

Digital Capability, Digital Innovation and Enterprise Performance of Selected Small and Medium Enterprises (Smes) In Guangdong, China: Guidelines for Growth and Policy

Yuping Zhu *

College of Business Administration, Graduate School, Adamson University, Manila, CO 0900, Philippines

* Corresponding author: Yuping Zhu (Email: zhuyuping1213@163.com)

Abstract: This study investigates the impact of digital capability and digital innovation on enterprise performance, including customer satisfaction and objective evaluations, among Small and Medium Enterprises (SMEs) in Guangdong Province, China. Through an extensive literature review, quantitative research methods including mean analysis, correlation analysis, and regression analysis were employed to analyze survey data collected from SMEs. The results reveal a significant positive relationship between both digital capability and digital innovation, and enterprise performance. Specifically, SMEs with stronger digital capabilities and higher levels of digital innovation tend to demonstrate better enterprise performance in terms of customer satisfaction and objective evaluations such as sales growth rate and profit margin. Furthermore, based on the findings, the study proposes guidelines for growth and policy recommendations aimed at enhancing the digital capabilities and fostering digital innovation, ultimately contributing to their competitiveness and performance in the digital age.

Keywords: Digital capability, Digital innovation, Enterprise performance, Small and Medium Enterprises (SMEs), Customer satisfaction.

1. Background of the Study

Currently is the digital age, the digital economy is exerting a profound influence on the global economic landscape, emerging as a pivotal fresh impetus for China's economic growth. Digital technology has profoundly affected society and life, promoted the high-speed operation of the digital economy, and triggered radical changes in business models. Digital innovation capabilities have brought about an era of massive quantification of market information, diversified customer needs, and novel value creation, changing production, organization, and marketing methods.

At the national level, major economies have prioritized the development of the digital economy as a key objective in their new developmental stages. Developed countries hold a prominent position in the digital economy sector. The "Global Digital Economy White Paper (2022)" reveals that these countries constitute 72.5% of the world's major economies, with the digital economy accounting for 55.7% of their GDP. China is the world's largest developing nation globally, with an economy that is digital of US\$7.1 trillion. The digital economy is of great significance in promoting high-quality economic development. UNCTAD considers China and the United States to be the leading forces in shaping the future trajectory of the digital economy.

Currently, countries all across the world are speeding up policy changes to support the growth of the digital economy in order to take advantage of the opportunity presented by this sector. Many nations' governments encourage businesses to go digital by investing in talent development, infrastructure development, and technology research and development. In its latest national plan, China emphasizes the significance of the digital evolution of industries as well as the necessity for continuous innovation in digital technology.

Within the framework of the digital transition, possessing digital-related capabilities has become crucial for companies seeking to attain a lasting competitive edge. In the process of realizing the plan, it should be taken into account that enterprises, as important participants in economic activities, can generate new digital technologies and apply digital technologies to innovate to bring about their own growth. Major enterprises across the board are recognizing the significance of the digital transition in catalyzing a digital revolution within their respective industries. Consequently, in the present economic digital age, the utilization of digital technology to foster innovation within enterprises warrants particular attention.

For enterprises, innovation capabilities constitute a vital component of an enterprise's core competitiveness, directly impacting its survival and growth. Academics have consistently focused on innovation at the enterprise level, and this focus has intensified as the world has firmly stepped into the economic digital age. The innovation in digitalization resulting from the application of digital technology within enterprises has now garnered even greater attention from scholars. Some scholars have shown that digital innovation has many characteristics such as relevancy, memorability, traceability, self-growth, and modularity, and has a certain effect on corporate value.

Enterprise performance is a reflection of an enterprise's ability to utilize and allocate resources. An enterprise's innovation decisions will have a great impact on the enterprise's future survival, development capabilities and competitiveness, and the impact on enterprise performance is self-evident. As a burgeoning form of corporate innovation in the economic digital age, the influence of digital innovation on enterprise performance merits scholarly attention. However, after reviewing the literature, it was found that there is not much research on how innovation in digitalization

affects corporate performance. Consequently, this study undertakes to investigate the effects of innovation in digitalization, an emergent innovation type within enterprises, on their performance.

