

Digital leadership, organizational culture, and innovative capability: Basis for the mechanism of digital innovation transformation of enterprises

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Received: 1 April 2024
Available Online: 15 June 2024

Revised: 15 May 2024
DOI: 10.5861/ijrsm.2024.1068

Accepted: 30 May 2024

ISSN: 2243-7770
Online ISSN: 2243-7789

OPEN ACCESS



Abstract

With the vigorous development of the new generation of digital technology, the digital economy has become the forefront of global economic development and industrial transformation, bringing opportunities and challenges to the development of the real economy. The digital transformation of physical enterprises has become the only way for enterprises in the digital economy era, and it is also a necessary condition for enterprises to survive and develop in the digital era. Based on the analysis of the current situation of enterprises, this article designed a questionnaire from three aspects: digital leadership, organizational culture, and innovation capabilities. This study relies on relevant literature to explore the mechanism of digital leadership, organizational culture and innovation capabilities on enterprise digital transformation performance. The survey results show that respondents from different levels of the enterprise all agree that digital leadership, organizational culture and innovation capabilities have an impact on the digital transformation of enterprises, and believe that strategic thinking, result orientation, leadership and other factors play a role in the digital transformation of enterprises. important role. There is a positive correlation between digital leadership and organizational culture, revealing that risk tolerance and team orientation are particularly important for enterprise digital transformation. Through research on the relationship between digital leadership, organizational culture and innovation capabilities, the results show that there is a significant positive correlation between digital leadership, organizational culture, and innovation capabilities. Good digital leadership in enterprises will bring better results. Improve organizational culture and innovation capabilities. At the same time, there is also a positive correlation between organizational culture and innovation capabilities, that is, the higher the effectiveness of organizational culture, the greater the influence of innovation capabilities. This study enriches the research on the influencing factors of enterprise digital transformation, provides new ideas and new perspectives for relevant research on enterprise digital transformation, and provides guidance for the practice of enterprise digital transformation. It has both high theoretical and practical value.

Keywords: digital leadership, organizational culture, innovation culture, enterprise digital transformation

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1. Introduction

In July 1998, the U.S. Department of Commerce released the Emerging Digital Economy, and the economy and society entered a new stage marked by digital productivity. Many large companies in the world, such as Google, Uber and Facebook realize the importance of digitalization for companies to seize market competitiveness and use the opportunities brought by corporate digital construction to create successful corporate transformation. In 2022, the report of the 20th National Congress of the Communist Party of China clearly stated that the basic requirements and tasks for building a modern industrial system are to accelerate the development of the digital economy and promote the deep integration of the digital economy and the real economy. In 2023, the Government Work Report of the State Council proposed vigorously developing the digital economy. This is the sixth time that digital economy has been included in the Government Work Report of the State Council. It can be seen that the digital economy is valued by the Chinese government and formulate relevant policy documents to help enterprises establish the goal of digital economic transformation and provide corresponding policy support.

As micro entities that support the macro economy, enterprises carry the dual missions of China's macro digital economic development and micro individual economic transformation. In 2021, the scale of China's digital industrialization will reach 8.4 trillion-yuan, accounting for 7.3% of GDP; the scale of the digital economy will be as high as 45.5 trillion-yuan, accounting for 39.8% of GDP. The digital economy is not only a growth point for the country's GDP, but also an opportunity for traditional industries to take this opportunity to upgrade and transform, and a focus for guiding enterprises to strengthen their demonstration and leadership roles. In order to promote the healthy and rapid development of China's digital economy, the 2022 "14th Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Long-term Goals for 2035" proposes to "use digital transformation to drive changes in production, life and governance methods", especially emphasizing that industrial digital transformation has entered a new era, the manufacturing industry has become more digital, networked, and intelligent, and the integrated development of producer services has accelerated and become more popular. This means that in the process of rapid and high-quality development of the digital economy, it is a practical need for China's innovation-driven development strategy to clarify corporate innovation mechanisms from the perspective of corporate digital transformation and promote the improvement of corporate innovation capabilities.

The essence of enterprise digital transformation is that enterprises replace traditional production and management with cutting-edge digital technologies represented by the Internet, big data, artificial intelligence, etc., becoming the main means to cultivate new development momentum, and realize the shift from "industrial management model" to "digital management model". Digital transformation generally starts from key businesses and key nodes. When the benefits brought by digital transformation exceed the costs, companies have incentives to adopt new technologies and new models. It can be seen that the digital transformation of enterprises is not only highly innovative and highly permeable, but also a fulcrum for transforming and upgrading traditional industries. Against the backdrop of the explosive global growth of the digital economy, Chinese enterprises are actively innovating and seeking change, integrating "digital technology +" as the primary development strategy. Companies have introduced digital technology into their organizational frameworks, and continue to break the original organizational structure, management logic and management paradigm.

However, according to a 2022 research report by Accenture and IDC, the digital transformation of most enterprises is in the initial stage of change. Only 17% of leading enterprises have achieved transformation results, and 30% of enterprises have succeeded in digital transformation. The digital transformation process of most enterprises is not smooth sailing. The factors that hinder the digital transformation of enterprises generally include

technical factors and non-technical factors. The key to leading these non-technical factors is people. The transformation of people is the basis and prerequisite for all transformations. In a sense, enterprise players are the key to the success of enterprises' digital transformation. Business participants refer to the managers and employees of the business. As the makers and executors of corporate policies, corporate managers' digital leadership has become the key to corporate digital transformation.

