

A STUDY ON THE PATH OF CUSTOMER ORIENTATION TO ENHANCE ENTERPRISE INNOVATION PERFORMANCE: A CHAIN MEDIATION MODEL

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ABSTRACT

This research investigates the intricate relationship between customer orientation and enterprise innovation performance, emphasizing the dynamic capabilities required for successful adaptation in the digital economy. Acknowledging the limited understanding of how external knowledge impacts innovation within enterprises, the study introduces a novel conceptual model incorporating dynamic capability theory and innovation theory.

The research posits that customer orientation influences innovation performance through two mediating variables: digital capability and organizational creativity. The dynamic interplay between these variables facilitates the renewal and restructuring of the enterprise knowledge base, fostering a culture conducive to innovation. Empirical data from a comprehensive survey of managers in 20 provinces and 3 municipalities in China substantiates the proposed model.

Findings indicate that enterprises exhibiting strong customer orientation enhance both digital capability and organizational creativity, subsequently contributing to innovation output. The study establishes a sequential mediation structure, with digital capability promoting organizational creativity, collectively mediating the positive relationship between customer orientation and innovation performance.

Theoretical contributions are twofold: firstly, the study introduces a nuanced understanding of the mechanisms through which customer orientation influences innovation by incorporating orderly chain mediating variables. This expands on previous research that primarily focused on the direct impact of customer orientation on innovation. Secondly, the research enriches the understanding of how dynamic capabilities, specifically digital capability and organizational creativity, mediate the transformation of customer orientation into innovation capability.

Management practice implications suggest that fostering a customer-oriented business philosophy is integral for enterprises seeking higher innovation performance. Additionally, embracing the digital economy entails improving digital capabilities, thereby facilitating digital transformation and innovation actions to enhance organizational creativity and overall innovation performance.

I. INTRODUCTION

1.1: Background of Work

In the early 20th century, Joseph Schumpeter proposed the theory of innovation, asserting that profit-driven enterprises with market power consistently seek technological advancements, a viewpoint widely accepted in academic circles (Schumpeter, 20th Century). Building innovative capabilities necessitates organizational knowledge, capabilities, and motivation, aligning innovative activities with market needs and organizational goals. Customer orientation, as a

strategic approach, guides enterprises towards behaviours fostering superior customer value and cultivating a culture conducive to innovation (Day, 1994).

Customer orientation spans activities involved in gathering and disseminating customer information throughout the organization (Narver & Slater, 1990). Investments in customer orientation are deemed to offer the best value proposition in competitive environments (Lusch & Webster, 2010). In the evolving landscape, technologies such as mobile internet, cloud computing, big data, artificial intelligence, and blockchain interact to propel a new wave of business innovation. Recognizing the impact of these technologies, this study posits Digital ability as a potential mediator in the relationship between Customer orientation and innovation performance (Han et al., 1998). In the digital economy, Digital capability emerges as a key factor for sustained competitive advantage (Liu Yang et al., 2021).

In the current digital era, innovation performance is crucial for organizational success (Alegre & Chiva, 2008). The integration of electronic word-of-mouth, the Internet of Things, cloud computing, big data, artificial intelligence, and robotics opens avenues for effective shaping of innovation performance (Mullangi et al., 2019). While previous studies explored factors influencing innovation performance beyond the digital economy, this paper focuses on the role of Customer orientation in enterprise innovation performance. The proposed conceptual model links Customer orientation to Digital innovation capability, Organizational creativity, and Innovation performance, offering insights into the drivers of innovation performance (Alegre & Chiva, 2008).

1.2 Structure of the research

This research paper comprises five sections. Section 1 introduces the main research question, emphasizing the impact of Customer orientation on business innovation performance. It outlines the study's importance, objectives, contributions, and limitations, providing definitions for key terms and concepts. Section 2 reviews literature on Customer orientation, Innovation performance, Digital capability, and Organizational creativity, offering a theoretical foundation for the study. It proposes a conceptual framework diagram and highlights limitations in existing studies. Section 3 details the research methodology, including variable scale composition, measurement, hypotheses, data collection, analysis methods, and indicator significance. It also assesses scale reliability and validity. Section 4 discusses descriptive and inferential statistical analysis results, providing testing outcomes for research hypotheses. Section 5 concludes the findings, summarizing theoretical analyses and empirical tests, discussing contributions and suggesting future research directions.

1.2 Significance & Objectives of the Study

This research addresses the fundamental question of how Customer orientation influences innovation performance. By constructing a theoretical model integrating Customer orientation, Digital capability, Organizational creativity, and Innovation performance, the study aims to reveal mechanisms and paths, offering theoretical reference and decision support for enterprises (Atuahene Gima, 1995).

The primary objective is to investigate factors influencing the relationship between Customer orientation, Digital capability, Organizational creativity, and enterprise Innovation performance. Specific objectives include exploring the direct effect of Customer Orientation, determining the

mediating role of Digital capability and Organizational creativity, and assessing the chain mediating role in the relationship between Customer orientation and Innovation performance.

This study contributes practically by enhancing competitiveness in the digital economy, emphasizing customer needs, and guiding managers in cultivating Digital capabilities. By exploring the impact of Customer orientation and Digital capability on Innovation performance, the study provides practical insights for formulating digital transformation strategies.

II. LITERATURE REVIEW

The literature review section delves into the conceptual evolution of independent and dependent variables, providing a comprehensive overview of innovation theories and their historical underpinnings.

2.1: Literature Review of Innovation Performance Studies

Conceptual History of Independent and Dependent Variables: Scholars have continuously explored innovation from diverse perspectives, with theories evolving over time to encompass various dimensions, including technological, product, and market innovation (Schumpeter, 1912). Schumpeter's groundbreaking work laid the groundwork for a multidimensional exploration of innovation, emphasizing its role in economic development and social progress. The connotations of innovation have expanded to include product, service, and market renewal, as well as the development of new production methods and management systems. The European Innovation Survey (EIS) offers a comprehensive definition, framing innovation as the implementation of new or significantly improved products, processes, marketing methods, or organizational approaches. This definition encompasses diverse forms of innovation, highlighting its role as both a process and an output (Crossan, 2011).

