

A Review of Research on Enterprise Digital Transformation

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Abstract: As digital transformation becomes an inevitable choice for the survival and development of enterprises, rather than an option, this paper systematically combs and analyzes relevant research. The article discusses the concept, type classification, implementation path, influencing factors, and risk challenges of enterprise digital transformation. Specifically, digital transformation is defined from three perspectives: technology application, organizational change, and value creation, and its types are refined according to the transformation links and goals; four main paths are proposed: data empowerment, platformization, service-oriented and peer effect; in-depth analysis of the factors affecting the digital transformation of enterprises in the external environment, internal enterprises and individual levels; and reveals the possible risks and challenges such as security and privacy threats, excessive monitoring and work conflicts, dehumanization and de-skilling. Overall, through a comprehensive and systematic analysis, this paper deepens the understanding of enterprise digital transformation and provides important theoretical support and practical guidance for enterprises to implement digital transformation strategies, optimize management practices, and improve transformation results.

Keywords: Digital economy, Digital technology, Digital transformation of enterprises, Influencing factors, Literature research.

1. Introduction

In recent years, the digital economy, as an important driving force for global economic growth, has become an important symbol of national competitiveness. China has made significant progress in the development of the digital economy. With its huge domestic market, complete industrial system, and increasingly mature digital infrastructure, it has promoted the leapfrog development of the digital economy. According to the latest data from the "Global Digital Economy White Paper (2024)", the global digital economy will exceed US\$33 trillion in 2023, an increase of more than 8% from the previous year. Among them, the total digital economy of the five major economies, including China, the United States, Germany, Japan, and South Korea, accounts for an increasing share of the global total year by year. Especially in the field of industrial digitalization, global industrial digitalization accounts for 86.8% of the digital economy, demonstrating the key role of industrial digitalization in optimizing the global economic structure.

The development of China's digital economy is particularly outstanding. In 2023, the added value of China's core digital economy industries will exceed 12 trillion yuan, accounting for about 10% of the gross domestic product (GDP). It is expected to complete the goal of 10% of the digital economy in the GDP set in the "14th Five-Year Plan" ahead of schedule. Compared with 2019, the total volume of China's digital economy has increased by more than 40%, showing the profound impact of digital transformation on the Chinese economy. In addition, China's digital economy growth rate in 2023 remained above 8%, far higher than the global average, consolidating its position as the world's second-largest digital economy.

The rapid development of the digital economy has not only promoted technological innovation and industrial upgrading but also accelerated the integration of traditional industries into the digital wave. Globally, industrial digitalization has

become the core force supporting the growth of the digital economy. According to statistics, industrial digitalization has accounted for 86.8% of the total global digital economy, and this proportion has shown an upward trend year by year. China has also performed well in this field, with industrial digitalization accounting for more than 87% of the total digital economy, providing strong support for promoting high-quality economic development. China's digital transformation is not only reflected in the digital transformation of traditional industries, but also through emerging technologies such as big data, artificial intelligence, and cloud computing. It has promoted the rise of emerging formats and spawned new economic forms such as intelligent manufacturing, digital agriculture, and digital finance.

The vigorous development of the digital economy has further promoted the structural optimization and innovative development of China's economy. Against the backdrop of a slowdown in global economic growth, the digital economy has injected new growth momentum into China's economy and has become an important engine for promoting the expansion of domestic demand, optimizing resource allocation, and increasing industrial added value. At the same time, the in-depth development of the digital economy has also promoted the reorganization of technology, capital, and labor resources, providing new space and opportunities for the innovative development of enterprises.

In summary, the rapid development of the digital economy around the world and China's outstanding achievements in this field indicate that digital transformation has become the core driving force for national economic development. The digital economy has not only played a positive role in promoting the upgrading of traditional industries and the cultivation of emerging formats but has also provided theoretical support and practical guidance for the high-quality development of the national economy. Exploring further development paths for the digital economy is not only an urgent requirement for China's economic transformation but

also a new challenge and opportunity for global economic development.