The digital background is reshaping the management model, production model and business model of enterprises at an unprecedented speed and scale. This requires business managers to satisfy their digital leadership as "digital communicators" and motivate organizational members to participate in digital innovation activities, thereby cultivating the team's digital thinking and building the team's digital culture. The digital transformation of enterprises is both a technological innovation and a cultural change. Organizational culture is the source of corporate cohesion and creativity. By establishing values with the goal of digital transformation, enterprise managers can give full play to the company's digital culture, enhance organizational members' recognition of digital transformation and positive digital awareness, and guide the company's value orientation and code of conduct, which has strong practical significance for accelerating the digital transformation of enterprises.

Innovation capability is a core capability that emphasizes the integration of external resources by enterprises and the realization of innovation. It not only affects the market competition situation of enterprises, but also determines the survival and development of enterprises. Vigorously developing innovation to improve innovation performance has risen to the level of enterprise development strategy. In 2021, the Central Economic Work Conference clearly proposed to enhance scientific and technological innovation capabilities and strengthen the main role of enterprises in innovation. In the context of the current slowdown in economic development and the pursuit of high-quality economic development, special emphasis must be placed on empowering productivity through innovation. Increase productivity. Innovation is a dynamic process. While stimulating enterprise vitality, improving enterprise performance, and bringing returns to enterprises, it also brings high risks and uncertainties to enterprise production and operations. With the emergence of artificial intelligence, cloud computing and other emerging technologies, the development of digital technology, the integration of enterprise management and business models with digital information technology has become a trend, and digital transformation has become a strategic choice for enterprises to follow the laws of development.

In the current world structure and market environment, enterprise digital transformation has become a must-have, and it is also a systematic project. Enterprise digital transformation refers to the process in which enterprises integrate digital technology into strategic decisions, organizational structures, operating systems, business processes, etc., to form new business models to meet changing business and market requirements. Through this transformation, it helps reduce enterprise costs, improve product quality, and improve customer experience, thereby enhancing the enterprise's market competitiveness. The goal of enterprise digital transformation is to form a digital business ecosystem, allowing enterprises to form keen insights by using digital technology to process large amounts of data. Efficient collaboration processes and flexible marketing models are required to maintain a leading position. However, in the process of digital transformation, enterprises may face problems such as unwillingness to transform, how to transform, and fear of transformation. These problems must be faced in the digital transformation of enterprises. This emphasizes that digital transformation is not just a matter of technology, but also involves organizational culture and strategic planning. Therefore, enterprises must study and understand the significance of digital transformation and adopt appropriate technologies and solutions to ensure that enterprises can effectively realize transformation and achieve good development results.

According to a survey by the China National Information Center, as of 2020, only 11% of Chinese companies have brought economic benefits through digital transformation, and many companies are facing the dilemma of digital transformation. In the process of transformation in the digital era, first of all, enterprises face the challenge of the cognitive layer of digital transformation; secondly, choosing and implementing the correct digital transformation method; and finally, enterprises must build a digital ecological environment. These are issues that enterprises need to face in their digital transformation. This research will delve into the close relationship among

digital leadership, organizational culture, and innovation capabilities, and how to achieve synergy to establish a more complete enterprise digital transformation mechanism.

Objectives of the Study - This study explores the impact of digital leadership on organizational culture and determines whether innovation capabilities have an impact on the mechanism of corporate digital innovation transformation. Specifically, determined digital leadership in terms of strategic vision, technological fluency, and adaptability; described the organizational culture from the aspects of result orientation, team orientation, and risk tolerance; assessed innovative capability from the aspects of leadership, people, process tested the significant relationship between digital leadership, organizational culture, and innovative capability; and to analyze the relationship between digital leadership and innovative capability; and developed a framework for digital innovation transformation of enterprises.

2. Methods

Research Design - Based on existing research, digital leadership, organizational culture, and innovation capabilities are the three independent variables, and the enterprise digital transformation mechanism is the dependent variable. The researcher designed a questionnaire survey, distributed it through the Internet, collected data, and use factor analysis method to test and analyze the reliability and validity of the questionnaire data. Finally, this study used multiple regression analysis techniques to empirically test the correlation between digital leadership, organizational culture, innovation capabilities and enterprise digital transformation. This approach aimed to reveal the extent to which three different dimensions impact an enterprise's digital transformation. Combined with the data test results, this study proposed a series of targeted countermeasures and suggestions to provide theoretical and practical support for the promotion of enterprise digital transformation. This study used descriptive statistical analysis of the results of the questionnaire survey to accurately analyze the research sample. At the same time, this study used inferential statistical analysis such as multiple regression analysis to explore the complex relationships between variables. These methods not only enhance the rigor of research, but also provide effective analytical tools for in-depth understanding of enterprise digital transformation mechanisms.

Participants of the Study - This study distributed 400 questionnaires via the Internet to respondents from different companies and at different levels. Respondents were selected from 20 companies in five provinces in China (Jiangsu, Zhejiang, Anhui, Shandong, and Hubei) using random sampling. Each enterprise randomly selected 30 ordinary employees, managers, and business owners, allowing this study to collect a rich and diverse perspective to ensure a comprehensive understanding of topics related to digital leadership, organizational culture, and innovation capabilities in an academic environment.

Data Gathering Instrument - Questionnaire was the main instrument used in this study. Based on the existing literature and the current situation of Chinese enterprises, the author designed a questionnaire "The Impact of Digital Leadership, Organizational Culture, and Innovation Capabilities on Enterprise Digital Transformation" from the three dimensions of digital leadership, organizational culture, and innovation capabilities. The first part of the questionnaire asks questions about digital leadership. Company staff evaluated the conditions for digital transformation of their companies based on the actual situation of their respective companies and their own perceptions. The second part focuses on the impact of organizational culture on enterprise digital transformation. The third part focuses on the impact of enterprise innovation capabilities on enterprise digital transformation. The questionnaire has been verified by experts, and the results of the questionnaire are reliable and authentic. The questions in this questionnaire collect responses using a four-point Likert scale, where the number 1 means "strongly disagree", 2 means "disagree", 3 means "agree", and 4 means "strongly agree".