Innovation Performance Studies: Innovation, since its conceptualization in the 19th century, has undergone continuous exploration. Scholars like Schumpeter emphasized its multidimensional nature, encompassing technological, product, and market innovation. The European Innovation Survey (EIS) further defined innovation as the implementation or execution of new or improved products, processes, marketing methods, or organizational approaches. This definition underlines the importance of execution in innovation and acknowledges the diverse forms it can take. Creativity is recognized as a prerequisite for innovation, with scholars distinguishing between the generation of creative ideas and their implementation. Commercialization is also highlighted, emphasizing the modification or invention of concepts to meet consumer needs and create wealth. The study of innovation performance involves assessing the effectiveness of enterprise innovation, with outputs exceeding costs as a measure of success (Frankle, 1990; Yoon and Grary, 1995).

The evolution of innovation theories has led to diverse perspectives on its connotation. Crossan (2011) defines innovation as the act of producing or adopting, assimilating, and utilizing that generates value, covering product, service, and market renewal. Creativity is considered a vital precursor to innovation, with the latter encompassing the generation of creative ideas and their implementation. Eurostat and OECD redefine innovation as a new or improved product or process significantly different from the previous, emphasizing its role in the survival and development of

businesses (Cefis and Marsili). The paper adopts a perspective aligning with the dynamic process wherein enterprises integrate internal and external knowledge to create new knowledge and transform it into commodities, realizing market value.

Meaning and Development of Innovation Performance: As innovation becomes paramount for maintaining competitive advantages, innovation performance emerges as a crucial area of study. Scholars focus on the outcomes of innovation, categorizing them as relatively novel innovations within the firm, market, and industry. The forms of innovation performance include product and service innovation, process innovation, and business model innovation. The degree of innovation is discussed in terms of exploratory and utilization innovation, persistent and destructive innovation, and technological, institutional, knowledge, management, and policy innovation. Despite diverse studies, a unified and standardized definition of innovation performance is lacking, with a predominant focus on product innovation performance and process innovation success. The research in this paper focuses on Chinese enterprises, with innovation mainly referring to technological innovation.

Factors Influencing Innovation Performance: Academic research on “factors influencing innovation performance” traces back to the 1970s. External factors include inter-enterprise network structure, social networks, technological opportunities, government behavior, and policies. Internal factors comprise R&D investment, human resource status, digitization level, social capital, absorptive capacity, knowledge integration mechanism, technological capability, technological learning, access to information resources, enterprise strategy, and scale. Studies by He Yue and others (2010) offer a causality diagram illustrating the interplay of external and internal factors in influencing innovation performance. External influences encompass regional environment, network capability, government subsidies, and tax incentives. Internal factors involve technological learning, R&D investment, entrepreneurial performance, and digital transformation, each contributing to the complex landscape of innovation performance.

Synthesis of Factors Shaping Innovation Performance: Globally, scholars have conducted in-depth research on the multifaceted factors influencing enterprise innovation performance. Their diverse perspectives and comprehensive analyses offer a rich foundation for this study. While the impact of digital transformation and customer orientation has been explored, the dynamic landscape of the digital economy necessitates a reexamination of the internal and external factors influencing innovation performance. This study breaks new ground by incorporating enterprise customer orientation and integrating digital capability into the influencing factors, aligning with the ongoing wave of digital transformation.

Gauging Innovation Performance: Precise measurement of innovation performance hinges on a nuanced understanding of the multifaceted nature of “performance.” As Bates and Holton (1995) argue, it is a multi-construct concept, and the choice of measurement factors leads to distinct outcomes. The lack of a unified indicator system for the connotation of innovation performance has resulted in scholars selecting different indicators based on research needs, sample characteristics, and data availability. Widely adopted measurement methods include the patent data method and the questionnaire survey method. While the former provides objectivity, the latter,

especially when utilizing scales, dominates the measurement landscape due to its ability to capture subtleties in innovation effectiveness compared to competitors.

Recapitulation: Since the advent of innovation theory, the spotlight on enterprise innovation performance has intensified. Existing literature explores external macro factors, internal organizational factors, and individual-level factors influencing innovation performance. Measurement methods, notably the patent data and questionnaire survey methods, play pivotal roles. Despite diverse perspectives and methodologies, a consensus emerges around indicators such as inputs, patents, new products, markets, and success rates as measures of enterprise innovation performance. The existing literature, while diverse, provides a robust foundation for studying the dependent variable—enterprise innovation performance.

2.2: Literature Review of Customer Orientation Research

Introduction to Customer Orientation: Philip Kotler underscores the integral role of customer satisfaction in an enterprise's entire business activity. Theodore Levitt's introduction of customer orientation advocates a departure from traditional development concepts. Customer orientation extends beyond understanding target buyers to continually creating superior value. This involves grasping the buyer's complete value chain and understanding both present and evolving needs.

The Essence of Customer Orientation: Customer orientation entails understanding target buyers for the continual creation of superior value. It manifests through attitudes and behaviors, encompassing both business philosophy and enterprise values. Scholars like Gatignon & Xuereb (1997) stress that customer-oriented firms identify, analyze, understand, and respond to customer needs, fostering innovation. It extends from the market to individual levels, emphasizing a focus on customer demand and increasing customer value.

2.3: Digital Capability Research

Digital Economy and Enterprise Digital Capability: The transformative wave of the digital economy, characterized by openness, borderlessness, and heightened interactivity, compels enterprises to undergo digital transformation (Sun Xinbo et al., 2021). In this scenario, reshaping and innovating business models emerge as inevitable strategies for enterprises aiming to adapt to digital economic development. The global focus on business innovation, driven by digital technology, underscores the paramount importance of Digital capability. Integrating digital technology into production and operational activities is crucial for enterprises to overcome technological and resource bottlenecks (Sun Xinbo et al., 2021). In the digitalization context, the robust application of digital technology prompts model innovations across various business segments. Enterprise value creation transitions from a centralized and isolated model to one characterized by co-sharing, co-creation, and sharing.