Enterprise performance serves as a mirror of a company's proficiency in resource utilization and allocation. An enterprise's innovation decisions have had a significant impact on its future survival, development capabilities, and competitiveness, with the effect on enterprise performance being self-evident. As digital innovation emerges as a novel form of corporate innovation in the economic digital age, its influence on enterprise performance has garnered considerable scholarly interest. However, a thorough literature review reveals a scarcity of research delving into the specifics of how digital innovation affects enterprise performance. Hence, this study aims to explore the effect of innovation in digitalization, a nascent innovation type within enterprises, on their overall performance.

SMEs as a pivotal force in the socio-economic landscape, play a crucial role in harnessing their full social and economic potential. Yet, the rapid evolution and iteration of information technology in the digital age have exposed SMEs to an external environment that is volatile, unpredictable, complicated, and ambiguous. In light of this complex environment, SMEs must urgently develop the capacity to integrate and configure internal as well as external digital resources in order to succeed in the digital age. Concurrently, the significance of innovation in digitalization has been increasingly emphasized, prompting scholars to scrutinize the significantly influence of digital innovation on SMEs performance.

In addition, as one of China's most economically developed regions, Guangdong Province has a large number of SMEs and is famous for its strong manufacturing and international trade. It occupies a prominent position and wields considerable influence in China's economic development. According to statistics from the China Bureau of Statistics, Guangdong Province has led the nation in economic aggregate for 33 consecutive years, with SMEs accounting for over 90% of the total. Thus, in the thriving Guangdong economy, SMEs are a vital impetus behind innovation and economic growth. Examining the digital innovation practices of SMEs in Guangdong Province holds profound implications for the development of China's economy. However, after combing through relevant literature, it was found that there is currently almost no research about the digital capability and digital innovation of SMEs in Guangdong Province. Consequently, selecting SMEs in Guangdong Province as the research focus becomes imperative.

In summary, digital capabilities and digital innovation are very important, but there are not many studies on their mechanism of enterprise performance, and there is almost no research on SMEs in Guangdong Province. Therefore, this study finally selects SMEs in Guangdong Province as the object of analysis. This study will investigate and assess how these elements impact enterprise performance by conducting an in-depth investigation of chosen SMEs' digital capability and digital innovation. It also presents specific strategies and recommendations to help enterprises optimize their digital capabilities and digital innovation. To further provide a comprehensive set of growth and policy guidance for SMEs in Guangdong Province to promote their competitiveness and business performance in the digital age.

2. Statement of the Problem

This research aims to understand how and in what way digital capability and digital innovation of SMEs in Guangdong Province, China affect enterprise performance? Ultimately, to provide Guangdong SMEs with a comprehensive set of growth and policy guidance on digital capabilities and digital innovation to promote their competitiveness and enterprise performance in the digital age.

To be more specific, this research endeavors to address the following sub-questions:

(1) What is the status of the following with regard to:

1.1 Enterprise Performance;

1.1.1 customer satisfaction

1.1.2 objective evaluation

1.2 Digital Capability; And

1.3 Digital Innovation?

(2) What is the level of agreement among SMEs within Guangdong Province in terms of:

2.1 Digital Capability; and

2.2 Digital Innovation?

(3) Is there a significant relationship between digital capability and digital innovation among SMEs in Guangdong Province?

(4) What is the consensus among SMEs within Guangdong Province in terms of enterprise performance:

4.1 Customer Satisfaction (corporate products and services); and

4.2 Objective Evaluation (sales growth rate and profit margin)?

(5) Is there a significant relationship between digital capability and digital innovation towards enterprise performance as to customer satisfaction and objective evaluation among SMEs in Guangdong Province?

(6) Based on the findings of this study, what growth and policy guidelines can be proposed for SMEs in Guangdong Province to enhance their enterprise performance in the digital age?

3. Hypothesis

Based on the objectives of this study, the following null hypotheses were tested:

Ho1: There is no significant relationship between digital capability and digital innovation among SMEs in Guangdong Province.

Ho2: There is no significant relationship between digital capability and digital innovation towards enterprise performance as to customer satisfaction and objective evaluation among SMEs in Guangdong Province.