The survey consisted of an initial part to collect basic information from the participants and questions about the topic. The questions covering the topic are mainly structured around dimensions and indicators related to digital leadership, organizational culture, and innovation capabilities. The status of each part of the questionnaire is as follows: The first part, "Digital Leadership," involves three aspects: strategic vision, technological fluency and

adaptability (Zhu, 2022; Wei, 2022; Zhang, et al., 2023). The second part "Organizational Culture" includes the three dimensions of result orientation, team orientation and risk tolerance (Qian, et. al., 2021). The third part, "Innovation Capabilities", is designed into three dimensions: leadership, people and processes (Cai, et al., 2019; Liu, et al., 2022).

With the approval of the graduate student's supervisory department, the researcher conducted a preliminary questionnaire survey. The results show that the α values are strategic vision (0.960), technical fluency (0.924), adaptability (0.951), result orientation (0.937), team orientation (0.927), risk tolerance (0.914), and leadership (0.982), people (0.982) and processes (0.952). By analyzing Cronbach's α coefficient, it was proved that this study performed well in terms of internal consistency. In terms of internal consistency, the performance of the three dimensions of digital leadership, organizational culture and innovation capabilities involved in this study is good. The validity of the questionnaire design and implementation was verified by the high reliability values of all indicators. However, for some indicators, such as innovation ability, leadership, etc., the reliability value is too high, and it may be necessary to further optimize the design and implementation of the questions to improve the accuracy and stability of the questionnaire. The analysis results provide meaningful feedback for this study and provide guidance for subsequent analysis and improvement.

Data Gathering Procedure - Based on the existing literature and the current situation of digital transformation of Chinese enterprises, the author designed a questionnaire and distributed through the "Questionnaire Star" online platform to ensure the results of the survey. Questionnaires were administered to employees, managers, and business owners from 20 companies in five provinces in China (Jiangsu, Zhejiang, Anhui, Shandong, and Hubei, n.d.). The contents of the questionnaire as well as the comprehensive thesis proposal needed to be approved by the LPU-Batangas Graduate School before being distributed through the above means. This step is critical to initiating data collection from modest cohorts of 20 to 100 participants. To obtain an accurate and broad survey, a preliminary assessment of the reliability and validity of the questionnaire construct was conducted using an initial sample. The steps to verify the accuracy and consistency of the questionnaire are very important. Feedback from the pre-distribution assessment of the initial sample prompted adjustments to the questionnaire. These modifications are critical to refining the tool and ensuring the robustness of the empirical analysis following widespread dissemination.

Data Analysis - In this study, through digital leadership, organizational culture and innovation capabilities, each indicator of the three independent variables was used to explain the influencing factors of enterprise digital transformation. Starting from the data of 20 companies surveyed, the factors affecting the digital transformation of enterprises were identified and the digital construction of statistical data is promoted. Through pre processing and statistical transformation, the basic work has been completed for module evaluation, laying the foundation for statistical analysis. Descriptive statistical analysis and inferential statistical analysis were the main quantitative methods used in data analysis in this study. In the initial stage, a descriptive analysis was performed on the characteristics of the three independent variables, frequency distribution and weighted average were used to perform a descriptive analysis on the basic attributes of the three independent variables to obtain a more comprehensive answer.

The researcher also used SPSS 28 to conduct reliability analysis on the three independent variables of enterprise digital transformation, and determined the interrelationship between digital leadership, organizational culture, and innovation capabilities through the rho index of correlation analysis. To explore the dynamic relationship between these variables more deeply, regression analysis was used to obtain regression coefficients to construct specific regression models of digital leadership, organizational culture, and innovation capabilities. Based on the enterprise digital transformation process of this study, the relative importance of each influencing factor is found, and empirical analysis conclusions are drawn to lay the foundation for the model of the enterprise digital transformation mechanism and ultimately achieve the analysis goals of the research. Because this questionnaire study refers to the mature scales studied by some scholars, this validity analysis used the software AMOS 26.0 to conduct confirmatory factor analysis on the independent variables and the dependent variables

separately. The results show that three independent variables can be used to analyze the influencing factors of enterprise digital transformation. The model of influencing factors of enterprise digital transformation has good adaptability, and each dimension has good convergent validity, combined reliability, and discriminant validity.

Ethical Consideration - Before commencing the study, the conceptual framework and questionnaire were reviewed and approved by the LPU Batangas faculty and the Graduate School. The respondents in this study were fully informed and voluntarily filled out the questionnaire. During the investigation process, the researchers sent letters to business owners asking them if they could participate in this study. They would not discriminate or prejudice the respondents based on gender, race, religion, etc., and ensured that no discrimination or bias would be caused against them during the research process, cause unnecessary harm or adverse effects to the respondent himself or his family. For example, excessive interference with the work or life of the respondent. To protect the privacy of the interviewees, names or personal information are blank, and there is no video or audio during the entire survey to ensure the interviewees are safe. In addition, this study ensures the fairness, impartiality and transparency of the survey process and the independent responses of the respondents.

3. Results and discussion

Table 1
Summary Table on Digital Leadership

Key Result Areas	Composite Mean	VI	Rank
Strategic Vision	3.10	Agree	1
Technological Fluency	3.02	Agree	2.5
Adaptability	3.02	Agree	2.5
Grand Composite Mean	3.05	Agree	

Legend: 3.50-4.00 = Strongly Agree; 2.50-3.49 = Agree; 1.50-2.49 = Disagree; 1.00-1.49 = Strongly Disagree

Table 1 uses survey data to introduce the comprehensive impact of the three indicators of digital leadership on enterprise digital transformation. The comprehensive average is 3.05, and the verbal explanations for the three indicators are "agree". This shows that respondents believe that the three indicators of digital leadership play a positive role in promoting the digital transformation of enterprises. This finding has important implications for understanding the importance of digital leadership to an organization's digital transformation and the key influence an organization has on the transformation process.