The driver of this paradigm shift is the enterprise's digital capacity, encompassing digital manufacturing and digital service capabilities (Sun Xinbo et al., 2021). Digital manufacturing streamlines production processes, fostering open, shared, flexible, and intelligent manufacturing systems. Concurrently, digital service capabilities revolutionize marketing, management, and decision-making through big data analysis. By reducing human intervention in production and enhancing organizational connectivity, digital capabilities enable real-time monitoring of

manufacturing processes, improved market perception, responsiveness, and resource integration efficiency. This adaptability ensures sustainable competitive advantages in the market by catering to individualized needs.

The Connotation and Dimensions of Digital Capability: Connotation of Digital Capability: In the era of the digital economy, innovation is imperative for enterprises seeking sustainable development. As Gropponte notes in "Digital Survival," the prevalence of "the DNA of information" signifies a shift toward comprehensive digitalization in human life. Amid the digital survival environment, enterprises focus on digital capability as a source of sustainable competition. Digital capability is not a mere conceptual abstraction; its essence is grounded in studies of information capability and dynamic capability (Dong Zhao, 2021). Scholars, leveraging digital technologies such as big data, machine learning, artificial intelligence, Internet of Things, cloud computing, and blockchain, increasingly recognize digital capability's significance. In management and entrepreneurship research, digital capability emerges as a critical element for organizations to secure sustainable competitive advantages (Ross et al., 1996; Zhuang Caiyun et al., 2020).

It is considered a dynamic capability that enables rapid adoption of response strategies to environmental changes, crucial for the survival, development of start-ups, and transformation of traditional enterprises (Zhu Xiumei et al., 2020; Ferreira et al., 2019; Levallet and Chan, 2018). The connotation of Digital capability is not a "castle in the air," and its connotation is mainly based on the study of information capability and dynamic capability, and scholars have put forward different understandings of digital capability according to their research purposes and perspectives (Dong Zhao, 2021). It has been widely recognized in the existing literature that Digital capability is the most characteristic dynamic capability in the digital era (Teece, 2007), which is not only the ability to apply digital technology, but also the ability of enterprises to synergistically integrate digital elements, which is the foundation and key to the development of enterprise digital innovation.

2.4: Literature review of research on Organizational creativity

The Connotation of Organizational Creativity: Organizational creativity, rooted in a complex social system, encapsulates original, novel, and useful ideas or problem solutions related to products, services, procedures, or processes. This creativity is generated collectively by individuals, teams, and organizations (Amabile, 1988). The historical trajectory of Organizational creativity research can be traced back to Guilford's seminal 1950 article on creativity, marking an early focus on individuals. Subsequently, scholars extended their exploration to team and organizational dimensions. Amabile (1983) defines creativity as the generation of novel and useful ideas, emphasizing outcome-oriented perspectives. The study evolved, incorporating diverse dimensions such as the creative process, creative products, creative people, and the creative environment (Harrington, 1990). Kirk and Spreckelmeyer (1998) argue that Organizational creativity involves individuals collaboratively generating, selecting, and optimizing novel problem-solving ideas.

The scholarly examination of Organizational creativity gained depth in the late 1980s, with varying perspectives contributing to nuanced definitions. The outcome perspective, process perspective, and capability perspective emerged as primary frameworks. Harrington (1990) represents the outcome perspective, defining Organizational creativity as the interactive combination of creative processes, products, people, and environments. Woodman et al. (1993) extend this perspective to complex social systems, viewing Organizational creativity as the creation of valuable and useful innovations through collaborative processes. Alternatively, some scholars conceptualize Organizational creativity as a resource (Bharadwa and Menon, 2000). Lee and Choi (2003) view it as a process capability, emphasizing the organization's comprehensive ability to advance and refine novel ideas about products, services, and processes. Peng Chan et al. (2003) focus on problem-solving abilities across various organizational tasks, defining Organizational creativity as the synthesis of improvement and innovation at every level. Gu Qinxuan and Jiang Wan (2013) adopt a multilevel perspective, considering Organizational creativity as the organization's ability to generate novel ideas at individual, team, and organizational levels.

Antecedent and Outcome Variables of Organizational Creativity: Current antecedent research on Organizational creativity primarily explores individual, team, and organizational variables influencing its realization. Grounded in knowledge theory, studies delve into how organizational learning and external knowledge acquisition impact Organizational creativity. Other factors such as organizational resources, climate, strategic orientation, incentives, and leadership styles play crucial roles. Organizational culture wields "soft power," influencing Organizational creativity, while organizational systems, representing "hard power," significantly shape creativity (Amabile et al., 1996; Elenkov et al., 2005). Antecedent variables also encompass leadership style, organizational strategy, structure, human resource practices, and incentives.

Measurement of Organizational Creativity: Compared to individual creativity, Organizational creativity research is exploratory, with limited mature scales. Amabile (1996) introduced the KEYS inventory, and subsequent scholars revised it. However, challenges exist in the content validity of these measures, as they assess antecedent variables more than Organizational creativity itself. Lee and Choi's (2003) five-item unidimensional scale is widely adopted, systematically reflecting creative motivation, environment, process, and results. This study employs this scale to measure Organizational creativity:

1. The enterprise generates many new and useful ideas (services/products).
2. The enterprise fosters an environment conducive to the generation of new and useful ideas (services/products).
3. The enterprise spends a lot of time producing novel and useful ideas (services/products).
4. The enterprise considers the production of new and useful ideas to be an important activity.
5. The enterprise actively produces new and useful ideas.

III. METHODOLOGY

This section discusses the research methods and methodologies used in the present study. It also discusses data collection instrument, population, sampling and statistical analyses used in the study

3.1: RESEARCH DESIGN

Independent variable → Customer orientation: This study mainly analyzes the influence of Customer orientation on Innovation performance, which is similar to the research of Xu Jianzhong (2018). Therefore, his measurement scale for Customer orientation is adopted in this study, which divides Customer orientation into Customer direct orientation and Customer indirect orientation, and the related measurement items are shown in Table 3.1.

