitations persist. Future research can build upon this paper. Firstly, the study of specialized entrepreneurship in SMEs requires more attention, including more in-depth and systematic research on the motivation, decision-making processes, and strategic outcomes of specialized strategies. Secondly, it explores the dynamic process between digital transformation and the performance of specialized entrepreneurship in enterprises. Finally, the research conclusions can be further tested through large-scale surveys and longitudinal sample data.

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