In the digital leadership evaluation system, the average value of "Strategic Vision" is 3.10, ranking first, indicating the importance of business managers' Strategic Vision in promoting digital transformation of enterprises. Business leaders not only need to have certain business management capabilities to maintain the normal operation of the company, such as the normal business development and financial stability of the company, but also need to think about the route and policies of the company's digital transformation, such as the company's digital development strategy and development methods. etc. The implementation of digital transformation of enterprises not only requires enterprises to adapt to the requirements of the development of the Internet economy, but also needs to enhance the market competitiveness and brand image of enterprises. Employees at all levels of the enterprise are increasingly inclined to support the company's enterprise digital transformation, making digital transformation a key strategy for companies to gain market advantage. This result was confirmed by the research of Fang, et al. (2021): The most important characteristics and abilities of digital leaders are vision for change and forward-looking thinking, which are important components of digital leadership. Forward-thinking skills enable leaders to lead the enterprise in responding to changing trends. The research results show that business managers' Strategic Vision not only helps companies cope with current Internet challenges, but also helps companies formulate reasonable strategic goals and management policies, allowing companies to steadily carry out digital transformation. Therefore, cultivating the strategic vision of business managers and formulating reasonable strategic goals can be beneficial to the digital transformation of enterprises.

Ranking second is Technological Fluency and Adaptability, both with scores of 3.02, and the verbal interpretation is "agree". The results illustrate the importance of Technological Fluency and Adaptability in

establishing and cultivating digital leadership. This result was confirmed by the research of Zhang, et al. (2023): Technological Fluency and Adaptability are abilities that business managers should possess. These two qualities will form a new leadership paradigm and lead business managers to create and activate high-performance teams. Similarly, this result was also confirmed by the research of Dong, et al. (2021). Digital leadership emerged as a new leadership paradigm and became an important force in coping with the digital transformation of enterprises. In the process of digital transformation, business managers must take the initiative to improve their digital skills and literacy, master knowledge related to digital technology and professional technology, and improve their adaptability to the new business operating environment.

In the process of promoting enterprise digital transformation, the three indicators of digital leadership, Strategic Vision, Technological Fluency, and Adaptability, all play an important role. Enterprises have made breakthroughs in these three aspects to ensure that they have the foundation for digital transformation and to promote the steady development of enterprise digital transformation. Therefore, enterprises should consider these key factors as important driving forces for their digital transformation in future strategy formulation to achieve successful and lasting development of digital transformation. Future research can further explore the interaction between different digital leadership indicators and their impact on the success of corporate digital transformation, thereby providing guidance for companies to formulate more precise and sustainable strategies (Liu, 2020)

Table 2
Summary Table on Organizational Culture

Key Result Areas	Composite Mean	VI	Rank
Result Orientation	3.05	Agree	1
Team Orientation	3.04	Agree	2.5
Risk Tolerance	3.04	Agree	2.5
Grand Composite Mean	3.04	Agree	

Legend: 3.50-4.00 = Strongly Agree; 2.50-3.49 = Agree; 1.50-2.49 = Disagree; 1.00-1.49 = Strongly Disagree

The data in table 2 shows the comprehensive performance of the three indicators of organizational culture in the success of enterprise digital transformation. Through the analysis of three related indicators, it was discovered that organizational culture has different impacts on enterprise digital transformation in terms of result orientation, team orientation and risk tolerance. These indicators provide important reference for policy formulation, team management and other aspects of the enterprise's digital transformation process. The overall composite mean of organizational culture is 3.04, and the verbal interpretation is "agree." The findings reflect the overall state of organizational culture, as well as an overall assessment of the field. In addition, the results show that respondents generally agree that organizational culture plays an important role in the digital transformation process of enterprises, and that organizational culture should be strengthened. Considering that organizational culture not only plays a positive role in the digital transformation of enterprises, but is also crucial to the healthy development of enterprises, the construction of organizational culture should be strengthened in future research and enterprise practice.

In the digital leadership evaluation system, the average value of "result orientation" is 3.10, ranking first, indicating that the result orientation of organizational culture plays an important role in promoting the digital transformation of enterprises. Business managers not only need to have certain digital leadership, such as the basic application of digitalization in the enterprise, but also need to think about the routes and policies of the enterprise's organizational culture, such as team building, etc. The implementation of enterprise digital transformation requires enterprises to formulate clear team goals and list detailed sub-goals so that employees of the enterprise can clarify their goals and gradually realize enterprise digital transformation. This result was confirmed by the research of Fang et al. (2021): Result orientation in organizational culture can enable corporate managers and employees to have clear goals, unify their thinking, and strive to develop the enterprise in the direction of digitalization. Therefore, formulating reasonable strategic goals and improving the result orientation in the organizational culture can be conducive to the digital transformation of enterprises.

Ranked second are team orientation and risk tolerance, both with scores of 3.04, and the verbal interpretation

is "agree". The survey results illustrate the importance of team orientation and risk tolerance in establishing and cultivating organizational culture, which play an important role in enterprise digital transformation. In the process of promoting enterprise digital transformation, the three indicators of organizational culture, result orientation, team orientation and risk tolerance, all play an important role. Enterprises that achieve good organizational culture construction in these three indicators can provide a good organizational foundation for enterprise transformation and promote the development of enterprise digital transformation. Therefore, enterprises should consider these key factors as important driving forces for their digital transformation in future strategy formulation to achieve the success of digital transformation. Future research can deeply explore the interaction between different organizational culture indicators and their impact on the success of enterprise digital transformation, thereby providing guidance for enterprises to formulate more accurate and sustainable strategies (Shen et al., 2020; Lu et al., 2021).