Measurement content	Secondary dimension	Measurement items
Customer Orientation (CO)	Customer Direct Orientation (CDO)	● Customers share their needs and suggestions with enterprises. ● Customers directly participate in enterprise design, production and sales. ● Enterprises systematically listen to and understand the needs and preferences of different customer groups. ● Obtain customer information through investigation and interview. ● Customers pay extra time cost to help enterprises complete innovation work.
	Customer Indirect Orientation (CIO)	● Express the greetings and thanks of the enterprise to customers. ● Customers express their brand feelings and recognition to the enterprise. ● Customers maintain good relations with enterprise staff. ● Systematic measures to improve enterprise products/ services to improve customer satisfaction and loyalty. ● Continuously improve the customer service process to help customers obtain information, and conduct transactions and complaints.

Table3.1: Measurement scale of Customer orientation

Independent variable → Organizational creativity: The measurement of organizational creativity (OC) is mainly referred to Lee and Choi's Organizational Creativity Scale. This scale evaluates the creative motivation, creative environment, creative process and creative result of an organization, and can systematically reflect all aspects of organizational creativity, which is basically consistent with the connotation of organizational creativity in this study. Therefore, based on this scale, this study measures the use of organizational creativity with that designed by Geng Ziling, which includes a total of five items as follows:

1. The enterprise has produced many novel and useful ideas (services/products).
2. The enterprise has cultivated an environment conducive to generating novel and useful ideas (services/products).
3. The enterprise has spent a lot of time to produce novel and useful ideas (services/products).

4. The enterprise thinks it is an important activity to produce novel and useful ideas.

5. The enterprise actively produces novel and useful ideas.

Independent variable → Organizational creativity: this study measures the use of organizational creativity with that designed by Geng Ziling, which includes a total of five items as follows:

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3. The enterprise has spent a lot of time to produce novel and useful ideas (services/products).

4. The enterprise thinks it is an important activity to produce novel and useful ideas.

5. The enterprise actively produces novel and useful ideas.

Implicit variable → Innovation performance: The study draws from the research of Chen Yufen, Guo Aifang, He Yubing, and Liang Liang to design questionnaires, measuring Innovation Performance (IP) in enterprises through five key indicators over the past five years:

1. Annual count of new products compared to peers.

2. Proportion of new product sales revenue to total sales in comparison to peers.

3. Rate of new product development relative to peers.

4. Success rate of innovative projects compared to peers.

5. Number of patent applications in comparison to peers.

Control variables: In this study, three control variables that are widely used in innovation research are selected, namely enterprise age, enterprise nature and enterprise scale. Enterprise age has a certain influence on the formation of enterprise Customer orientation and Digital capability.

3.2: HYPOTHESIS

Relationship between Customer Orientation and Digitalization Ability: Customer orientation significantly shapes enterprise Digital capability. Enterprises prioritizing customer needs develop digital solutions, improving adoption rates and satisfaction. Customer-oriented firms collect customer data for personalized experiences, utilizing digital tools effectively. Customer orientation encourages data-driven decisions, optimizing digital products, marketing, and operations, enhancing innovation (Li Shuman, 2021).

Hypothesis 1: Customer orientation positively impacts Digital capability.

- Assumption 1a: Customer direct orientation positively affects digitalization capability.
- Hypothesis 1b: Customer indirect orientation positively affects digitalization capability.

Relationship between Customer Orientation and Organizational Creativity: Customer-oriented enterprises foster creativity and innovation by addressing customer needs, promoting employee creativity. Actively involving customers generates insights for creative solutions. Organizational creativity, driven by customer feedback, leads to innovative products and services, enhancing overall business performance.

Hypothesis 2: Customer orientation positively impacts Organizational creativity.

- Hypothesis 2a: Customer direct orientation positively impacts Organizational creativity.
- Hypothesis 2b: Customer indirect orientation positively impacts Organizational creativity.

Relationship between Digitalization Capability and Organizational Creativity: Digital capability enhances organizational creativity by providing tools and resources for innovation. Collaboration platforms, data-driven insights, and digital tools promote seamless collaboration, quick testing of ideas, and support for rapid prototype design. Digital capabilities significantly contribute to organizational creativity.

Hypothesis 3: Digitalization ability positively impacts Organizational creativity.

Relationship between Organizational Creativity and Innovation Performance: Organizational creativity, generating novel ideas and solutions, positively influences Innovation performance. Creativity is instrumental in designing new processes, identifying customer needs, and applying original methods or technologies. A creative organization promotes innovative products and services, positively impacting Innovation performance.

Hypothesis 4: Organizational creativity positively affects Innovation performance.

Relationship between Digitalization Capability and Innovation Performance: Digital capability, crucial for survival and competition in the digital landscape, complements business model innovation. Enhanced by digital tools, organizations gain insights, collaborate effectively, and create new value propositions. Digitalization significantly influences Innovation performance.

Hypothesis 5: Digitalization capability positively influences Innovation performance.

Relationship between Customer Orientation and Innovation Performance

Customer orientation, prioritizing customer needs, contributes to innovation. Market-oriented enterprises focus on customer information use and learning, leading to improved Innovation performance. Customer orientation positively influences innovation, fostering customer acceptance of innovative products.

Hypothesis 6: Customer orientation positively impacts Innovation performance.

- Hypothesis 6a: Customer direct orientation positively impacts Innovation performance.
- Hypothesis 6b: Customer indirect orientation positively impacts Innovation performance.

Mediating Role of Digital Capability between Customer Orientation and Innovation Performance: Digital capability mediates the positive impact of Customer orientation on Innovation performance. Customer-oriented enterprises benefit from enhanced Innovation performance through improved Digital capabilities.

Hypothesis 7: Digital capability acts as an intermediary between Customer orientation and Innovation performance.

- Hypothesis 7a: Digital capability acts as an intermediary between Customer direct orientation and Innovation performance.

- Hypothesis 7b: Digital capability acts as an intermediary between Customer indirect orientation and Innovation performance.

Mediating Role of Organizational Creativity between Customer Orientation and Innovation Performance: Organizational creativity mediates the relationship between Customer orientation and Innovation performance. Fostering a creative environment enhances the positive impact of Customer orientation on Innovation performance.

Hypothesis 8: Organizational creativity acts as an intermediary between Customer orientation and Innovation performance.

- Hypothesis 8a: Organizational creativity acts as an intermediary between Customer direct orientation and Innovation performance.