2. Definition of the Concept of Enterprise Digital Transformation

The process of digital development has gone through three stages: data, digitalization, and digital transformation (Verhoef et al., 2021; Zhong Xiaolong and Li Huihui, 2024). Among them, digital transformation refers to the reconstruction and upgrading of traditional businesses, processes, and business models through digital technology, aiming to improve operational efficiency, create value, and promote organizational change and development. It is applicable to all walks of life and different types of organizations. Foreign scholars have also gradually deepened their research on digital transformation, especially in terms of technology application, organizational change, and value creation. For example, Westerman et al. (2011) proposed that digital transformation is not just the introduction of technology, but the deep integration of technology and organizational strategy, which can guide enterprises to the path of innovation and efficiency improvement. Bharadwaj et al. (2013) pointed out that the application of digital technology is the key to enterprises maintaining their competitiveness, especially in the face of a rapidly changing market environment. Digital transformation can help enterprises improve their adaptability and agility.

Digital transformation is not limited to the enterprise level but is widely applicable to all kinds of organizations and industries. However, as a specific form of practice, enterprise digital transformation refers to the process of using digital technology to systematically change its business processes, management models, and business structures in the face of market demand and technological changes. Domestic and foreign studies have shown that the success of enterprise digital transformation depends not only on the effective application of technology, but also on the culture, structure, and value-creation model of the organization (Kane et al., 2015). For example, Liu and Zhang (2022) emphasized the core role of organizational change in enterprise digital transformation and believed that successful digital transformation needs to be driven by effective leadership and adaptive change.

At present, the academic community has conducted research on enterprise digital transformation from multiple perspectives, mainly focusing on three aspects: technology application, organizational change, and value creation. Foreign literature also mentioned that enterprises face multiple challenges in the process of digital transformation, such as technology implementation, employee adaptation, and data security (Hess et al., 2016). These studies provide important theoretical frameworks and practical inspirations for enterprise digital transformation.

In summary, this article aims to comprehensively sort out and summarize the relevant research on enterprise digital transformation, and combine the views of domestic and foreign scholars to provide a clearer and more comprehensive perspective. This will not only help deepen the theoretical understanding of enterprise digital transformation, but also lay the foundation for subsequent research, and provide valuable theoretical and practical guidance for enterprises and academia.

The concept of enterprise digital transformation has been

widely discussed, and research has mainly explored it from three perspectives: technology application, organizational change, and value creation. These perspectives provide different theoretical frameworks for understanding the complexity of digital transformation.

First, from the perspective of technology application, many studies regard enterprise digital transformation as the process of applying digital technology in business operations. Fitzgerald et al. (2014) defined it as the process of enhancing the operational efficiency and competitiveness of enterprises by introducing and using digital technologies (such as social media, mobile Internet, and embedded devices) in the process of major business improvements. In addition, domestic scholars such as Li Yunlong (2020) also emphasized that the widespread application of digital technology is a key factor in promoting enterprise innovation and improving operational efficiency. This perspective emphasizes technology-driven transformation and highlights the fundamental role of digitalization in the daily operations of enterprises.

Secondly, from the perspective of organizational change, with the deep integration of digital technology and the real economy, more and more scholars have begun to explain the significance of enterprise digital transformation from the perspective of organizational change. Vial (2019) proposed that digital transformation is not only the introduction of technology but also a combination of information, computing, communication, and connection technologies that trigger profound changes in the internal structure, process, and culture of an organization. This view is further supported by domestic research. Wang Zhiwei (2021) believes that the adjustment of organizational structure and the renewal of corporate culture are the key to the successful implementation of digital transformation, especially in the digital age. Organizations must have flexibility and innovation capabilities to effectively adapt to external changes and promote internal innovation.

Finally, from the perspective of value creation, the core of enterprise digital transformation lies in creating new forms of value through the innovative application of digital technology. Gong and Ribiere (2021) clearly pointed out through four stages of research (definition collection, definition analysis, definition creation, and definition evaluation) that digital transformation is not only a technological innovation but also a fundamental change in organizational structure and function, thereby creating new value propositions for enterprises and their stakeholders. This theory has been widely recognized by scholars at home and abroad. Nasiri et al. (2020) also pointed out that digital transformation is a new value-creation process that helps enterprises better respond to changes in market demand and technological advances and enhance core competitiveness by improving business processes and promoting cultural changes.