Table 3
Summary Table on Innovative Capability

Key Result Areas	Composite Mean	VI	Rank
Leadership	3.03	Agree	1
People	3.01	Agree	3
Processes	3.02	Agree	2
Grand Composite Mean	3.02	Agree	

Legend: 3.50-4.00 = Strongly Agree; 2.50-3.49 = Agree; 1.50-2.49 = Disagree; 1.00-1.49 = Strongly Disagree

Table 3 summarizes innovative capability, which systematically evaluates leadership, people, and processes. This survey provides an in-depth understanding of the innovation capabilities in different areas within the enterprise and provides important reference for future enterprise digital transformation. The overall composite mean is 3.02, and the verbal interpretation is "agree." This shows that the respondents have a positive attitude towards internal innovation of enterprises that can improve the success rate of digital transformation of enterprises, and are regarded as an important engine to promote the digital transformation of enterprises. This assessment can enable business managers to better understand the actual effects of internal innovation capabilities in different fields, and provide theoretical support for future corporate digital transformation.

In this table, the indicator with the highest weighted average is "leadership" with a score of 3.03 and the verbal interpretation is "agree". The innovative ability of enterprise managers has a positive and significant impact on the entire process of enterprise digital transformation. This important practical significance reflects the degree to which business managers' leadership recognizes and adopts innovation within the organization. At the same time, this also means that the innovation awareness of business leaders and the innovation environment of the enterprise must reach a certain level, so that innovation capabilities can be effectively transformed into an effective driving force for the digital transformation of enterprises. This result was proven by the research of Li, et al. (2020), which pointed out that the support of middle and senior managers and their ability to lead enterprises with digital technology to innovate are the keys to enterprises successfully achieving digital transformation. This means that if companies want to achieve development in the increasingly fierce competition in the digital economy, managers need to create a new, dynamic, and continuous learning innovative leadership (Liu, et al., 2021). This shows that leadership is one of the important factors in cultivating internal innovation capabilities of enterprises, and provides important inspiration for future digital transformation of enterprises. That is, it is necessary to focus on the leadership training of enterprise leaders to ensure that they can exert good management talents in the management field. These research results provide strong practical basis and reference for the promotion of policy support and enterprise innovation capability cultivation.

Secondly, the weighted average of the processes indicator is 3.02, ranking second, and the verbal interpretation is "agree", slightly lower than leadership. This shows that internal process innovation of enterprises is valued in improving the digital transformation of enterprises, highlighting its optimization of resource utilization, and improving operational efficiency, thus promoting the digital transformation of enterprises. In table 3, the indicator with the lowest score is people, with a weighted average of 3.01, ranking third, and the verbal interpretation is "agree". Although the weighted average ranks the lowest, it can still illustrate the positive role of team members'

innovation in the digital transformation of enterprises, indicating that it still has room for improvement. This may require further optimizing the innovative thinking and innovation environment within the entire enterprise, strengthening the formulation and implementation of innovation policies, and improving the actual effect of innovation capabilities in the digital transformation of enterprises. The cultivation of employees' digital capabilities, the improvement of individual work reshaping capabilities, the stimulation and reshaping of individual creativity, promote digital transformation within the organization, are conducive to innovative thinking and innovation environment within the enterprise, thereby promoting the success of the enterprise's digital transformation (Abbasi, et al., 2021).

The digital leadership and organizational culture shown in table 4 is highly correlated, with the maximum value of rho being 0.717 and the minimum value being 0.650. The overall composite average indicates a correlation between the two. This is critical to understanding how digital leadership impacts organizational culture. After analyzing the values of these indicators, it was found that there is a correlation between digital leadership and organizational culture, which provides guidance for the digital transformation of enterprises. The metric with the highest weighted average is the correlation between adaptability and team orientation, with a rho value of 0.717. This shows that there is a significant positive relationship between adaptability in digital leadership and team orientation in organizational culture. Research shows that as adaptability in digital leadership increases, team orientation in organizational culture also increases. Therefore, strengthening the research and promotion of adaptability is of great significance to promoting the improvement of enterprise digital leadership and achieving the goal of enterprise digital transformation.

Table 4
Relationship Between Digital Leadership and Organizational Culture

Variables	rho	p-value	Interpretation
Strategic Vision			
Result Orientation	0.659**	<.001	Highly Significant
Team Orientation	0.703**	<.001	Highly Significant
Risk Tolerance	0.704**	<.001	Highly Significant
Technological Fluency			
Result Orientation	0.674**	<.001	Highly Significant
Team Orientation	0.696**	<.001	Highly Significant
Risk Tolerance	0.688**	<.001	Highly Significant
Adaptability			
Result Orientation	0.650**	<.001	Highly Significant
Team Orientation	0.717**	<.001	Highly Significant
Risk Tolerance	0.684**	<.001	Highly Significant

***. Correlation is significant at the 0.01 level*

Secondly, among the three indicators of strategic vision, technological fluency and adaptability in the digital leadership dimension and the three indicators of result orientation, team orientation and risk tolerance of organizational culture, all P values are lower than 0.001, emphasizing the close correlation between these indicators. The rho values of the three indicators result orientation, team orientation and risk tolerance in strategic vision and organizational culture are respectively: 0.659 (third), 0.703 (second) and 0.704 (first). Technological fluency and result in organizational culture the rho values of the three indicators orientation, team orientation and risk tolerance are: 0.674 (third), 0.696 (first) and 0.688 (second) respectively. The rho values of the three indicators of result orientation, team orientation and risk tolerance in adaptability and organizational culture are: 0.650 (third), 0.717 (first) and 0.684 (second) respectively. The significant relationship between digital leadership and organizational culture is fully demonstrated by the numbers in this table. Therefore, future research that deeply explores the complex relationship between digital leadership and organizational culture can better understand their dynamics and specific correlations and promote the goal of successful enterprise digital transformation.