- Hypothesis 8b: Organizational creativity acts as an intermediary between Customer indirect orientation and Innovation performance.

Mediating Role of Organizational Creativity on Digitalization Ability and Innovation Performance: Organizational creativity acts as an intermediary between digital ability and Innovation performance. Creativity enhances the effectiveness of digital tools in generating innovative solutions, positively influencing overall Innovation performance.

Hypothesis 9: Organizational creativity acts as an intermediary between Digital ability and Innovation performance.

Mediating Role of Digital Capability on Customer Orientation and Organizational Creativity: Digital capability acts as an intermediary between Customer orientation and Organizational creativity. Combining digital tools and customer-centric strategies promotes a more creative organizational culture, positively influencing Organizational creativity.

Hypothesis 10: Digital capability acts as an intermediary between Customer orientation and Organizational creativity.

- Hypothesis 10a: Digital capability acts as an intermediary between Customer direct orientation and Organizational creativity.
- Hypothesis 10b: Digital capability acts as an intermediary between Customer indirect orientation and Organizational creativity.

Chain Mediating Role of Digitalization Capability and Organizational Creativity on Customer Orientation and Innovation Performance: The chain intermediary effect of Digital capability and Organizational creativity on Customer orientation and Innovation performance emphasizes their interconnected role in promoting customer-centric strategies, digital capabilities, and creative organizational cultures. The synergy of these factors enhances Innovation performance and sustainable competitive advantage.

Hypothesis 11: Digital capability and Organizational creativity act as a chain intermediary between Customer orientation and Innovation performance.

- Hypothesis 11a: Digital capability and Organizational creativity act as a chain intermediary between Customer direct orientation and Innovation performance.
- Hypothesis 11b: Digital capability and Organizational creativity act as a chain intermediary between Customer indirect orientation and Innovation performance.

3.3 Population and Sampling

This paper explores the relationship among Customer orientation, Digital capability, Organizational creativity, and Innovation performance in industrial enterprises. The study focuses on Shandong, Beijing, Jiangsu, Tianjin, Hebei, and other provinces and cities for convenience and

feasibility. Shandong is the key area due to established relations and cost-saving benefits. Data collection employs convenient sampling.

3.4 Sampling & Sampling Size

The study, involving Customer orientation, Digital capability, Organizational creativity, and Innovation performance, targets enterprise managers through a questionnaire. Convenient sampling is chosen based on accessibility and practicality, particularly suitable when more stringent techniques are impractical.

Structural equation model (AMOS) will be used for analysis. The recommended sample size is greater than 200, considering the number of parameters pre-estimated. A sample size below 100 may compromise correlation matrix stability. This study, with 35 questions, aims for a sample size exceeding 200.

3.5 Data Collection & Analysis

Data collection involves eight stages, including literature review, pilot studies, and questionnaire distribution. The study collects 328 questionnaires through various channels, emphasizing the importance of demographic information and research variables. The questionnaire ensures authenticity and validity.

SPSS and AMOS are used for analysis. Descriptive statistical analysis examines sample characteristics. Reliability and validity analysis assesses scale credibility. Structural equation modeling tests overall fit, while bootstrap method estimates intermediary effect and its confidence interval.

3.6 Reliability and Validity Analysis of the Scale

Pre-investigation ensures questionnaire validity. Reliability analysis, using Cronbach's α , checks consistency, with a threshold above 0.5. Validity analysis includes content validity, structural validity, convergent validity, and discriminant validity. Structural validity uses exploratory factor analysis with KMO and Bartlett's ball test criteria.

IV. RESULTS

4.1: Reliability Analysis

The reliability test assesses the questionnaire's credibility, focusing on the consistency and stability of results. Internal reliability examines whether questions within a set measure the same concept and how well individual scale components exhibit internal consistency. Cronbach's Alpha measures internal reliability, with higher coefficients indicating greater internal consistency. A coefficient above 0.9 suggests high internal consistency, 0.8 to 0.9 is considered good, 0.7 to 0.8 is average, and below 0.7 is considered poor, rendering the questionnaire inconvenient as a research tool.

The internal consistency of each scale in this study is evaluated using Cronbach's Alpha, with coefficients exceeding 0.7, indicating relatively high internal consistency.

Dimension	Number of terms	Cronbach Alpha
Digital capability	4	0.909
Customer Direct Orientation	5	0.900
Customer Indirect Orientation	5	0.864

Organizational creativity	5	0.889
Innovation performance	5	0.892

Table 4.1: Results of questionnaire reliability analysis

As can be seen from the above table that the questionnaire is divided into five dimensions, and Cronbach's Alpha coefficient of each dimension meets the basic standard of being greater than 0.7. Therefore, the questionnaire used in this study has good reliability.

4.2: Validity Analysis

In practical research, the validity test involves content and structural validity assessments. Content validity gauges the questionnaire items' relevance to the sampled content or behavior. This study's scale, drawn from prior literature and adjusted after pre-investigation, exhibits good content validity.

Structural validity, also known as construct validity, evaluates the extent to which analyses confirm a theoretical hypothesis. Confirmatory Factor Analysis (CFA) is employed to assess the formal survey scale's validity. AMOS24.0 software is used for this purpose, considering four aspects: absolute fitness index, value-added fitness index, simple fitness index, and internal fitness (CR and AVE). Criteria for evaluation include small χ^2 , RMSEA less than 0.08, GFI and AGFI above 0.8, NFI, RFI, IFI, TLI, and CFI greater than 0.9, χ^2/df between 1-3, PGFI, PNFI, and PCFI above 0.5, and CR above 0.7 with AVE above 0.5.

If individual variables' initial models fail these criteria, appropriate revisions are made, primarily based on standard parameter estimates and Modification Indices (MI). CFA, constructed using AMOS25.0, is evaluated through the maximum likelihood method. The model diagram is depicted in the figure, and the assessment results in the subsequent table indicate satisfactory fitting, affirming the model's validity.

