

The Impact of Digitalization on Business Performance: The Mediating Role of Consumer–centric Innovation and Organizational Agility

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Abstract

The purposes of this research were (1) to determine the relationship between digitalization, organizational agility, consumer–centric innovation, and business performance; (2) to examine the effect of digitalization on consumer–centric innovation, organizational agility, and business performance; (3) to examine the direct effect of consumer–centric innovation and organizational agility on business performance; and (4) to examine the indirect effect of digitalization on business performance through consumer–centric innovation and organizational agility. A quantitative research design was employed in this study. The research focused on the Chinese NEV sector, targeting professionals from NEV manufacturers, suppliers, and service providers. The samples used in this study comprised 511 respondents, selected through stratified random sampling. Structural Equation Modeling (SEM) was used for data analysis.

The research results were as follows: 1. There was a positive relationship between digitalization, organizational agility, consumer–centric innovation, and business performance; 2. Digitalization had a direct effect on consumer–centric innovation, organizational agility, and business performance; 3. Consumer–centric innovation and organizational agility had a direct effect on business performance; 4. Consumer–centric innovation and organizational agility significantly mediated the relationship between digitalization and business performance. This research highlights the critical role of digitalization in increasing business performance and the indirect effect of digitalization on business performance through consumer–centric innovation and organizational agility.

Keywords: Digitalization; Consumer–Centric Innovation; Organizational Agility; Business Performance

Introduction

The rapid advancement of digital technologies such as artificial intelligence, big data analytics, and cloud computing has accelerated innovation across many industries, with particularly profound effects on the new energy vehicle (NEV) sector (Kaiser et al., 2017). In response to global climate policies, shifting consumer expectations, and technological progress, the NEV market has experienced explosive growth (Xu et al., 2024). Governments, especially in countries like China, have actively supported the transition through subsidies and regulatory frameworks aimed at reducing carbon emissions. Consequently, firms are under pressure to adopt digital tools to maintain competitiveness and agility in a highly dynamic environment (Kaiser et al., 2017). Prior research confirms the positive impact of digital transformation on innovation and performance (Llopis-Albert et al., 2021), yet there remains a significant research gap in understanding how digital transformation translates into firm performance particularly through mechanisms such as consumer-centric innovation and organizational agility. While some studies have explored the role of agility in responding to market changes (Criado-Gomis et al., 2017), few have integrated this concept with digitalization and consumer innovation in the NEV context, especially under varying market conditions (AlNuaimi et al., 2022).

This study focuses on NEV firms operating in highly competitive and rapidly evolving markets, where the ability to innovate based on real-time consumer feedback is crucial. The NEV sector is characterized by intense competition between traditional automakers (e.g., Toyota, Volkswagen) and new entrants (e.g., Tesla, NIO), all striving to meet consumer demands for smarter, greener, and more connected vehicles. Researchers have observed that firms like BYD and NIO are leveraging digital platforms to enhance user experience, improve manufacturing processes, and drive customer co-creation (Han & Zhang, 2022). The research team, with experience in digital strategy and innovation management in emerging industries, aims to examine how these digital efforts contribute to business performance. The target audience includes business leaders in the NEV industry, policymakers involved in digital infrastructure and innovation policy, and scholars studying digital transformation and organizational change.

In light of these considerations, this study constructs a comprehensive theoretical framework to examine how digitalization in the NEV industry influences firm performance through two primary pathways, while also assessing the moderating role of market dynamics. On one hand, digital management platforms support consumer-centric innovation by enabling firms to accurately identify customer preferences through big data analytics, intelligent recommendation

engines, and interactive digital technologies ultimately leading to enhanced business outcomes. On the other hand, such platforms strengthen internal operations, particularly in project coordination and resource allocation. By improving project workflows and enhancing information sharing, firms are better positioned to respond to market fluctuations with greater agility, which in turn contributes to performance improvement.

This researcher considered that the digitalization would have a direct effect on business performance and indirect effect on business performance of the NEV industry through consumer-centric innovation and organizational agility. Therefore, the researcher is interested in conducting this study. The findings are expected to contribute to academic literature on digital transformation and provide practical guidance to NEV firms seeking to navigate digital change, enhance innovation capacity, and respond effectively to turbulent market environments.