In the study of the relationship between digital leadership and organizational culture, between the adaptability of digital leadership and the team orientation of organizational culture, the rho value is 0.674, which is the lowest score and ranks last. Although the correlation between them is not as significant as other indicators, it still reveals

that there is a certain degree of positive correlation between Adaptability in digital leadership and organizational culture. This impact may be reflected in the improvement of corporate digital leadership through strengthening digital leadership training, strengthening technology, etc., thus enhancing the success of corporate digital transformation. The research results of this study by Zhou, et al. (2024) confirm that digital leadership plays a significant positive impact in promoting the development of organizational culture, especially in improving the team orientation of organizational culture. This research result is confirmed by the research of Zhu, et al. (2022): The vision communication of corporate leaders who can adapt to and master digital technology and data business makes employees have a sense of mission for digital transformation, strengthens employees' meaning construction of change, and leaders The entrepreneurs themselves lead by example, and their enthusiasm and belief in digital transformation will further infect employees' support for digital transformation, thus promoting the success of the company's digital transformation. Therefore, it is of great significance to strengthen digital leadership and study its role in organizational culture.

The data in Table 4 shows that there is a significant positive correlation between the indicators of digital leadership and organizational culture, which provides important theoretical and empirical basis for further exploring the interactive relationship between digital leadership and organizational culture. Digital leadership is not limited to the individual level, but also involves the economic development of countries and enterprises. Future research could explore the causal relationship between digital leadership and organizational culture. In other words, whether increasing levels of digital leadership will promote the development of organizational culture, or whether the rise of organizational culture will in turn affect the improvement of digital leadership. In addition, research should also pay more attention to the similarities and differences in the relationship between digital leadership and organizational culture in different countries or regions. Under different cultures, different systems and different development stages, the impact of digital leadership on organizational culture may be different, which will also be an important direction for future research. Overall, studying the relationship between digital leadership and organizational culture not only helps promote the innovative development of enterprises, but also provides theoretical support and policy suggestions for realizing enterprise digital transformation.

Table 5
Relationship Between Digital Leadership and Innovative Capability

Variables	rho	p-value	Interpretation
Strategic Vision			
Leadership	0.694**	<.001	Highly Significant
People	0.694**	<.001	Highly Significant
Processes	0.682**	<.001	Highly Significant
Technological Fluency			
Leadership	0.693**	<.001	Highly Significant
People	0.685**	<.001	Highly Significant
Processes	0.674**	<.001	Highly Significant
Adaptability			
Leadership	0.689**	<.001	Highly Significant
People	0.633**	<.001	Highly Significant
Processes	0.663**	<.001	Highly Significant

** . Correlation is significant at the 0.01 level

Table 5 explores the relationship between digital leadership and innovation capabilities, and specifically demonstrates the correlation between them through analysis. The maximum value of rho is 0.693, and the minimum value is 0.633. The rho value (correlation coefficient) of the results of this study and p-value (significance level) shows that there is a correlation between the two. The overall composite average is critical to understanding the impact of digital leadership on innovation capabilities. This table provides an in-depth exploration of the complex relationship between digital leadership and innovation capabilities, providing an important reference for enterprises' digital transformation.

The indicator with the highest weighted average is the correlation between strategic vision and leadership and people in digital leadership, with rho values of 0.694. This shows that there is a positive correlation between strategic vision in digital leadership and leadership and people in innovation capabilities. This research shows that

as strategic vision in digital leadership increases, leadership and people in innovation capabilities also increase. This survey research was confirmed by Nie (2023) claiming that strategic vision of digital leadership can make itself more closely connected with the outside world, improve its own leadership, promote its fulfillment of social responsibilities, and improve itself to build a good internal and external relationship network. This is helpful for enterprises to absorb social talents and external resources for innovation. This result has also been confirmed by the research of Lou et al. (2021) saying that human capital has a mediating role in the impact of digital transformation on promoting innovation, especially digital leadership, which emphasizes the importance of people in transformation. However, in response to this issue, it can further explore the specific impact mechanism of strategic vision in digital leadership on leadership and people in innovation capabilities.

Secondly, among the three indicators of strategic vision, technological fluency and adaptability in the digital leadership dimension and the three indicators of leadership, people and processes of innovative capability, all P values are lower than 0.001, emphasizing the close correlation between these indicators. The rho values of the three indicators of leadership, people and processes of strategic vision and innovative capability are: 0.694 (first), 0.694 (first) and 0.682 (third) respectively. The three indicators of leadership, people and processes of technological fluency and innovative capability the rho values of each indicator are: 0.693 (first), 0.685 (second) and 0.674 (third). The rho values of the three indicators of leadership, people and processes of adaptability and innovative capability are: 0.689 (first), 0.633 (third) and 0.663 (second) respectively. The significant relationship between digital leadership and innovative capability is fully demonstrated by the numbers in this table. Therefore, future research that deeply explores the complex relationship between Digital Leadership and Innovative Capability can better understand their dynamics and specific correlations and promote the goal of successful and sustainable development of enterprise digital transformation. This finding illustrates the challenges that may arise in leveraging adaptability in digital leadership to drive improvements in people's innovation capabilities. However, the challenge now is how to overcome these barriers and further research is needed.