Reference index	Evaluation criterion	Statistical values	Model adaptation judgment
χ^2/df	It is more suitable between 1 and 3.	2.687	Yes
AGFI	More than 0.8, the closer to 1, the higher the fitness.	0.819	Yes
GFI	More than 0.8, the closer to 1, the higher the fitness.	0.854	Yes
TLI	More than 0.9, the closer to 1, the higher the fitness.	0.911	Yes
NFI	More than 0.9, the closer to 1, the higher the fitness.	0.882	Almost
CFI	More than 0.9, the closer to 1, the higher the fitness.	0.922	Yes
RMSEA	Less than 0.08	0.072	Yes

Table 4.2: Model Fitting Index

The table above confirms that all model fitting indices from the confirmatory factor analysis meet the prescribed criteria. Subsequently, we delve into the questionnaire's aggregation validity and discrimination validity.

For discrimination validity, the study initially examines the correlation coefficient of each variable. The results reveal a positive correlation between variables, with a significant correlation coefficient at $P < 0.001$. Finally, the square root of the Average Variance Extracted (AVE) for each latent variable is computed. If the square root value of AVE surpasses the correlation coefficient between a latent variable and others, it signifies robust discrimination validity for that variable.

4.3: Demographic Overview

Personal characteristics of the respondents: The respondents' personal characteristics, outlined in Table 4.6, provide a comprehensive snapshot of the survey sample. The gender distribution indicates a predominance of females, constituting 33.64%, while males make up 66.36%. Age-wise, the distribution is as follows: 30 and below (10.70%), 31-35 (14.37%), 36-40 (36.39%), 41-45 (20.18%), and 46 and above (18.35%).

Personal traits	Variable category	Frequency	Proportion (%)
Gender	female	110	33.64%
	male	217	66.36%
Age	30 years old and under	35	10.70%
	31-35 years old	47	14.37%
	36-40 years old	119	36.39%
	41-45 years old	66	20.18%
	46 years old and above	60	18.35%
Academic degree	Master degree or above	142	43.43%
	bachelor	109	33.33%
	College graduates	30	9.17%
	Secondary vocational college graduates or high school graduates	30	9.17%
	Junior high school graduates and below	16	4.89%

Table4.3: Distribution of gender characteristics of samples

Regarding education, a higher educational attainment prevails, with 43.43% holding a master's degree or above, 33.33% with a bachelor's degree, and 9.17% each for junior college and technical

secondary school or high school degrees. Respondents with a junior high school degree or below constitute 4.89%. This diverse educational profile enhances the representativeness of the sample.

Enterprise Profile: Examining the characteristics of the enterprises under investigation, the analysis reveals a balanced distribution. In terms of enterprise age, 29.36% have been established for less than 5 years, 33.64% for 5-10 years, 26.91% for 11-20 years, 7.95% for 21-50 years, and 2.64% for 51 years or more.

Considering enterprise scale, 37.92% of enterprises have fewer than 20 employees, 20.28% have 21-50 employees, 5.81% have 51-100 employees, 6.12% have 101-500 employees, and 19.88% have more than 500 employees. This balanced distribution across enterprise age and scale contributes to the overall representativeness of the survey sample.

Basic feature	Variable category	Frequency	Proportion (%)
Enterprise age	Less than 5 years	96	29.36%
	5-10 years	110	33.64%
	11-20 years	88	26.91%
	21-50 years	26	7.95%
	51 years and above	7	2.64%
Enterprise scale	Less than 20 people	124	37.92%
	21-50 people	99	20.28%
	51-100 people	19	5.81%
	101-500 people	20	6.12%
	501 and above	65	19.88%
Enterprise nature	State-owned enterprise	84	25.69%
	Private enterprise	191	58.41%
	Joint venture enterprise	9	2.75%
	Exclusively foreign-owned enterprise	2	0.61%
	Others	41	12.54%

Table4.4: Sample distribution

4.4 Descriptive statistics of variables

Following the comprehensive reliability and validity assessment, this research scale exhibits commendable reliability and validity. Prior to testing the research hypotheses, the formal research data undergo descriptive statistical analysis to ascertain their adherence to a multivariate normal distribution, a prerequisite for subsequent data analysis.

Utilizing SPSS 22.0, the descriptive statistics encompass maximum and minimum values, mean, standard deviation, skewness, standard error, and kurtosis. The mean provides insight into the overall sample average, while the standard deviation gauges sample data dispersion. Skewness and kurtosis coefficients assess the normal distribution of the sample data, with values below 3 and 10, respectively, considered acceptable (Kline, 2005).

Table 4.5 presents the results of the descriptive statistics, revealing skewness coefficients ranging from 0.181 to 1.097 (meeting the criterion of <3) and kurtosis coefficients between 0.163 and

1.338 (fulfilling the criterion of <10). The maximum absolute values of skewness and kurtosis for each main variable in Table 4.6 are 0.922 and 1.711, respectively, affirming adherence to normal distribution. Consequently, the overall sample data adheres to normal distribution standards, satisfying the prerequisites for subsequent data testing and analysis.

Item	M	M	Average	Standard deviation	Skewness coefficient	Standard error	Coefficient of kurtosis	Standard error
CDO 1	1	7	4.350	1.509	-0.316	0.135	-0.753	0.269
CDO 2	1	7	4.240	1.533	-0.181	0.135	-0.561	0.269
CDO 3	1	7	4.350	1.542	-0.311	0.135	-0.602	0.269
CDO 4	1	7	4.380	1.569	-0.338	0.135	-0.580	0.269
CDO 5	1	7	4.600	1.371	-0.709	0.135	0.181	0.269
CIO1	1	7	4.610	1.470	-0.387	0.135	-0.101	0.269
CIO2	1	7	5.060	1.324	-0.757	0.135	0.444	0.269
CIO3	1	7	5.050	1.321	-0.981	0.135	1.175	0.269
CIO4	1	7	4.580	1.496	-0.503	0.135	-0.337	0.269
CIO5	1	7	4.970	1.415	-0.738	0.135	0.213	0.269
DC1	1	7	5.390	1.324	-0.965	0.135	1.338	0.269
DC2	1	7	5.160	1.372	-0.834	0.135	0.940	0.269
DC3	1	7	5.310	1.366	-0.970	0.135	1.160	0.269
DC4	1	7	5.110	1.477	-0.823	0.135	0.635	0.269
OC1	1	7	5.110	1.287	-0.684	0.135	0.667	0.269
OC2	1	7	5.250	1.376	-0.956	0.135	1.082	0.269
OC3	1	7	5.170	1.323	-0.902	0.135	1.253	0.269
OC4	1	7	4.960	1.407	-0.662	0.135	0.126	0.269
OC5	1	7	5.120	1.137	-1.010	0.135	1.978	0.269
IP1	1	7	4.670	1.406	-0.298	0.135	-0.163	0.269