Research Objectives

1. To find the relationship between digitalization, organizational agility, consumer-centric innovation and business performance
2. To examine the direct effect of digitalization on consumer-centric innovation, organizational agility and business performance
3. To examine the direct of consumer-centric innovation and organizational agility on business performance
4. To examine the indirect effect of digitalization on business performance through consumer-centric innovation and organizational agility

Literature Review

1. Critical Review of Relevant Theories and Conceptual Frameworks the Resource-Based View (RBV)

RBV is foundational in strategic management, emphasizing that firms achieve sustained competitive advantage through the possession of valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991). Originating from Penrose's (1959) work on firm growth constraints due to internal resources, RBV was extended by Barney (1995) through the VRIO framework, adding the 'Organization' dimension, which highlights the firm's internal capacity to exploit resources fully. This extension shifts focus from resource attributes alone to the firm's organizational capabilities (Fosso Wamba et al., 2019). While RBV provides a robust foundation for

evaluating resource uniqueness, it has been criticized for its static perspective, lacking insight into how firms adapt resources in dynamic markets (Ilham et al., 2021). This limitation is particularly salient in digital transformation contexts, where rapid change demands more agile resource management.

2. Dynamic Capabilities Theory

The Dynamic Capabilities Theory (DCT), introduced emerged as an extension of the Resource-Based View (RBV) of the firm. While RBV emphasizes the role of valuable, rare, inimitable, and non-substitutable (VRIN) resources in achieving sustained competitive advantage, it has been critiqued for its static orientation and lack of responsiveness to rapidly changing environments. In contrast, DCT focuses on the firm's capacity to adapt and innovate in dynamic markets. Teece et al. (1997) responded to RBV's static nature by introducing dynamic capabilities, defined as a firm's ability to integrate, reconfigure, and deploy resources to respond effectively to changing environments. This theory is especially relevant in innovation-driven and digital markets, emphasizing sensing, seizing, and reconfiguring capabilities that enable long-term competitiveness (Teece, 2007). Recent studies highlight those technologies such as AI and real-time data analytics enhance firms' dynamic capabilities, allowing swift adaptation and continuous innovation (Bari et al., 2022; Aldoseri et al., 2024).

3. Knowledge-Based View (KBV)

The Knowledge-Based View (KBV) of the firm expands upon the Resource-Based View (RBV) by emphasizing that knowledge, rather than traditional physical or financial resources, constitutes the most strategically valuable asset within an organization. According to this perspective, sustained competitive advantage and innovation are primarily driven by a firm's ability to effectively create, manage, and leverage knowledge assets. Central to KBV is the notion that organizational success hinges on processes such as knowledge capture, sharing, and application, which collectively enhance the firm's capacity for innovation. In the era of digital transformation, these processes are increasingly mediated and enhanced by digital technologies. Specifically, knowledge management systems (KMS) and artificial intelligence (AI) play a vital role in enabling the integration and utilization of dispersed knowledge across organizational units. These digital tools facilitate more dynamic and responsive knowledge flows, thereby supporting continuous innovation and strategic adaptability. As Zahra (2021) highlights, the strategic use of digital technologies to manage knowledge not only improves operational efficiency but also enhances a firm's innovation potential and long-term competitive positioning.

4. Integration of Resource-Based View, Knowledge-Based View and Dynamic Capabilities

Together, RBV, KBV, and dynamic capabilities offer a comprehensive lens to analyze how firms manage internal resources and knowledge while adapting dynamically to fast-changing markets. RBV focuses on resource identification and valuation, KBV emphasizes knowledge integration as a core resource, and dynamic capabilities highlight the processes for adapting these resources in real-time. Digital technologies like cloud computing, IoT, and AI improve these capabilities by enabling real-time data monitoring, knowledge dissemination, and agile resource reconfiguration (Channuwong et al., 2025; Inigo & Albareda, 2019; Ochuba et al., 2024).