4. Scope and Delimitation of the Study

There are three main variables in this study, which are digital capabilities, digital innovation and enterprise performance. Among them, digital capabilities and digital innovation are independent variables, while enterprise performance is the dependent variable.

This research explores whether digital capability and digital innovation significantly influence enterprise performance, with a particular focus on SMEs in Guangdong Province. Utilizing a quantitative approach through questionnaire surveys, the study elucidates the mechanisms by which digital capabilities and digital innovation affect enterprise performance. Based on these findings, relevant

strategies are proposed to enhance the digital capabilities and foster digital innovation among SMEs in Guangdong Province, ultimately aiming to improve their overall performance. The research concludes by offering suggestions for the sustainable growth of these SMEs and their attainment of market competitive advantages.

This study focuses on existing SMEs in Guangdong Province, China. Given that SMEs play a pivotal role in driving national economic growth, and considering that Guangdong Province is the largest economic province in China, it serves as an ideal context for this study.

This study has used a questionnaire survey, which has been conducted from June 2024 to August 2024. Guangdong Province consists of 21 prefecture-level cities. To ensure the representativeness of the sample, this study has randomly selected respondents from different industries of SMEs in each prefecture-level city in Guangdong Province. There have been no fewer than 18 respondents per prefecture-level city. This study has randomly selected respondents from various industries without specifying any particular industry. Additionally, this study has not included other types of businesses such as micro and large enterprises. The geographical locations of neighboring cities have also been excluded from the target study scope.

The study was limited to those who were permanently employed at the institution. Part-time employees were not a significant part of this study. The purpose is to ensure that they have a certain understanding of the company and can grasp the content of the variables presented by the company. In addition, in order to ensure that respondents are well informed about their company's digital capability and the current state of digital innovation, respondents mainly chose company managers rather than ordinary employees. This study did not have any restrictions on demographic data in terms of age, gender, ethnicity, education level, etc.

5. Research Design

This research will investigate how digital capability and innovation affect enterprise performance, the selected SMEs' response in Guangdong of China, effectively adapting to changes and reallocation through digital capability and digital innovation in pursuit of better performance and achievement of competitive advantage. Based on this, through literature review, data collection, and analysis, this paper tries to provide a reliable reference and a new research perspective for performance management of SMEs in Guangdong. Questionnaires were used in collecting data. Random sampling has been done to ensure representativeness and reliability in choosing the samples of SMEs in Guangdong.

The collected data has been analyzed in detail using SPSS software. First of all, regarding the questionnaire data, this paper evaluates the reliability of the digital capability scale, digital innovation scale, enterprise performance scale and overall scale. Subsequently, it has conducted correlation analysis and regression analysis to analyze and verify the relationships between variables.

Finally, using the research results, this study has proposed growth and policy guidelines for digital capability and digital innovation for SMEs in Guangdong Province to promote their competitiveness and business performance in the digital era.

6. Results

Status of SMEs in Guangdong Province with Regard to

Selected Variables

In this study, the selected variables for analysis are Enterprise Performance (Including Customer Satisfaction and Objective Evaluation), Digital Capability, and Digital Innovation. The following sections present a detailed assessment of the status of each of these variables.

Table 1. Status of SMEs' Enterprise Performance in Terms of Customer Satisfaction

Customer Satisfaction	Mean	Interpretation
Customer satisfaction levels with our company are higher than those of our competitors.	3.07	Satisfied
Our company is more effective in attracting new customers compared to its competitors.	3.09	Satisfied
Customer Satisfaction Weighted Mean	3.08	Satisfied

The data in Table 1. reveals the status of customer satisfaction among SMEs in Guangdong Province. Based on the overall customer satisfaction weighted mean score of 3.08, which falls within the "satisfied" range (2.6-3.25), it can be concluded that SMEs generally agree their customers are more satisfied with their products and services compared to those of their competitors. This indicates that they perceive this enterprise performance about customer satisfaction to be positive. The second item has a slightly higher mean score of 3.09, indicating that SMEs agree they are relatively more successful in attracting new customers compared to their competitors. This shows that besides retaining existing customers, SMEs are confident of their ability to grow their customer base. These findings emphasize how important SMEs view customer satisfaction. This observation is in agreement with the latest research works that note customer satisfaction as one of the drivers of competitive advantage and overall business success.