In table 5, the lowest rho value is 0.633, and the correlation between adaptability and people ranks last. Although this correlation was explored statistically, there was still a significant relationship between them, but the correlation between them was relatively weak compared to other dimensions. In view of this situation, research needs to have a deeper understanding of the impact mechanism of adaptability on people in innovation ability. This result was confirmed by the research results of Wang et al. (2021), which pointed out that digital leaders master digital technology, use digital management of enterprises, focus on cultivating employees' digital capabilities, and improve individual work reshaping capabilities, and work reshaping is conducive to stimulating individual creativity. This research result was also confirmed by the research results of Zeike et al. (2019). The study believes that digital leaders should adapt to changes in the internal and external environment of the enterprise, pay attention to the application of digital technology, effectively integrate digital technology into individuals, and strive to reduce the impact of digitalization on the uncertainty and digital divide between team members can be overcome, giving individuals greater autonomy and flexibility to enhance personal creativity.

In summary, the overall composite average indicates that there is a correlation between the three dimensions of digital leadership (strategic vision, technical fluency, adaptability) and the three dimensions of innovation capabilities (leadership, people, processes), providing a basis for further exploration of digital leadership. The interactive relationship with innovation capabilities provides important theoretical and empirical foundations. The research results show that there is a certain degree of positive correlation between digital leadership and innovation capabilities, but the correlation strength varies in different fields and dimensions. However, all P values were below 0.001, emphasizing the strong correlation between these indicators. This result was confirmed by the research of Wang et al. (2022): Digital leadership relies on its high data analysis capabilities to achieve efficient use of resources and provide strong support for corporate innovation. Future research could explore the causal relationship between digital leadership and innovation capabilities. In other words, the research direction is how the improvement of the level of digital leadership affects the development of innovation capabilities. At the same time, will the rise of innovation capabilities have a negative impact on the improvement of digital leadership? Overall, studying the relationship between digital leadership and innovation capabilities not only helps promote

the innovative development of enterprises, but also provides theoretical support and policy suggestions for realizing enterprise digital transformation.

Table 6 shows the correlation analysis between organizational culture and innovation capabilities, including the result orientation, team orientation, and risk tolerance of organizational culture and the three main indicators of innovation capabilities, namely, leadership, people, and processes of innovation. The correlation coefficient (rho value) ranges from 0.620 to 0.699, showing the degree of correlation from weak to strong. All P values are below 0.001, indicating a significant correlation between these indicators.

Table 6
Relationship Between Organizational Culture and Innovative Capability

Variables	rho	p-value	Interpretation
Result Orientation			
Leadership	0.620**	<.001	Highly Significant
People	0.649**	<.001	Highly Significant
Processes	0.637**	<.001	Highly Significant
Team Orientation			
Leadership	0.680**	<.001	Highly Significant
People	0.686**	<.001	Highly Significant
Processes	0.688**	<.001	Highly Significant
Risk Tolerance			
Leadership	0.685**	<.001	Highly Significant
People	0.699**	<.001	Highly Significant
Processes	0.662**	<.001	Highly Significant

***. Correlation is significant at the 0.01 level*

What is particularly noteworthy is that in the field of risk tolerance, it has the strongest correlation with People in the innovation ability (rho value is 0.699), ranking first. This shows that there is a significant positive correlation between risk tolerance in organizational culture and people in innovation capabilities. This study shows that as risk tolerance in organizational culture increases, People in innovation capabilities also increase. This finding was confirmed by the researchers' (Chanias et al., 2019) research: enterprises improve their risk taking by collecting digital information in the external environment, capturing digital opportunities, and sensing the threats of digital entrants. ability. In the face of the risks borne by the enterprise, it is necessary to carry out employee digital knowledge and skills training, encourage employees to actively participate in project discussions, provide problem solutions, etc., to cultivate employees' digital awareness and innovative thinking, which will promote the development of innovative capabilities in the process of enterprise digital transformation.

The specific correlation coefficients of each factor in the table are: in the field of result orientation, the correlation value with people is 0.649 (ranked first), processes is 0.637 (ranked second), and leadership is 0.620 (ranked third). in the field of team orientation, the correlation value with processes is 0.688 (ranked first), people is 0.686 (ranked second), and leadership is 0.680 (third). The results of this survey highlight the important role of team orientation and result orientation factors in the relationship between organizational culture and innovation capabilities. Therefore, these data results highlight the need to delve deeper into the complex relationship between organizational culture and innovation capabilities to better understand their dynamics and specific relevance and advance the goals of successful digital transformation in enterprises.

By analyzing the data in table 6, it is found that the correlation between result orientation in organizational culture and leadership in innovation capability is low, with a specific correlation coefficient of 0.620, ranking the lowest. Although the correlation value between the two is lower than other indicators, the positive correlation between the two exists. This study shows that as the result orientation in organizational culture increases, the leadership in innovation capabilities also increases. This survey result was confirmed by the research results of Chen, et al. (2022) saying that result orientation in organizational culture may face problems such as insufficient leadership capabilities and insufficient digital management literacy, thus limiting the development and construction of corporate innovation capabilities. These challenges may hinder result orientation's growth and influence in the areas of organizational culture and innovation capabilities. Therefore, research needs to deeply explore the role

and impact of result orientation and promote its connection with innovation capabilities, thereby promoting a more comprehensive and effective development of organizational culture and contributing to the realization of enterprise digital transformation.

To sum up, the overall composite average in table 6 shows that there is a strong correlation between the three indicators of organizational culture (result orientation, team orientation, risk tolerance) and the three indicators of innovation capability (leadership, people, processes), which provides an important theoretical and empirical basis for further exploring the interactive relationship between organizational culture and innovation capabilities. The research results show that there is a certain degree of positive correlation between organizational culture and innovation capabilities, but there are differences in the strength of the correlation in different fields and dimensions. The organizational capabilities of enterprises are enhanced, and the innovation capabilities of enterprises are significantly improved. Similarly, this research result has also been confirmed by Liu, et al. (2022), enterprises rely on the Internet thinking brought about by digital transformation to improve the management methods within the organization, which helps strengthen the enterprise's ability to obtain resources, thereby counteracting the digital transformation of enterprises and improving transformation success rate. In other words, a company's organizational culture and innovation capabilities interact and complement each other to jointly enhance the company's digital transformation. Overall, studying the relationship between organizational culture and innovation capabilities not only helps promote the innovative development of enterprises, but also provides theoretical support and policy suggestions for realizing enterprise digital transformation.