5. Technology Acceptance Model (TAM)

Complementing these views, TAM explains how the adoption of digital technologies by employees and consumers influences organizational agility and innovation. TAM provides insights into user acceptance factors critical for the successful deployment and utilization of digital resources, thereby impacting competitive advantage in digitally transforming firms.

Summary This literature review demonstrates that while RBV, KBV, and dynamic capabilities theories each provide valuable insights into resource management, knowledge integration, and adaptability, there remains a lack of integrated frameworks that holistically examine their interplay within digital transformation contexts. Additionally, TAM's role in technology adoption further complements these perspectives by addressing behavioral aspects critical for successful implementation. By synthesizing these theories, this study establishes a robust conceptual framework that bridges the static and dynamic dimensions of resource-based theories with knowledge management and technology acceptance. This framework will enable a systematic investigation of how digital transformation facilitates resource integration, capability development, and innovation, thus addressing the identified knowledge gap and advancing strategic management literature in fast-changing digital markets.

Conceptual Framework

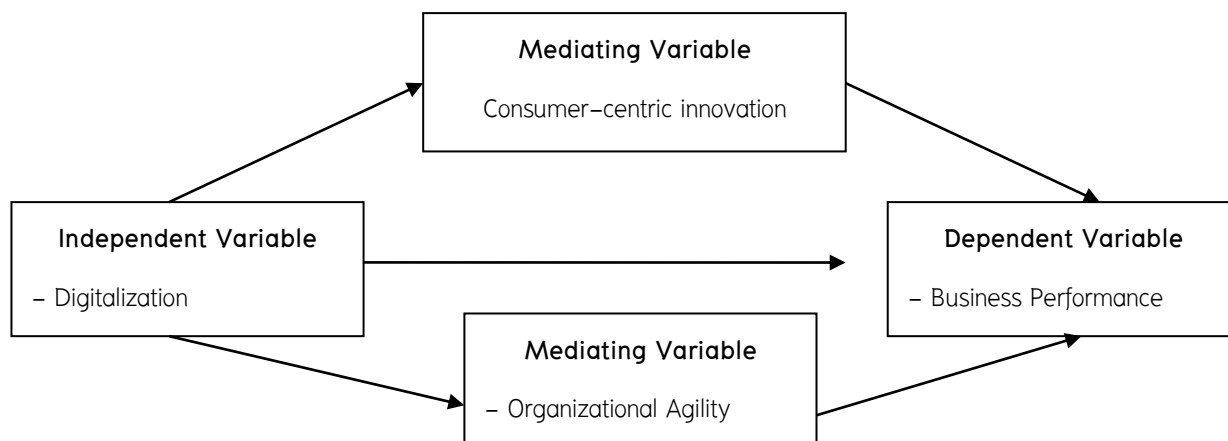


Figure 1 Conceptual Framework

Research Methodology

This study adopts a quantitative research design, aiming to empirically examine the relationships between digitalization and business performance within the New Energy Vehicle (NEV) industry in China. The research is explanatory in nature, seeking to test hypothesized relationships among key constructs grounded in established theoretical frameworks.

Conceptual Foundation

The study is theoretically grounded in:

1. Dynamic Capabilities Theory – emphasizing how firms adapt and innovate in dynamic environments.
2. Technology–Organization–Environment (TOE) Framework focusing on how technological, organizational, and environmental factors influence innovation and performance.

Population

The population consists of professionals operating in China's NEV sector, including:

1. NEV manufacturers
2. Suppliers of parts and technology
3. Service providers within the NEV ecosystem

Participants were selected from companies actively engaged in digital transformation and innovation initiatives within the NEV industry.

Sample Groups

A total of 511 respondents formed the study sample. These participants represent:

1. Senior and mid-level managers
2. R&D and innovation personnel
3. IT and digital transformation teams
4. Marketing and strategic planning professionals

This ensures a broad perspective across key functional areas influencing and influenced by digitalization.

Sampling Technique

The sampling was conducted using stratified random sampling, ensuring representation from different organizational roles and company types (manufacturers, suppliers, service providers). This method improved the generalizability of the findings within the industry.