In summary, the core goal of enterprise digital transformation is to enhance competitiveness, which is fully reflected in the three aspects of technology application, organizational change, and value creation. The success of digital transformation requires not only the widespread application of technology but also depends on the innovation of organizational culture and the clarification of strategic goals. With the integration of various digital technologies such as artificial intelligence, blockchain, big data, cloud computing, and the Internet of Things, enterprises need to create an atmosphere that supports transformation internally, encourages employees to learn new technologies and methods,

and promotes information sharing and knowledge transfer. At the same time, strategic planning for enterprise digital transformation is crucial, and clear transformation goals and implementation steps are the key to success.

Different types of enterprises face different challenges and opportunities in the process of digital transformation. More mature enterprises tend to pay more attention to the deepening and expansion of digital transformation, while relatively primary enterprises should start with infrastructure construction and gradually advance the transformation process. Specifically, manufacturing enterprises may pay more attention to the application of intelligent manufacturing technology to improve production efficiency and reduce costs; the financial industry focuses on using big data and artificial intelligence to optimize risk control capabilities and improve customer service; the retail industry focuses on achieving online and offline integration and supply chain optimization; and small and medium-sized enterprises pay more attention to reducing transformation costs, improving management efficiency and market competitiveness.

Therefore, enterprise digital transformation is not only a technology-driven process but also a complex change process involving strategy, culture, organization, and technology. It requires the formulation of personalized transformation strategies and implementation paths based on the maturity, industry characteristics, and market demand of each enterprise.

3. Types of Enterprise Digital Transformation

With the widespread application of digital technologies such as cloud computing, big data, and artificial intelligence, the market environment faced by enterprises has become increasingly complex and changeable, which requires enterprises to continuously adjust and optimize their operating models to maintain competitiveness. Through the review of existing literature, it can be seen that enterprise digital transformation can be divided into different types according to different transformation links and transformation goals. First, from the perspective of transformation links, the study divides enterprise digital transformation into process digitalization, management digitalization, and value chain digitalization. These types represent the digital transformation of enterprises in different fields and levels. Process digitalization refers to the application of digital technology by enterprises to improve or create new business processes, including product production, service provision, marketing, and relationship management with customers and partners. This field plays a vital role in many traditional manufacturing industries (Adomako et al., 2021; Fu Ying et al., 2021; Yi Jingtao and Cao Ruonan, 2022). In addition, management digitalization involves the application of information technology and communication technology to the management structure and operation process of the enterprise, thereby realizing the deep reform of management mode and production process (Liu Shuchun et al., 2021). For example, Liu Shanshi et al. (2022) explored the application of algorithmic management in online labor platforms, pointed out that this management style is closely related to the rise of platform-based enterprises, and called for further research on this new management model. Value chain digitalization is the application of digital technology throughout the value chain, from design to production to marketing and delivery (Wang

Wenna et al., 2023). These types of digital transformation reveal how digital technology plays a role in different functions and business processes of enterprises.

Secondly, from the perspective of transformation purpose, enterprise digital transformation can be divided into manufacturing process digitalization and business model digitalization. Manufacturing process digitalization focuses on improving production efficiency and reducing costs, usually focusing on automation, intelligent production, and supply chain optimization. Business model digitalization emphasizes creating new customer value and improving customer experience through digital technology, especially in the personalization and customization of services and products (Chi Renyong et al., 2022). According to this classification, the digital transformation of enterprises can take two different paths: one is to shift from traditional production models to a more intelligent and interconnected production system, and the other is to shift from a simple marketing focus to a business model that pays more attention to customer experience and comprehensive value creation.

These two paths do not exist independently but complement each other. The success of enterprise digital transformation often depends on the organic combination of the two. If an enterprise only focuses on the digitalization of the production process and ignores the improvement of customer experience, or only emphasizes customer value and ignores the improvement of production efficiency, it will often lead to insufficient transformation effect or deviation in direction (Chi Renyong et al., 2022). Therefore, when enterprises carry out digital transformation, they must balance production efficiency and customer experience to ensure the coordinated development of the two in order to achieve a comprehensive and in-depth transformation effect.