Proposed Framework for Digital Innovation

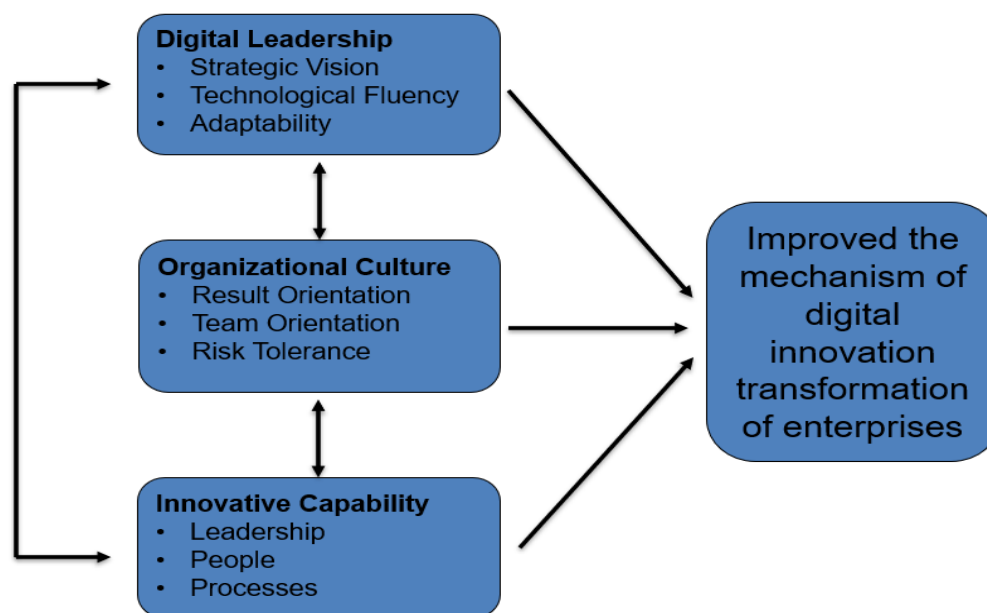


Figure 1. Framework for Digital Innovation

This investigation starts from the three key variables of digital leadership, organizational culture, and innovation capabilities, and explores how they cooperated with each other to promote the success of enterprise digital transformation (Qian et al., 2021). In the current context of global economic integration and the rapid development of the Internet, building more digital, efficient, innovative, and sustainable enterprises has become a global consensus. Enterprise digital transformation not only involves the development of the enterprise itself, but also includes economic growth and social progress. Therefore, how to find a balance between enhancing digital leadership, organizational culture and innovation capabilities is the core issue to achieve the success of enterprise digital transformation.

As shown, Figure 1 is a diagram of the development model of enterprise digital transformation. In the constructed model diagram, digital leadership is fundamental. It provides more support for enterprises in the digital transformation process by improving strategic vision, technological fluency and adaptability. The improvement of digital leadership can help enterprises obtain a broader thinking line, build a low-cost enterprise operation system, and especially achieve success in enterprise transformation and sustainable development. Organizational culture provides motivation and resources for enterprises to build good innovation capabilities by providing result orientation with clear indicators, good team orientation, and strong risk tolerance support. Innovation capabilities play an important role in the digital transformation process of enterprises: build a model to better leverage the innovation capabilities of enterprises from the three dimensions of leadership, people and processes, moreover, build a basic digital environment, establish a digital corporate culture, build innovative enterprises, and directly promote the digital transformation of enterprises. These three indicators influence and promote each other, and together constitute a powerful mechanism to promote the digital transformation of enterprises. They not only promote the digital transformation of enterprises, but also bring long-term economic benefits to enterprises and society.

The analytical model shows how digital leadership, organizational culture and innovation capabilities cooperate, interact, and depend on each other in the digital transformation of enterprises, and jointly promote the digital transformation of enterprises and the continuous improvement of operating conditions. This holistic understanding helps policymakers, business managers, and corporate employees make more informed decisions when promoting corporate digital transformation.

4. Conclusions and recommendations

Respondents agreed in the company's digital leadership, organizational culture, and innovation capabilities. Respondents generally believe that digital leadership is reflected in strategic vision, technological fluency, and adaptability. Respondents generally believe that the transformation of innovation capabilities is reflected in leadership, people, and process. The results show that there is a highly significant relationship between digital leadership, organizational culture and innovation capabilities. The researcher proposes a framework for the digital innovation and transformation mechanism of Chinese enterprises.

Enterprises can strengthen digital leadership training and ensure that enterprises have the basic conditions for digital transformation by improving strategic vision, technical fluency and adaptability. At the same time, continuous improvement can enhance the trust of internal management and employees of enterprises. Enterprises can actively build a good organizational culture that is conducive to the digital transformation of enterprises, such as establishing a clear result orientation, good team orientation and risk tolerance, holding regular lectures, and focusing on the cultivation of digital teams, establishing advanced incubation mechanisms, and cultivating Knowledge-based new innovative employees. Business managers can give priority to companies with good digital leadership, organizational culture, and innovative capability to carry out digital transformation. This framework has the potential to improve the success rate of enterprise digital transformation. Future researchers can continue to conduct similar related studies to check the authenticity of this study and enrich the findings of this study. At the same time, future research should focus on how government policies support the digital transformation of enterprises and affect the improvement of digital leadership, organizational culture, and innovation capabilities.

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