However, the single item measuring "customer satisfaction levels" has a mean of 3.07, which is the lowest in the table, and it indicates that while firms are confident in their performance, there may be challenges in consistently outperforming competitors on customer loyalty and product satisfaction. It follows that continuous improvement in customer satisfaction is necessary. SMEs have difficulty in sustaining consistency in customer satisfaction due to limitations in resources and increasing competition in the market. In addition, both scores, 3.07 for customer satisfaction levels and 3.09 for attracting new customers, fall within the upper half of the "satisfied" range (2.6-3.25) but do not reach the "very satisfied" category (3.26-4.00) highlights a measured confidence. This indicates that, while SMEs believe they are performing well, they recognize the need for improvement to further enhance customer satisfaction and loyalty.

Therefore, the answer to "what is the status of customer satisfaction?" based on the data is that, while the status of customer satisfaction among Guangdong SMEs is generally satisfied, with a consensus that they outperform their competitors in customer satisfaction, there is still room for improvement. This therefore calls for continued evaluation and improvement of customer satisfaction strategies.

Table 2. Status of SMEs' Enterprise Performance in Terms of Objective Evaluation

Objective Evaluation	Mean	Interpretation
Our company's overall profit margin exceeds that of its competitors.	3.16	Confident
Our company's net profit margin surpasses that of its competitors.	3.12	Confident
Our company's rate of sales growth is superior to that of its competitors.	3.18	Confident
Objective Evaluation Weighted Mean	3.16	Confident

Table 2 indicates the status of objective evaluation of enterprise performance among SMEs in Guangdong Province. Based on the overall objective evaluation weighted mean score of 3.16, which falls within the "confident" range, the data presented that SMEs in Guangdong Province demonstrate robust confidence in their enterprise performance under the objective evaluation dimension. The overall profit margin has a weighted mean score of 3.16, reflecting that most respondents believe their profit margins are higher than those of their competitors. Similarly, the sales growth rate achieved the highest score of 3.18, indicating that SMEs feel their sales are expanding at a faster pace compared to their competitors. This shows strong confidence in market expansion strategies and growth potential.

Despite these positive results, it is worth noting that although all scores fall within the "confident" range, none have reached the "very confident" category. The lowest score of 3.12, pertaining to net profit margins, still falls within the "confident" range, signaling that while SMEs believe they are profitable, maintaining consistent profitability in a competitive environment presents challenges. The moderate confidence of Guangdong SMEs in net profit margins may be attributed to profit management and cost control. SMEs often face difficulties in sustaining high net profit margins due to rising operational costs and market pressures.

Thus, in response to "what is the status of objective evaluation?", the data reveals that the status of objective evaluation for SMEs in Guangdong is largely positive, with firms expressing strong confidence in their financial performance, particularly in terms of sales growth. However, the relatively lower score for net profit margins suggests there is room for improvement in profitability. Companies need to continuously strengthen their financial strategies to remain competitive in an increasingly demanding market.

7. Conclusion

This study investigates the relationship between digital capability, digital innovation, and enterprise performance among small and medium-sized enterprises (SMEs) in Guangdong Province. The findings reveal key insights regarding the current status of these factors, the level of agreement among SMEs, and the relationships that exist between digital capability, innovation, and enterprise performance outcomes. The following are the specific conclusions:

(1) Regarding the status of enterprise performance (SOP 1.1), this study utilized weighted mean analysis to evaluate customer satisfaction and objective evaluation. For customer satisfaction, the weighted mean score of 3.08 indicates a generally positive consensus among SMEs, reflecting confidence in their ability to attract new customers and maintain satisfaction levels. However, the findings also reveal areas for improvement in customer loyalty and product

satisfaction. In terms of objective evaluation, SMEs exhibit confidence in their financial performance, with a weighted mean score of 3.16, particularly in sales growth (mean score: 3.18). Nonetheless, the relatively lower score for net profit margins (3.12) suggests challenges in maintaining profitability. SMEs face profitability pressures due to operational costs, and need for refined cost management strategies.