4. Enterprise Digital Transformation Path

Enterprise digital transformation is a complex and diverse process, and its paths and strategies vary depending on the enterprise's industry background, resource base, and development goals. Through the review and analysis of existing literature, enterprise digital transformation can be divided into four paths: data empowerment, platformization, service-oriented, and peer effect. Data empowerment is regarded as the core link of digital transformation. Sun Xinbo et al. (2020) believe that data empowerment is to achieve data value creation by innovating data application scenarios and improving data application skills and methods. There are differences in this path between domestic and foreign research. Foreign research focuses on the technical context and incentive mechanism of data empowerment, while domestic research focuses more on the role of data as a strategic resource and capability building. The platformization path refers to enterprises promoting digital transformation by building platforms, integrating resources, optimizing supply chains, and improving service levels. Du Yong et al. (2022) analyzed the multi-stage evolution of manufacturing enterprises in the process of platformization transformation and pointed out that platformization helps to solve the digital divide problem in transformation. Based on the absorptive capacity theory, Zheng Yonghua et al. (2023) revealed the key role of platform data empowerment in digital transformation, indicating that the improvement of platform capabilities can significantly promote the digitalization

process of enterprises. The service-oriented path emphasizes that enterprises create service value through digital technology. Zhang Zhengang et al. (2022) pointed out that the service-oriented path has gone through three stages: digitalization of production factors, construction of digital service capabilities, and creation of digital service value, which has promoted the transformation of enterprises from product-centric to customer-centric. Dong Xiaosong et al. (2021) used the case of the Renhe Group to explain the evolution of digital service transformation and emphasized value creation as a driving force for transformation. Li Shuwen et al. (2022) proposed the "connection iteration-innovation iteration" framework to further analyze the key mechanisms in the service-oriented transformation process. Finally, the peer effect path focuses on the interaction between enterprises. Chen Qingjiang et al. (2021) found that the digital transformation level of the focal enterprise has an impact on other enterprises in its group, and this effect is affected by factors such as network embeddedness, market competition, and environmental uncertainty. Zhong Xiaolong et al. (2022) explored how digital technology can promote the digital transformation of enterprises in regions and industries by reducing the cost of knowledge dissemination and promoting knowledge spillover. To sum up, the four paths of data empowerment, platformization, service-oriented, and peer effect provide a theoretical framework and practical guidance for the digital transformation of enterprises. The organic combination and coordinated promotion of different paths will help enterprises achieve a comprehensive breakthrough in digital transformation in the increasingly fierce market competition and promote high-quality economic development.

5. Factors Affecting Enterprise Digital Transformation

In the digital age, the digital transformation of enterprises is not an easy task, and it is affected by many factors. Existing studies have conducted in-depth discussions on the factors affecting the digital transformation of enterprises, mainly focusing on the following three levels: external environment level, enterprise level, and individual level.

In the digital age, the digital transformation of enterprises has become the key to improving competitiveness and adapting to market changes. However, digital transformation is not achieved overnight, and its process is affected by many factors. Existing literature has conducted in-depth discussions on the factors affecting the digital transformation of enterprises, mainly focusing on the three dimensions of the external environment, enterprise-level, and individual level. The following will analyze the factors affecting digital transformation in detail from these three levels, and conduct a literature review in combination with relevant theories.

5.1. Influencing Factors of The External Environment

The external environment plays a particularly critical role in promoting the digital transformation of enterprises. External factors mainly include government policies, industry development trends, technological innovation, competitive pressure, and market demand. First, government policies provide institutional guarantees and policy support for the digital transformation of enterprises. In recent years, many national and regional governments have issued a number of

policy documents on digital economy, scientific and technological innovation, and industrial upgrading to encourage enterprises to carry out digital transformation. China has clearly proposed in the "14th Five-Year Plan for Digital Economy Development" to accelerate digital transformation and support the widespread application of digital technology in various industries (State Council, 2021). In addition, the government also promotes enterprises' investment in technology research and development and digital infrastructure construction through financial subsidies, tax incentives, and innovation funding support. According to Porter and Heppelmann (2014), the government's active investment in digital economy policies can effectively reduce the cost of digital transformation of enterprises and increase the feasibility of their transformation.

Secondly, industry development trends and technological innovations provide new opportunities for the digital transformation of enterprises. With the continuous development of technologies such as the Internet of Things, artificial intelligence, and big data, enterprises can improve production efficiency, optimize product design, and improve customer experience through these advanced technologies. For example, Fitzgerald et al. (2014) pointed out that technological innovation not only changes the form of products and services but also redefines the business processes and operating models of enterprises, thereby accelerating the digital transformation of enterprises. At the same time, competitive pressure in the industry is also an important external factor that drives enterprises to carry out digital transformation. With the intensification of globalization and market competition, enterprises face strong pressure from peers and cross-industry enterprises. Adomako et al. (2021) mentioned that in order to maintain market share in a competitive environment, enterprises have to rely on digital technology to improve their productivity and market responsiveness.