Research Tools

Three primary research instruments were employed:

1. Structured Questionnaires designed to capture data on key constructs such as digitalization, innovation, agility, and performance.
2. Likert-Scale Surveys – using a 5-point scale to quantify respondents' perceptions and evaluations.
3. Demographic Profiling Tools capturing background variables such as industry segment, company size, and respondent role.

Research Procedures

1. Instrument Development: Items were adapted from validated scales in prior literature aligned with the conceptual framework.
2. Pilot Testing: Conducted with a small group of NEV professionals to ensure clarity and reliability.
3. Data Collection: Surveys were distributed electronically and responses were collected over a 6-week period.
4. Ethical Considerations: Participation was voluntary and anonymous, with informed consent obtained from all respondents.

Data Collection

Quantitative data were collected via an online survey platform, ensuring broad geographic reach across China's NEV firms. Each participant completed the full questionnaire, which took approximately 15–20 minutes.

Data Analysis Methods

Structural Equation Modeling (SEM) was used to test the hypothesized relationships between constructs. Confirmatory Factor Analysis (CFA) was conducted to validate the measurement model.

Research Results

Table 1 shows a balanced gender structure, a concentration of young and middle-aged employees (especially 26–35 years old), and a relatively high education level with most holding a bachelor's degree or above. The majority are entry-level staff with 1–6 years of experience, reflecting a young and dynamic workforce, while managers and senior managers are reasonably represented. Departmental distribution emphasizes R&D and IT, consistent with a focus on innovation and digital transformation, complemented by Marketing and Production roles that ensure operational balance.

Table 1 Basic Characteristics of Demographic Variables

Variable	Attribute	Frequency	Percent	Variable	Attribute	Frequency	Percent
Gender	Male	268	52.4%	Position	Entry-level staff	323	63.2%
	Female	243	47.6%	Level	Management	151	29.5%
	Prefer not to disclose	0	0.0%		Senior Management	37	7.2%
Age	18–25 years old	106	20.7%	Years of Experience	1–3 years	239	46.8%
	26–35 years old	199	38.9%		4–6 years	180	35.2%
	36–45 years old	137	26.8%		7–10 years	63	12.3%
	46 years old and above	69	13.5%		More than 10 years	29	5.7%
	Associate degree or below	174	34.1%	Department	Research and Development	155	30.3%
Education	Bachelor's degree	252	49.3%		Production	97	19.0%
Level	Master's degree or above	85	16.6%		Marketing	119	23.3%
					IT	129	25.2%
					Other	11	2.2%

Objective 1: To find the relationship between digitalization, organizational agility, consumer-centric innovation and business performance.

The correlation analysis shows that digitalization is positively related to organizational agility ($r = 0.159$, $p < 0.01$), consumer-centric innovation ($r = 0.094$, $p < 0.05$), and business performance ($r = 0.283$, $p < 0.01$), though the direct effects are modest to moderate, indicating that digital adoption alone is not sufficient to drive performance gains. Organizational agility demonstrates relatively strong correlations with both consumer-centric innovation ($r = 0.398$, $p < 0.01$) and business performance ($r = 0.394$, $p < 0.01$), underscoring its role as a critical enabler that helps firms translate digital investments into outcomes. Consumer-centric innovation exhibits the strongest association with business performance ($r = 0.438$, $p < 0.01$), suggesting that prioritizing consumer needs in innovation is a key driver of competitiveness. Overall, the results highlight that while digitalization provides the foundation, its impact on performance in NEV firms is most effectively realized when reinforced by agility and a strong consumer orientation (Table 2).

Table 2 Correlation Analysis

	1	2	3	4
1. Digitalization	1			
2. Organizational Agility	0.159**	1		
3. Consumer-Centric Innovation	0.094*	0.398**	1	
4. Business Performance	0.283**	0.394**	0.438**	1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Objective 2: To examine the direct effect of digitalization on consumer-centric innovation, organizational agility and business performance.