Concerning the status of digital capability and digital innovation (SOP 1.2 and 1.3), weighted mean analysis shows that SMEs possess solid digital readiness, with a digital capability weighted mean score of 3.09. They exhibit strengths in responding to digital transformation initiatives (3.15) and identifying digital opportunities (3.11). However, challenges persist in mastering advanced digital technologies (3.02), indicating resource constraints and skill gaps. Similarly, SMEs demonstrate potential in digital innovation, leveraging digital tools for new products and services. However, gaps in comprehensive digital integration remain, reflecting the need for robust innovation ecosystems.

(2) In examining the level of agreement among SMEs regarding digital capability and innovation (SOP 2.1 and 2.2), the study employed descriptive statistics, revealing a consensus on their importance for competitiveness. While SMEs agree on the foundational value of digital transformation, discrepancies in the adoption of advanced technologies indicate variability in resource availability and strategic priorities across firms.

(3) To explore the relationship between digital capability and digital innovation (SOP 3), correlation analysis confirmed a significant positive relationship. Digital capability acts as an enabler for digital innovation by fostering adaptive resource allocation and technological integration. It emphasizes the synergistic effects of digital capabilities on innovation outcomes. These findings highlight the importance of cultivating digital readiness to drive innovation and sustain competitive advantages.

(4) Regarding the consensus among SMEs on enterprise performance (SOP 4), weighted mean analysis revealed general agreement on positive performance outcomes. For customer satisfaction, SMEs acknowledge their competitive edge in attracting new customers, yet recognize the need for improved customer loyalty strategies. Objective evaluation metrics reflect strong confidence in financial performance, particularly sales growth. However, sustaining profitability remains a challenge, requiring refined cost management and market strategies. It underscores the criticality of aligning customer-focused initiatives and financial strategies to sustain SME performance.

(5) In investigating the relationship between digital capability, digital innovation, and enterprise performance (SOP 5), regression analysis revealed a significant positive impact of both digital capability and innovation on customer satisfaction and objective evaluation. Digital capabilities enhance innovation processes, which in turn improve customer satisfaction and financial outcomes. It highlights the transformative potential of integrated digital strategies in driving performance improvements.

(6) Based on the findings, this study proposes growth and policy guidelines (SOP 6) to enhance SME competitiveness in Guangdong Province. Recommendations include fostering advanced digital skills, strengthening innovation ecosystems, and leveraging governmental support to overcome resource constraints. It emphasizes the importance of adaptive policies

in promoting digital transformation and sustaining competitive advantages in the digital economy.

In conclusion, the study has demonstrated that both digital capability and digital innovation play pivotal roles in enhancing the performance of SMEs in Guangdong Province. The positive relationships found between these variables reinforce the importance of investing in digital transformation initiatives to maintain competitiveness in the digital economy. However, the study also revealed key areas where SMEs need to improve, particularly in mastering advanced digital technologies and sustaining high profit margins. These findings provide a solid foundation for the next section, where specific recommendations will be offered to help SMEs enhance their digital capabilities and innovations, ultimately driving sustained growth and performance in a rapidly evolving digital landscape.

8. Recommendations

In light of the results and conclusions drawn from this study, actionable recommendations are essential to address the identified challenges and capitalize on opportunities for SMEs in Guangdong Province. Based on the results and conclusions of each SOP, the following specific recommendations are proposed:

(1) Based on the results and conclusions regarding the status of enterprise performance (SOP 1.1), it is recommended that SMEs in Guangdong Province prioritize enhancing customer satisfaction by investing in customer relationship management (CRM) systems and conducting regular feedback surveys. These tools will allow SMEs to track customer preferences and evolving needs, helping businesses deliver personalized services and build stronger customer loyalty. Additionally, to address challenges in profitability, SMEs should adopt cost-control measures such as streamlining operational processes, automating routine tasks, and integrating digital tools to reduce inefficiencies. By optimizing resources, SMEs can reallocate funds to value-added activities, which will improve both customer satisfaction and profitability. It indicates the importance of effective cost management strategies in sustaining long-term growth.