IP2	1	7	4.940	1.403	-0.741	0.135	0.315	0.269
IP3	1	7	5.010	1.367	-1.097	0.135	1.082	0.269
IP4	1	7	4.510	1.560	-0.487	0.135	-0.324	0.269
IP5	1	7	4.770	1.493	-0.850	0.135	0.374	0.269

Table4.5: Descriptive statistical analysis 1

Item	Min	Max	Average	Standard deviation	Skewness coefficient	Coefficient of kurtosis
Customer direct orientation	1	7	4.3859	1.2889	-0.547	-0.266
Customer indirect orientation	1.2	7	4.8532	1.189	-0.629	0.256
Digital capability	1	7	5.2431	1.16791	-0.921	1.711
Organizational creativity	1.2	7	5.1211	1.08984	-0.922	1.531
Innovation performance	1.4	6.8	4.7786	1.21004	-0.631	-0.08

Table4.6: Descriptive statistical analysis 2

4.5: Variable Correlation Analysis

To scrutinize the interdependence between variables, this study conducts correlation analysis, employing correlation coefficients and significance for preliminary model assessment. The standardized correlation coefficient, ranging from -1 to 1, indicates the strength of correlation. Closer to zero signifies weaker correlation, and vice versa. A coefficient surpassing 0.7 signals potential collinearity concerns in the model. Results in Table 4.7 reveal positive correlations between Customer orientation dimensions and Digital capability (0.372 and 0.466), Customer orientation and Organizational creativity (0.372 and 0.419), and Customer orientation and Innovation performance (0.430 and 0.483). Digital capability also correlates positively with Organizational creativity (0.502) and Innovation performance (0.525), while Organizational creativity positively correlates with Innovation performance (0.516). These findings align with the study's theoretical expectations. With correlation coefficients predominantly below 0.7, a solid foundation is established for subsequent regression modeling and hypothesis validation.

Item	1	2	3	4	5
1. Customer direct orientation	1	.502**	.372**	.372**	.430**

2. Customer indirect orientation	.502**	1	.466**	.419**	.483**
3. Digital capability	.372**	.466**	1	.502**	.525**
4. Organizational creativity	.372**	.419**	.502**	1	.516**
5. Innovation performance	.430**	.483**	.525**	.516**	1

Table 4.7: Variable correlation analysis results

Note: * * At the level of 0.01 (double tail), the correlation is significant.

4.6 Structural Equation Model (SEM)

The Structural Equation Model (SEM), also termed covariance structure model, is a pivotal multivariate analysis tool relying on the covariance matrix of feature variables to assess their relationships. SEM proves particularly valuable in fields where unobservable variables, such as learning motivation and user satisfaction, pose challenges for traditional statistical methods. This model accommodates multiple dependent variables simultaneously, addressing a limitation of conventional regression models that overlook interdependencies. SEM comprises a measurement model and a structural model, evaluating the internal structure and relationships among potential variables. Model evaluation involves fitting and parameter tests.

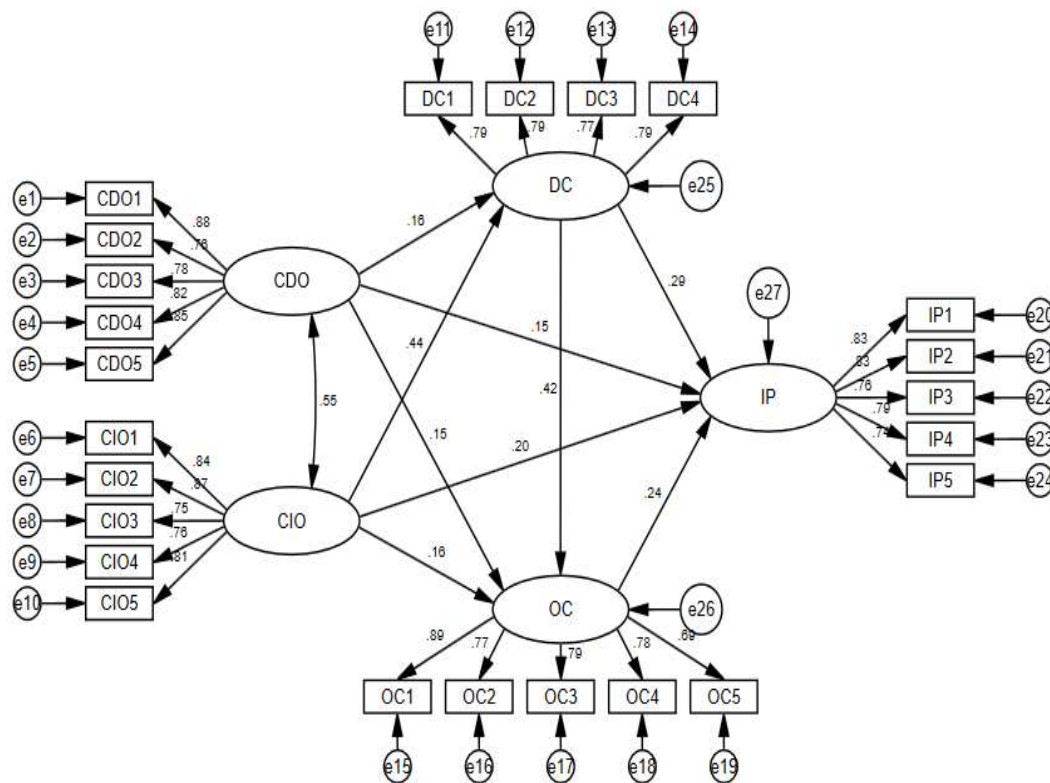


Fig4.1 First-order structural equation model diagram

Statistical Analysis Results: Based on the proposed theoretical model, this study establishes and evaluates a SEM using AMOS 25.0. The maximum likelihood method estimates model parameters. Evaluation criteria include NFI, RMSEA, CFI, and more. The obtained indicators generally meet established standards, validating the model's use for subsequent analyses.