Table 3 illustrates the direct effects among the core variables of this study, and the structural model results ($\chi^2/df = 1.236$, IFI = 0.99, TLI = 0.989, CFI = 0.99, RMSEA = 0.022) confirm an excellent model fit, providing a strong support for the hypothesized relationships. Digitalization shows significant positive effect on consumer-centric innovation ($\beta = 0.132$, $p < 0.05$), organizational agility ($\beta = 0.202$, $p < 0.01$) and business performance ($\beta = 0.239$, $p < 0.01$), underscoring its role as a foundational enabler.

Objective 3: To find the direct effect of consumer–centric innovation and organizational agility on business performance.

The research results showed that both consumer–centric innovation ($\beta = 0.371$, $p < 0.01$) and organizational agility ($\beta = 0.268$, $p < 0.01$) significantly affect business performance, highlighting their mediating importance (Table 3).

Table 3 Estimation of the Baseline Structural Equation Model

Item	Main Effect
Model fit	Model 1
χ^2/df	1.236
IFI	0.99
TLI	0.989
CFI	0.99
RMSEA	0.022
DI→CI	0.132*(2.473)
DI→OA	0.202**(3.739)
DI→BP	0.239**(5.160)
CI→BP	0.371**(7.874)
OA→BP	0.268**(5.773)

Objective 4: To examine the indirect effect of digitalization on business performance through consumer–centric innovation and organizational agility.

Table 4 reports the mediation analysis results, showing that both consumer–centric innovation and organizational agility partially mediate the relationship between digitalization and business performance. For the pathway through consumer–centric innovation, the indirect effect is significant (0.064, 95% CI [0.012, 0.133], $p = 0.018$), indicating that digitalization enhances business performance partly by strengthening firms' consumer–focused innovation capabilities, while the direct effect of digitalization on performance remains significant ($\beta = 0.311$, $p = 0.001$), confirming partial mediation. Similarly, for the pathway through organizational agility, the indirect effect is also significant (0.070, 95% CI [0.031, 0.130], $p < 0.001$), with digitalization continuing to exert a direct impact on performance ($\beta = 0.311$, $p = 0.001$), again supporting partial mediation. Overall, these findings confirm that digitalization improves business performance both directly and indirectly by fostering consumer–centric innovation and agility, highlighting the

multifaceted mechanisms through which digital transformation strengthens competitiveness in the NEV sector.

Table 4 Summary of Mediation Effect Testing

Path		Estimate	Lower	Upper	P
Digitalization → Consumer–Centric Innovation → Business Performance	Indirect Effect	0.064	0.012	0.133	0.018
	Direct Effect	0.311	0.171	0.445	0.001
	Total Effect	0.374	0.235	0.516	0.001
Digitalization → Organizational Agility → Business Performance	Indirect Effect	0.070	0.031	0.130	0.000
	Direct Effect	0.311	0.171	0.445	0.001
	Total Effect	0.381	0.251	0.516	0.001

Discussions

The research results from objective 1 show that digitalization is positively related to organizational agility, consumer–centric innovation and business performance. Organizational agility is positively related to both consumer–centric innovation and business performance, underscoring its role as a critical enabler that helps firms translate digital investments into outcomes. Consumer–centric innovation exhibits the strongest association with business performance.

The research results from objective 2 show that digitalization has an effect on consumer–centric innovation, organizational agility and business performance; consumer–centric innovation has an effect on business performance; and organizational agility has an effect on business performance. This research highlights the critical role of digitalization not only as a technological driver but also as an enabler of strategic capabilities like innovation and agility. These research findings can be discussed as follows: Digitalization fosters consumer–centric innovation by enabling firms to better understand and respond to tech–savvy, innovation–driven customers (Pukas, 2023). Technologies like ADAS and OTA updates support personalized experiences and brand loyalty (Xie et al., 2024). This encourages NEV firms to invest in R&D, particularly in areas like autonomous driving and V2X communication, thus driving both innovation and performance. Consumer innovation orientation mediates the link between digitalization and firm success.

Digitalization enables agility by transforming operations into data–driven, flexible systems (Ahmed et al., 2022; Aldoseri et al., 2024; Jiang–Min, 2023). Tools like IoT and cloud computing support rapid adaptation to demand changes, while digital supply chains and blockchain enhance coordination and transparency. Moreover, digitalization opens new revenue streams (e.g., battery leasing, smart charging), reinforcing strategic flexibility and competitiveness (Yao, 2024).