Based on the results and conclusions regarding the status of digital capability and digital innovation (SOP 1.2 and 1.3), SMEs should focus on developing advanced digital skills among employees through structured training programs, workshops, and partnerships with technology providers. Strengthening internal digital capabilities will enable SMEs to better adopt and leverage emerging technologies, helping them remain competitive in the digital economy. To further bridge the gaps in advanced digital technology mastery, SMEs should explore government-sponsored digital adoption grants or collaborate with innovation hubs that provide access to state-of-the-art resources and expertise. Moreover, SMEs should invest in R&D initiatives that utilize digital tools for product development, service delivery, and operational optimization. This approach will foster a culture of continuous innovation and ensure that SMEs remain adaptable to evolving market conditions. It highlights the importance of building strong innovation ecosystems to sustain competitiveness, further supporting these recommendations.

(2) Based on the results and conclusions regarding the level of agreement among SMEs on digital capability and digital innovation (SOP 2.1 and 2.2), it is recommended that SMEs

adopt standardized digital transformation frameworks tailored to specific industry needs. Collaborating with local industry associations and policymakers to develop these frameworks can provide SMEs with structured guidelines for measuring and improving their digital maturity. Moreover, establishing cross-industry digital forums or clusters can further foster knowledge-sharing, resource-sharing, and collective problem-solving. These platforms would not only address discrepancies in technology adoption but also encourage strategic partnerships and innovation co-development. It highlights the importance of collaboration in achieving aligned digital strategies and enhancing overall industry performance.

(3) Based on the results and conclusions regarding the relationship between digital capability and digital innovation (SOP 3), two recommendations are proposed. First, SMEs should establish dedicated internal innovation teams that continuously monitor and evaluate digital opportunities. These teams can work on integrating digital tools into existing processes while exploring new business models that enhance competitiveness. Second, adopting robust performance metrics to evaluate the impact of digital capabilities on innovation outcomes is crucial for driving continuous improvement. Such metrics enable firms to track their progress, identify bottlenecks, and refine their strategies for better results. It indicates the importance of proactive resource allocation and monitoring in fostering innovation.

(4) Based on the results and conclusions regarding the consensus on enterprise performance (SOP 4), SMEs should implement initiatives to enhance customer satisfaction and financial performance. For customer satisfaction, SMEs should deepen their customer engagement efforts by implementing advanced analytics tools to segment customer data and deliver personalized marketing campaigns. Such tailored approaches can help retain customers and build brand loyalty in a competitive market. To improve financial performance, SMEs should adopt integrated enterprise resource planning (ERP) systems that provide real-time data on revenue streams and cost structures. These systems enable firms to identify inefficiencies, optimize resource allocation, and uncover growth opportunities.

(5) Based on the results and conclusions regarding the relationship between digital capability, digital innovation, and enterprise performance (SOP 5), SMEs are advised to develop comprehensive digital roadmaps that integrate innovation objectives with measurable performance targets. These roadmaps serve as strategic tools to align digital capabilities and innovation efforts with broader business goals. Furthermore, adopting collaborative innovation platforms can enable SMEs to partner with industry leaders and research institutions, gaining access to advanced tools and technologies. Such partnerships enhance SMEs' ability to innovate and adapt to market demands.

(6) Based on the results and conclusions regarding growth and policy guidelines (SOP 6), policymakers should establish dedicated digital innovation hubs or incubators to provide SMEs with access to advanced infrastructure, mentorship, and networking opportunities. These hubs can facilitate technological advancements and entrepreneurial growth by fostering collaboration among SMEs, researchers, and technology providers. Additionally, government support programs offering financial incentives, such as tax breaks and subsidies for digital transformation investments, can help SMEs overcome resource constraints and accelerate

technology adoption. Policymakers should also create platforms for knowledge-sharing, enabling SMEs to learn from best practices and successful case studies. These measures are crucial for fostering an environment that promotes SME competitiveness and growth in the digital economy.

(7) Future study. The following recommendations suggest potential areas for future study:

Future study can build on this study to further explore the complex relationship between digital innovation and enterprise performance. Investigating the intersection of digital innovation and employee engagement would provide valuable insights. Research could analyze how firms can increase employee engagement in digital initiatives, enhancing acceptance and execution of innovations, ultimately leading to improved performance outcomes. Such studies would offer valuable insights for firms in developing effective digital strategies.