Finally, changes in market demand are also an important factor in the external environment. Consumers' needs are becoming more personalized and diversified. If traditional companies cannot respond quickly to market changes, they will lose their competitive advantage. With the popularization of the Internet and changes in consumer habits, more and more consumers prefer online shopping, personalized customization, and other services, which provides a strong market demand driving force for the digital transformation of enterprises (Vial, 2019).

5.2. Influencing Factors at The Enterprise Level

Enterprise-level factors mainly include the enterprise's resources, technical foundation, strategic direction, management capabilities, etc. These factors determine whether the enterprise has the ability to successfully implement digital transformation.

First, the resources and technological foundation of an enterprise are key factors in determining whether it can successfully carry out digital transformation. According to the RBV theory (resource-based theory), the resources of an enterprise (including physical resources, technological resources, human resources, etc.) are the source of its competitive advantage. When enterprises carry out digital transformation, they need to rely on a strong technological foundation and innovation capabilities. Therefore, having advanced information technology infrastructure (such as

cloud computing platforms, data storage systems, etc.) and a high-quality technical team is a prerequisite for the success of digital transformation (Brynjolfsson & McAfee, 2014). In addition, during the transformation process, enterprises need to integrate and optimize existing technologies to adapt them to the needs of digital transformation.

Secondly, the role of the company's strategic direction and management capabilities in digital transformation cannot be ignored. Companies need to formulate clear digital transformation strategies and integrate them with the overall strategy. Porter (2001) believes that digital transformation should be consistent with the company's core competitiveness. It should not simply pursue technological upgrading but should be adjusted around the company's long-term goals and market positioning. On this basis, companies need to have effective management capabilities, including project management, resource coordination, and risk control, to ensure the smooth implementation of the transformation process.

Furthermore, corporate leadership also plays a vital role in digital transformation. According to the transformational leadership theory proposed by Bass (1990), corporate leaders should be visionary, able to inspire employees' innovation potential and motivation for change and provide strategic guidance and management support for digital transformation. Effective leadership can promote the transformation of corporate culture and promote collaboration within and outside the organization, thereby improving the overall effectiveness of digital transformation (Hossain et al., 2021).

5.3. Influencing Factors at The Individual Level

In the process of digital transformation, individual factors cannot be ignored, especially psychological factors such as employee acceptance, skills, and resistance to change. The ultimate realization of digital transformation often depends on the active participation of employees and technology acceptance. According to the Technology Acceptance Model (TAM, Davis, 1989), individual acceptance of new technologies is mainly affected by perceived usefulness and perceived ease of use. If employees believe that digital technology can improve work efficiency and is easy to use, they are more likely to actively support digital transformation.

However, when companies are undergoing digital transformation, employees may face uncertainty and anxiety, especially when traditional working methods and skill systems are challenged. Therefore, employees' resistance to change may become an obstacle in the transformation process (Kotter, 1996). In order to overcome this psychological barrier, companies need to strengthen training and skills improvement to help employees adapt to new technologies and working methods, while creating a supportive organizational culture to reduce employees' resistance to transformation.

In addition, employees' digital literacy is also one of the key factors affecting the success of digital transformation. With the rapid development of technology, corporate employees must have certain digital skills to better utilize new technologies to achieve work goals. Therefore, companies need to regularly provide employees with digital technology training and learning opportunities to improve their technical capabilities and work efficiency (Agarwal et al., 2020).

5.4. In conclusion

In summary, the factors affecting enterprise digital transformation are multifaceted, covering multiple factors at the external environment, enterprise-level, and individual level. From the perspective of the external environment, policy support, technological innovation, competitive pressure, and market demand are important factors driving transformation; from the enterprise level, resources, technological foundation, strategic direction, and management capabilities are the key to successful transformation; and from the individual level, employee acceptance, skills, and change psychology play an important role in transformation. Future research can further explore the interaction between these factors and how to overcome the challenges in the transformation process in actual operations, so as to promote the smooth implementation of enterprise digital transformation.