Reference index	χ^2/df	AGFI	GFI	TLI	NFI	CFI	RMSEA
Evaluation criterion	1—3	>0.8	>0.8	>0.9	>0.9	>0.9	<0.08
Statistical values	2.687	0.819	0.854	0.911	0.882	0.922	0.072
Model adaptation	Yes	Yes	Yes	Yes	Yes	Almost	Yes

Table4.8: Test results of structural equation model fitting degree

Path Analysis: The SEM incorporates independent variables (Customer direct orientation, Customer indirect orientation), intermediary variables (Digital capability, Organizational creativity), and the dependent variable (Innovation performance). A fitness test confirms model alignment with formal survey data. Path analysis involves estimating regression coefficients, with results meeting significance criteria. Standardized path coefficients reveal positive effects:

1. Customer direct orientation on Digital capability (0.164, $p < 0.05$)
2. Customer indirect orientation on Digital capability (0.437, $p < 0.05$)
3. Customer direct orientation on Organizational creativity (0.152, $p < 0.05$)
4. Customer indirect orientation on Organizational creativity (0.159, $p < 0.05$)
5. Digital capability on Organizational creativity (0.424, $p < 0.05$)
6. Customer direct orientation on Innovation performance (0.150, $p < 0.05$)
7. Customer indirect orientation on Innovation performance (0.202, $p < 0.05$)
8. Digital capability on Innovation performance (0.292, $p < 0.05$)
9. Organizational creativity on Innovation performance (0.241, $p < 0.05$). These findings support the established hypotheses and demonstrate the significant impact of variables on innovation performance.

V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Effect of Customer Orientation on Innovation Performance: This study validates the positive impact of Customer Orientation, including Customer Direct and Customer Indirect Orientation, on Innovation Performance. The research introduces a nuanced perspective, distinguishing between dimensions of Customer Orientation. Findings affirm that customer-centric strategies enhance an enterprise's understanding of market dynamics, fostering innovation. Customer feedback stimulates problem-solving and product development, positioning customer-oriented enterprises for sustained growth.

Mediation Role of Digitalization Capability: Digital Capability emerges as a crucial mediator, connecting Customer Orientation with Innovation Performance. Customer Direct and Indirect Orientation contribute to Digital Capability, aligning organizations with the evolving digital

landscape. Through data-driven decision-making and technology utilization, enterprises gain agility, ensuring responsiveness to customer needs. Digital transformation catalyzes business evolution, fortifying Digital Capability and subsequently improving Innovation Performance.

Mediating Role of Organizational Creativity: Organizational Creativity acts as a vital bridge between Customer Orientation and Innovation Performance. The study confirms that both Customer Direct and Indirect Orientation positively influence Organizational Creativity. Organizations valuing customer insights foster environments conducive to creative thinking, driving innovative solutions. Collaboration and risk-taking, encouraged by customer-centric approaches, contribute to an innovative culture.

Chain Mediation Function of Digital Capability and Organizational Creativity: Digital Capability and Organizational Creativity jointly mediate the positive relationship between Customer Orientation and Innovation Performance. Digital Capability enhances the organization's ability to process data efficiently, fostering creativity. Organizational Creativity transforms insights gained from Digital Capability into tangible innovative solutions. This sequential mediation emphasizes the interconnectedness of these elements, emphasizing the importance of both in enhancing Innovation Performance.

5.2 Discussion

There are four key aspects of the research. Firstly, it emphasizes the significant impact of Customer Orientation on Innovation Performance, contributing insights to existing literature. Secondly, the introduction of Digital Capability enriches understanding, revealing its mediating role between Customer Orientation and Innovation Performance. Thirdly, the study explores the mediating function of Organizational Creativity, shedding light on its influence on enterprise performance. Finally, the continuous mediation of Digital Capability and Organizational Creativity underscores the intricate relationship between Customer Orientation and Innovation Performance, offering a comprehensive perspective for future research.

5.3 Recommendations

1. Prioritize Customer Orientation: Enterprises should recognize the pivotal role of Customer Orientation in achieving higher Innovation Performance. Strengthening customer engagement, involving customers in product innovation, and aligning product development with customer needs are crucial strategies. Cultivating a customer-oriented business philosophy, formulating strategic plans, and fostering communication with customers are essential steps. Simultaneously, enhancing Digital Capability is crucial to leverage the benefits of Customer Orientation and expedite technological innovation.

2. Consider the Path Mechanism: While a negative relationship between Customer Orientation and Innovation Performance is not found, enterprises should carefully balance the intensity of Customer Orientation. The study underscores the mediating roles of Digital Capability and Organizational Creativity after Customer Orientation. Enterprises need to evaluate their innovation output, align the implementation of Customer Orientation with actual capabilities, and adjust strategies based on environmental factors and organizational creativity.

3. Emphasize Digital Capability: In the digital economy landscape, improving Digital Capability becomes imperative for enhancing Innovation Performance. Enterprises should focus on digital capacity building, utilizing digital resources and technology to transform various aspects of their operations. This includes changing perception, decision-making, organization, marketing, and business models. Attention should not only be on information technology investment but also on building and utilizing IT capabilities to empower practical activities, such as product innovation and understanding customer needs.

5.4 Further Study

1. Strengthen Theoretical Depth: Future researchers are encouraged to enhance theoretical depth by exploring the application of integrated market orientation across different enterprise periods. Introducing more variables and control factors would enrich the understanding of the relationship between market orientation and enterprise performance.

2. Expand Research Object Scope: Extend the research scope to specific industries, small and medium-sized enterprises, and non-profit units. Comparative analysis of basic enterprise information across industries or regions can provide valuable insights. Exploring diverse research objects will contribute to a comprehensive understanding.

3. Develop Tailored Measurement Tools: Consider developing or refining measurement scales tailored to different industries. This would ensure more accurate assessments in diverse contexts. Incorporating industry-specific characteristics into measuring tools will enhance the reliability and validity of future empirical research.

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