Future researchers could also be expanded to analyze how digital capabilities impact SMEs in different industries in diverse ways. For instance, the effects of digital innovation and capability may differ significantly between manufacturing and service industries. By examining industry-specific challenges and opportunities, researchers can provide targeted strategies for businesses navigating their digital transformations.

Future study can expand the scope of this study to include SMEs from different regions or countries would provide comparative insights. The current study is geographically confined to Guangdong Province, which may limit the generalizability of the findings. Cross-regional or cross-national studies could reveal how contextual factors, such as policy environments, cultural differences, and market dynamics, affect the relationships among digital capability, innovation, and performance.

Future researchers could track the long-term effects of digital transformation on enterprise performance, particularly for SMEs. Longitudinal studies can yield insights into the sustainability of digital innovations and their impacts on competitiveness. By analyzing long-term data across various industries and regions, researchers can provide critical insights into how firms can adjust their strategies to maintain a competitive edge in a rapidly evolving digital landscape.

References

- [1] Abbate, T., Codini, A., Aquilani, B., et al. (2021). From Knowledge Ecosystems to Capabilities Ecosystems: When Open Innovation Digital Platforms Lead to Value Co-creation. *Journal of the Knowledge Economy*.
- [2] Abbott, J. A. M. (2020). A Foundation for Change: Using Challenges and Opportunities as Building Blocks for Collection Management. *Collection Management*, 45(2), 110-123.
- [3] Ajaegbu, A. (2020). The Role and Impact of Digital Capabilities on Value Co-Creation of Servitising Organisations (Ph.D. Thesis). Aston University, Birmingham, UK.
- [4] Alexandru, A., Ianculescu, M., Marinescu, I. A., et al. (2019). Shaping the Digital Citizen into a Smart Citizen on the Basis of IoT Capabilities: 2019 22nd International Conference on Control Systems and Computer Science (CSCS).
- [5] Anna, E., Termeleva. (2022). Digital transformation at the present stage and its impact on innovation. *Vestnik Samarskogo universiteta. Ekonomika i upravlenie*, 13(3):50-58. doi: 10.18287/2542-0461-2022-13-3-50-58
- [6] Annarelli, A., Battistella, C., Nonino, F., Parida, V., & Pessot, E. (2021). Literature review on digitalization capabilities: Co-citation analysis of antecedents, conceptualization and consequences. *Technological Forecasting and Social Change*, 166, 120635.
- [7] Berawi, M. A., Suwartha, N., Asvial, M., Harwahyu, R., Suryanegara, M., Setiawan, E. A., & Maknun, I. J. (2020). Digital innovation: Creating competitive advantages. *International Journal of Technology*, 11, 1076–1080.
- [8] Bo, Li., Yan, Li., Li, Tang., Yipeng, Zhao., Haodong, Chang. (2023). The impact of enterprise resilience and HRM practices on performance: Findings from fsQCA. *Frontiers in Psychology*, doi: 10.3389/fpsyg.2023.1114087.
- [9] Buttice, V., Caviggioli, F., Franzoni, C., et al. (2020). Counterfeiting in digital technologies: An empirical analysis of the economic performance and innovative activities of affected companies. *Research Policy*, 49(5).
- [10] Calle, A. D. L., Freije, I., Ugarte, J. V., & Larrinaga, M. Á. (2020). Measuring the impact of digital capabilities on product-service innovation in Spanish industries. *International Journal of Business Environment*, 11, 254–274.
- [11] Can, T., & Luo, J. (2023). Digital Capability and Business Model Innovation by Big Data Technology: The Mediating Role of Resource Reconfiguration. *International Journal of Business and Economics Research*. doi: 10.11648/j.ijber.20231201.15.
- [12] Cao, C. (2024). Research on the impact of digital innovation readiness on enterprise digital innovation and the role of open innovation and digital capabilities. *Exhibition Economy*, (18), 83-86.
- [13] Ceipek, R., Hautz, J., Petruzzelli, A. M., et al. (2021). A motivation and ability perspective on engagement in emerging digital technologies: The case of Internet of Things solutions. *Long Range Planning*, 54.
- [14] Chen, C. (2019). Research on the construction of digital transformation capability system of traditional enterprises. *People's Forum·Academic Frontiers*, 2019(18), 6-12.
- [15] Cheng, X., Zhu, S., & Xie, H. (2021). Digitalization, service-oriented strategy and business model innovation. *Technology and Economy*, 34(01), 36-40.
- [16] Chi, R., Wang, G., Zhou, Z., & Zhu, R. (2023). Digital capabilities, value co-creation, and enterprise performance: The moderating role of data security. *Journal of Technology Economics*, 42(2).
- [17] Chuan, B., & Hu, B. (2024). Research on innovative marketing models in the context of digital transformation. *Finance and Management: International Academic Forum*, 3(6), 101-103.
- [18] Cui, J. J. (2023). Competitive strategy, regional market competition, and corporate performance: An empirical analysis based on state-owned listed companies. *China Business Review*, 14, 157-160.
- [19] Daquan, Gao., Xin, Ju, Mo. (2023). Smarter and Prosperous: Digital Transformation and Enterprise Performance. *Systems*, doi: 10.3390/systems11070329.
- [20] Edu, S. A., Agoyi, M., & Agozie, D. Q. (2020). Integrating digital innovation capabilities towards value creation: A conceptual view. *International Journal of Intelligent Information Technologies*, 16, 37–50.
- [21] Елена, Морозова. (2024). The impact of digital transformation on the competitive advantages of the company's brand. *Экономика и предпринимательство*, 848-851. doi: 10.34925/eip.2024.166.5.172