6. Risks and Challenges Brought About by Enterprise Digital Transformation

First, security threats and privacy violations. Second, excessive monitoring and work conflicts. Third, dehumanization and de-skilling.

While the digital transformation of enterprises brings efficiency improvement, innovation opportunities, and competitive advantages, it is also accompanied by many risks and challenges. Digital transformation involves multiple aspects such as data flow, technology application, process change, etc. Therefore, it is not only a transformation at the technical level but also involves profound changes in society, organizations, and individuals. In this process, enterprises face many potential risks, mainly including security threats and privacy violations, excessive monitoring and work conflicts, and dehumanization and de-skilling. The following will conduct an academic analysis of these three aspects and review them in combination with relevant domestic and foreign literature.

6.1. Security Threats and Privacy Invasion

With the advancement of digital transformation, enterprises are increasingly relying on technologies such as cloud computing, big data, and the Internet of Things for business operations, and the collection and storage of massive amounts of data have become more common. However, data leakage, cyber attacks, and privacy violations have become the main security threats facing enterprises. According to the requirements of the EU GDPR (General Data Protection Regulation), enterprises must ensure legality, fairness, and transparency when collecting and processing personal data. However, in actual operations, many enterprises may fail to fully protect users' personal privacy due to imperfect technical means or regulatory loopholes when undergoing digital transformation, resulting in data leakage and privacy violations.

Research shows that data leakage not only affects the reputation of enterprises but may also bring huge legal liabilities and economic losses. For example, Thompson et al. (2019) pointed out that the occurrence of data leakage may lead to a decline in customer trust and customer loss, which will have a negative impact on the long-term profitability of enterprises. In addition, the frequency and complexity of cyber attacks are also increasing, especially new types of

cyber attacks such as ransomware, malware, and DDoS (distributed denial of service) attacks, which pose a severe challenge to enterprises (Anderson et al., 2020). Therefore, when enterprises are undergoing digital transformation, they must strengthen network security protection and data encryption, and establish effective privacy protection mechanisms to prevent security threats and privacy violations.

Domestic research also shows that enterprises are facing more and more data security issues during the digital transformation process. Li Haibo and Wang Yan (2021) pointed out that with the widespread application of digital technology in enterprises, data has become the core asset of enterprises, but its security and privacy protection issues are often overlooked. Therefore, many domestic scholars call on enterprises to strengthen information security management during the transformation process and cooperate with the government and third-party security agencies to ensure the security and legality of data during the digital transformation process.

6.2. Excessive Monitoring and Work Conflict

Digital transformation has brought new ways of working and tools, such as remote work, online collaboration platforms, and automated workflows. While these technologies improve efficiency, they may also lead to excessive monitoring of employees by companies. In the traditional work model, employees' work behavior is usually monitored through regular performance evaluations and face-to-face management. In the process of digital transformation, companies use various technical means (such as employee tracking software, email monitoring, production efficiency monitoring, etc.) to monitor employees' work status in real-time. Although this monitoring method improves productivity, it also brings psychological pressure to employees and infringes on privacy.

Research shows that excessive monitoring can lead to anxiety, burnout, and decreased job satisfaction among employees (Ball, 2010). For example, Schwartz et al. (2019) found through case studies of multiple companies in the United States and Europe that excessive monitoring can increase employee stress and have a negative impact on their work efficiency. Employees may feel that their privacy is being invaded due to constant monitoring, leading to work conflicts and low morale. In addition, over-reliance on digital monitoring tools may cause managers to make biased judgments about employees' actual performance, ignoring employees' creativity and subjective initiative.

In China, Li Ling and Chen Wei (2020) studied the impact of corporate monitoring on employees during the digital transformation process, pointing out that excessive monitoring not only affects employee work enthusiasm but may also cause labor disputes. China's labor law emphasizes the protection of employees' personal privacy, but companies often ignore this in their pursuit of efficient management. Therefore, how to balance monitoring and employee work freedom has become an urgent problem to be solved in the process of digital transformation of enterprises.