Digitalization has a direct effect on business performance. The results of this study are relevant to the findings of Bari et al. (2022), Pukas (2023), and Bogarin et al. (2022) which showed that digitalization has a significant direct positive effect on NEV firm performance. Digital technologies—AI, big data, IoT, and cloud computing enhance operational efficiency, reduce costs, and improve decision-making through real-time analytics. These improvements bolster firms' dynamic capabilities (Jafari et al., 2022; Teece, 2007), enabling them to sense and respond to market shifts, streamline resource allocation, and maintain competitiveness in a rapidly evolving industry.

Consumer-centric innovation has a direct effect on business performance, aligning with Liao et al. (2024), and Narver and Slater (1990) who found that consumer-centric innovation tailoring products to customer needs boosts satisfaction, loyalty, and long-term performance. In the NEV sector, this approach enables differentiation and sustainable growth through stronger customer relationships and responsive product development.

An organizational agility has an effect on business performance, aligning with the previous studies which defined that the rapid adaptation to change significantly enhances performance. Digital tools provide real-time insights, enabling quicker decisions and shorter development cycles (AlNuaimi et al., 2022; Panichakarn et al., 2024). Agile firms also better engage in open innovation, adapt to new technologies, and respond to evolving consumer needs, leading to sustained advantage (Cheraghalizadeh et al., 2021; Su et al., 2022; Wongmajarapinya et al. 2024; Xu et al., 2024).

Consumer-centric innovation and organizational agility significantly moderate the impact of digitalization and business performance. It can be concluded that digitalization fosters innovation and agility, which in turn translate into improved efficiency, competitiveness, and customer satisfaction. The results of this study are relevant to the findings of Panichakarn et al. (2024), Channuwong et al. (2022), and Jiang-Min (2023) which found that integrating digital technologies with a strong consumer focus and agile management is key to sustaining performance in a rapidly changing market.

New Knowledge from Research

This study explores the complex relationships among digitalization, consumer-centric innovation, organizational agility and business performance within the NEV industry. The research results reveals that the digitalization has a direct effect on business performance. The consumer-centric innovation and organizational agility are the significant moderating factors between digitalization and business performance. This research not only advances theoretical understanding of digital transformation in the NEV sector but also provides actionable insights for industry practitioners. Specifically, NEV firms are encouraged to leverage digitalization strategically to drive innovation and agility, thereby gaining a competitive advantage in an increasingly dynamic market environment. Overall, this study underscores the critical role of digitalization as both a technological enabler and a strategic capability, offering valuable guidance for enhancing business performance amid rapid industry evolution. Firms that prioritize customer-driven innovation report improved competitive positioning, market responsiveness, and revenue growth.

Conclusion

This study comprehensively examined the multifaceted influence of digitalization on business performance within China's New Energy Vehicle (NEV) industry, addressing key aspects such as consumer-centric innovation, organizational agility, and the moderating role of market dynamism. The findings confirm that digitalization exerts a significant direct positive impact on business performance, while also fostering consumer-centric innovation and enhancing organizational agility both of which further contribute to improved business outcomes. Moreover, the research reveals that digitalization has a direct effect and strengthens the positive effects of consumer-centric innovation and organizational agility on business performance, highlighting the importance of adapting digital strategies to dynamic market conditions.

Suggestions

1. NEV Firms To maximize the benefits of digitalization, companies should invest in technologies and processes that not only enhance operational efficiency but also foster consumer-centric innovation and organizational agility. By aligning digital initiatives with market conditions, firms can better respond to customer needs and competitive pressures, thereby improving business performance.

2. Policymakers' Supportive policies that encourage digital infrastructure development and innovation ecosystems within the NEV industry will be crucial. Facilitating collaboration between manufacturers, suppliers, and service providers can help accelerate digital adoption and agility, which are vital in sustaining industry growth and competitiveness.

3. Consumers and the Public increased transparency and consumer involvement through digital platforms can drive more personalized and innovative product offerings, improving customer satisfaction and engagement within the NEV market.

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