- [22] Fan, H., & Wu, T. (2021). Regional digital capability measurement and improvement strategic path. *Technology Economics and Management Research*, 2021(11), 8-14.
- [23] Fazal, Ur, Rehman. (2024). 30. Digital capabilities and market competitiveness: the two-fold mediation of internal and external drivers. *European Business Review*, doi: 10.1108/eb-02-2024-0088
- [24] Fenwick, M., McCahery, J. A., & Vermeulen, E. (2019). The End of 'Corporate' Governance: Hello 'Platform' Governance. *European Business Organization Law Review*, 20, 171-199.
- [25] Ferreira, J. J. M., Fernandes, C. I., & Ferreira, F. A. F. (2019). To be or not to be digital, that is the question: Firm innovation and performance. *Journal of Business Research*, 101, 583-590.
- [26] Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2020). Embracing digital technology: A new strategic imperative. *MIT Sloan Management Review*, 58(2), 1-12.
- [27] Ge, Y. (2024). Research on the relationship between digital transformation, dynamic capabilities, and enterprise performance. *Time-Honored Brand Marketing*, (17), 108-110.
- [28] Guo, X., Zhang, X., & Zhang, L. (2022). Research on digital technology integration, strategic change and resource-based enterprise performance. *Scientific Management Research*, 40(04), 91-98.
- [29] Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies*, 58(5), 1159-1197.
- [30] Hao, Z., Liu, C., & Goh, M. (2021). Determining the effects of lean production and servitization of manufacturing on sustainable performance. *Sustainable Production and Consumption*, 25, 374-389.
- [31] He, F., & Liu, H. (2019). Evaluation of the performance improvement effect of digital transformation in physical enterprises from the perspective of digital economy. *Reform*, 4, 137-148.
- [32] Heredia, J., Castillo-Vergara, M., Geldes, C., Gamarra, F. M. C., Flores, A., & Heredia, W. (2022). How do digital capabilities affect firm performance? The mediating role of technological capabilities in the "new normal". *Journal of Innovation & Knowledge*, 7, 100171.
- [33] Hirvonen, J., & Majuri, M. (2020). Digital capabilities in manufacturing SMEs. *Procedia Manufacturing*, 51, 1283-1289.
- [34] Hou, G., & Liu, Q. (2022). Network power and innovation performance: Based on the perspective of enterprise digital capabilities. *Scientific Research*, 40(06), 1143-1152.
- [35] Hu, Y., Chen, S., & Qiu, F. (2021). Digital strategic orientation, market competitiveness, and organizational resilience. *China Soft Science*, 2021(S1), 214-225.