6.3. Dehumanization and De-skilling

Although digital transformation has brought about productivity improvements, it has also put some jobs at risk of being replaced by automation and artificial intelligence, especially in the manufacturing and traditional service industries. The development of emerging technologies such

as automation, artificial intelligence, and robots has led to the replacement of many low-skilled, repetitive jobs by machines, which in turn has led to the problem of de-skilling in the labor market. This not only poses a threat to traditional workers but also makes companies face problems of talent shortage and skill mismatch when implementing digital transformation.

Goos et al. (2014) pointed out in their research that technological progress has accelerated the disappearance of low-skilled jobs and led to the phenomenon of dehumanization. Especially in the service industry, digital technology has gradually replaced some jobs with strong interpersonal interaction with automated systems, and employees' work content has become mechanized, lacking interpersonal interaction and emotional communication, which may have a negative impact on employees' job satisfaction and organizational identity (Brynjolfsson & McAfee, 2014). For example, the popularity of self-service ordering machines and unmanned supermarkets in the catering and retail industries has gradually replaced traditional manual services, and the roles of employees have gradually been "dehumanized", which may lead to a decline in employees' professional identity.

At the same time, during the digital transformation process, companies tend to pay more attention to the training and introduction of technical talents, while insufficient investment in the skill improvement and transformation training of traditional labor has led to the intensification of de-skilling. Domestic research also pointed out that during the digital transformation process, some companies failed to effectively respond to the increase in employee skill requirements due to technological substitution, and many traditional workers faced the dilemma of outdated skills (Liu Guodong et al., 2020). This skill mismatch not only exacerbates inequality in the labor market but also affects the social responsibility and long-term development of enterprises.

6.4. In conclusion

In summary, although the digital transformation of enterprises has brought many opportunities, it is also accompanied by a series of risks and challenges. In terms of security threats and privacy violations, enterprises need to strengthen data protection and network security protection; in terms of excessive monitoring and work conflicts, enterprises need to balance the relationship between efficiency and employee privacy to avoid the negative impact of excessive monitoring; in terms of dehumanization and de-skilling, enterprises should focus on the career development and skill improvement of employees to avoid employee dissatisfaction and social inequality caused by automation. By paying attention to these risks during the transformation process, enterprises can enjoy the advantages brought by digital transformation while reducing its potential negative impact, thereby achieving more sustainable and healthy digital development.

7. Conclusion and Discussion

The digital technology revolution has promoted the rapid development of the digital economy and is profoundly changing the organizational mode and value creation model of enterprises, becoming a new engine of modern economic growth. With the continuous advancement of information technology, especially the popularization of technologies such as cloud computing, big data, artificial intelligence, and

the Internet of Things, the digital transformation of enterprises has not only become an important means to enhance competitiveness but also a necessary choice for enterprises to survive and develop in the digital economy era. Digital transformation helps to enhance the overall value of enterprises (Chen Xiaozhen and Chen Lilin, 2023), promote the sustainable development of enterprises (Yuan Chun et al., 2021), and promote the improvement of enterprises' innovation capabilities (Wu Fei et al., 2021), which has far-reaching significance for promoting the high-quality development of China's economy (Sun Chengji et al., 2023). Whether in the industry or academia, the digital transformation of enterprises has become a research topic that has attracted much attention, and it is challenging and cutting-edge.

In the industry, enterprises are facing major challenges such as how to adapt to the trend of digital transformation, improve production efficiency, and enhance innovation capabilities. As digital technology is increasingly integrated into various industries, the operating models and production methods of traditional enterprises are also undergoing drastic changes. In the process of digital transformation, many enterprises need to deal with not only complex technical issues but also major changes in organizational structure, management model, and employee skills. Therefore, the industry urgently needs the support of relevant theories and practical guidance to achieve a smooth transition and sustainable development of transformation. In academia, researchers are committed to deeply analyzing the internal mechanisms, implementation strategies, and impacts of digital transformation, and providing strong support and guidance for the transformation of enterprises from a theoretical perspective. Academic research not only focuses on the specific impact of digital transformation on enterprise operations but also attempts to reveal the driving force, implementation barriers, and successful paths of digital transformation.

To this end, this article systematically sorts out and classifies the existing relevant research from five dimensions: the definition of enterprise digital transformation, transformation types, transformation paths, influencing factors, risks, and challenges. By integrating the existing research results, this article not only provides readers with a panoramic understanding of enterprise digital transformation but also deeply explores its deep connotation and extension. The purpose of this study is to deepen the understanding of enterprise digital transformation in the industry and academia, promote the application and practice of digital transformation theory, and promote the effective connection between academic research and actual enterprise operations.

First, this paper further clarifies and deepens the concept of enterprise digital transformation. Digital transformation refers to the process of reconstructing and upgrading traditional enterprise businesses, processes, and business models using modern digital technologies. Enterprise digital transformation is the specific implementation of this process at the enterprise level and is the practical application of enterprises using digital technologies to carry out business transformation and organizational innovation. Through this definition, this paper effectively distinguishes between the two concepts of "digital transformation" and "enterprise digital transformation", avoiding the possible confusion of concepts in existing research. At the same time, this paper comprehensively summarizes the core concepts of enterprise

digital transformation and elaborates on them in detail from different dimensions, providing a systematic understanding and theoretical basis for future related research.

Secondly, this article deeply explores the different paths of enterprise digital transformation, especially the specific contents of the data empowerment path, platformization path, service-oriented path, and peer effect path. Through the detailed analysis of these transformation paths, this article helps readers understand the specific process and practice of enterprise digital transformation. The data empowerment path emphasizes the key role of data in enterprise transformation, the platformization path focuses on enterprises achieving digital transformation by building platforms and optimizing resource allocation, the service-oriented path points out the process of enterprises improving service value through digital technology, and the peer effect path explores the collective effect of promoting digital transformation through interactive cooperation among enterprises. By analyzing these different paths, this article further enriches the research on the internal mechanism of digital transformation and provides a valuable perspective for understanding the complex factors in the transformation process.

In terms of the analysis of influencing factors, this paper systematically explores the various factors that affect the digital transformation of enterprises, covering multiple influences at the external environment, internal enterprise resources, and individual levels. The factors at the external environment level mainly include external conditions such as policies and regulations, market competition, and technological progress. These factors play a vital role in promoting or restricting the digital transformation of enterprises; the factors at the enterprise level include the digital capabilities, innovation capabilities, management models, and culture of enterprises, which determine whether enterprises can effectively implement digital transformation; the factors at the individual level mainly involve employees' digital literacy, acceptance, and adaptability, which directly affect the effect and efficiency of enterprise transformation. Through the analysis of these factors, this paper provides a theoretical framework and empirical basis for future related research, helping enterprises to better grasp the key driving factors in transformation.

In addition, this article also conducts a detailed analysis of the risks and challenges that enterprises may face in digital transformation, focusing on security threats and privacy violations, excessive monitoring and work conflicts, dehumanization and de-skilling, etc. In response to these challenges, this article proposes some practical solutions, such as establishing internal and external collaboration mechanisms, clarifying the purpose and scope of monitoring, and formulating a reasonable inspection mechanism. These measures will help reduce potential risks in the transformation process and ensure the smooth implementation of enterprise digital transformation.

From a practical perspective, this article provides valuable experience and theoretical support for enterprises to implement digital transformation strategies, optimize management practices, and improve transformation effects. Through in-depth analysis of different transformation paths, enterprises can choose appropriate transformation plans based on their actual conditions to achieve a smooth transition; by understanding the influencing factors at different levels, enterprises can better optimize transformation management and increase the probability of successful transformation; at

the same time, this article's discussion of the adverse effects that may occur during the digital transformation process will help enterprises to do risk management in advance and reduce uncertainties and challenges during the transformation process.

Finally, this paper looks forward to the future research direction in the field of digital transformation. Future research can focus on the relationship between enterprise digital transformation and technological innovation, explore how to promote enterprise innovation and development through digital technology; it can also study the differences and personalized needs of different types of enterprises (such as large enterprises and small and medium-sized enterprises) in the process of digital transformation; in addition, the research can also explore the long-term impact of digital transformation on enterprise management model, organizational structure and employee behavior, as well as how to deal with the uncertainty and market changes brought about by the rapid development of technology.

In summary, enterprise digital transformation is not only an important measure for enterprises to adapt to the digital economy era but also a necessary path to promote enterprise innovation and sustainable development. This paper, through an in-depth analysis of enterprise digital transformation, puts forward valuable theoretical contributions and practical guidance and provides theoretical support and practical reference for academia and industry in promoting digital transformation.

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