

Research on the Impact of AI Technology Application on Enterprise Digital Innovation

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Abstract. With the deep development of the digital economy, AI technology has become a key factor driving enterprises' digital innovation. This article takes the relationship between AI technology application and enterprise digital innovation as the research object. Based on the dynamic capability theory, through qualitative analysis methods, it systematically analyzes the mechanism of AI technology enabling enterprise digital innovation, and proposes practical paths for enterprises to enhance digital innovation capabilities through AI technology application. The research finds that AI technology application can empower digital innovation through multiple paths, such as data processing and knowledge integration, optimization of innovation processes, and cross-departmental organizational collaboration, and the effects show significant heterogeneity. The driving effect presents a dynamic process of "technology empowerment - organizational restructuring - innovation output". This study not only enriches the research results on the relationship between AI technology and enterprise digital innovation, but also provides practical references for enterprises to formulate AI application strategies and promote digital innovation.

Keywords: Application of AI technology, Enterprise digital innovation, Core competitiveness, High-quality development

1. Introduction

In recent years, artificial intelligence technology has achieved rapid breakthroughs. Core technologies such as large models, machine learning, and natural language processing have been continuously upgraded, driving artificial intelligence from an auxiliary tool for enterprise development to a core engine for industrial empowerment. In August 2025, the State Council of China officially issued the "Opinions on Deeply Implementing the 'Artificial Intelligence+' Initiative", clearly proposing to accelerate the implementation of key actions in six major fields of "artificial intelligence+", and achieving an application penetration rate of over 70% for intelligent terminals and intelligent agents in key fields by 2027, providing a clear direction for the deep integration of AI and industries. At the same time, industrial policies, through policy incentives, industry regulations, and market cultivation, further accelerate the upgrading of artificial intelligence [1]. Today, the artificial intelligence industry has formed a complete industrial chain of "algorithm + computing power + data" coordinated upgrading, providing a solid industrial foundation for enterprise digital innovation. With the development of the digital economy, the innovation activities

of enterprises have moved away from the old R&D model and established a new model of digital innovation that is "data-driven + algorithm empowerment + scenario traction". As a fundamental support for digital transformation, artificial intelligence technology has gradually begun to be applied in various ways to alter the process and structure of innovation within enterprises and drive the realization of innovation. Li Yuhua et al. [2] pointed out that artificial intelligence can optimize the allocation of resources and free up human resources so that employees can focus on creative work and achieve innovation from "process optimization" to "value creation". In addition, artificial intelligence technology can alleviate the resource constraints of enterprises in the process of digital innovation, improve the efficiency of resource allocation, and strengthen the ability of enterprises to scan the external environment, integrate knowledge, perform cross-border search and learning, process data, etc., thus promoting the development of enterprises and digital innovation clusters [3].

This study will investigate how to apply artificial intelligence technology to advance the digital transformation of enterprises, what kinds of effects it can bring about, and how enterprises can make better use of AI to boost their digital innovation capabilities and performance. In theory, this study will focus on the application scenarios of artificial intelligence technology, add new results to the research on the relationship between the application of AI technology and enterprise digital innovation, expand the analytical scope of digital innovation studies, explore how AI affects digital innovation, strengthen the theoretical explanation system for the effect of AI on enterprise innovation through the integration of technology, policy and enterprise practice in the analysis, and provide references for subsequent related research. Therefore, enterprises can use this study to drive the application of artificial intelligence and strengthen their own digital transformation. At the same time, this study will also study how artificial intelligence is promoting digital transformation and help enterprises find problems in the application of AI.

2. Review of current research status at home and abroad and theoretical foundation

The application of AI technology has become an important topic in the field of enterprise strategic management. Regarding the definition of AI technology application, the academic community has not yet reached a unified standard. However, from a technical perspective, AI is regarded as a collection of technologies capable of performing human-like cognitive tasks, including learning, reasoning, decision-making, and goal-oriented actions, covering various technical forms such as machine learning and computer vision [4]. In recent years, with the rise of generative AI and agent-based AI, AI has mainly had the following three types: traditional AI is good at providing automated solutions for specific tasks, generative AI can create new content, and agent-based AI has the ability to make independent decisions and pursue goal-oriented actions. In enterprise management, the application scenarios of AI technology have become increasingly diverse. By using AI technology for data analysis and predictive modeling, Midea has formed data-driven product innovation [5]. At the economic effect level, Zheng Yanming et al. [6] found that AI has a positive impact by promoting economic growth, optimizing the industrial structure, stimulating innovation vitality, etc. At the organizational effect level, the application of AI technology can break through the knowledge flow barriers in traditional R&D organizations and promote the integration and sharing of internal knowledge and cross-departmental collaboration [7].

Digital innovation is an innovative behavior that enterprises use digital technologies and data elements to deeply empower, promoting business model transformation, business process optimization, intelligent product iteration and update, and the development of new digital services in the digital economy era [8]. It goes beyond the boundaries of traditional innovation theories and is a unique manifestation in the digital economy era. Its forms of expression can be divided into product

and service innovation, business model innovation, technology application innovation, and organizational form innovation. Different from traditional innovation, the core characteristics of digital innovation can be summarized as three aspects: first, reconfigurability. Digital technologies adopt decoupling to configure functions and components, enabling innovation elements to be flexibly split and reorganized [9]. Second, openness, that is, the degree to which digital technologies allow other entities to participate and share [10]. Third, iterative nature. Digital products and services can be rapidly iterated based on data feedback, improving the efficiency and speed of collaborative innovation [9]. There are many influencing factors of digital innovation. From external driving factors, Li Zuo et al. [11] found that foreign direct investment significantly promotes enterprise digital innovation, while government research subsidies have an inverted "N"-shaped impact on it [12]. From internal driving factors, the background of senior executives in IT [13] is an important force driving digital innovation. In short, the driving forces of digital innovation in the present day are often considered to be external environmental factors and internal capabilities. AI technology is a very new and disruptive form of digital technology at present, so how to use it in digital innovation is still being explored.

Teece and others were the first to put forward the theory of dynamic capabilities in 1997 [14]. It explains how the company will adjust its resources to adapt to the changes in the environment and maintain an advantage. At the center of this theory is the requirement for enterprises to have the ability to grasp market changes, mobilize all available resources inside and outside the company, and change their operating mode. At the time of digitalization, artificial intelligence technology has started to promote the strengthening of enterprises' dynamic capabilities. Through big data analysis and algorithm prediction, artificial intelligence can keep enterprises updated on new technological trends and changes in the market, make full use of all types of resources from within and outside the company in response to these changes, and employ expert systems technology to enhance the ability to acquire and organize knowledge, thus promoting digital innovation. The theoretical system of artificial intelligence technology application has been realized to some extent and can help enterprises achieve digital innovation in the face of uncertainty. To address the problem of limited resources for traditional innovation, it is necessary to strengthen the dynamic capabilities of enterprises and construct a data-driven innovation system; thus, the following parts will examine how artificial intelligence technology impacts digital transformation.

3. Analysis of the impact mechanism of AI technology application on enterprise digital innovation

3.1. The application of AI technology enhances the ability of enterprises to process data and extract knowledge

3.1.1. Enhance the ability of information recognition and analysis

Artificial intelligence can be used to analyze the data of many enterprises more efficiently, extract relevant information, organize it in some ways, and rank the importance level, thereby enhancing their awareness of market changes, changes in user needs, and new technologies. According to a survey by the China Academy of Information and Communications Technology, after using artificial intelligence technology for demand management at a certain company, the accuracy of the demands has risen by 20%, and the number of reworks caused by unclear demands has dropped by 30%, thereby improving the company's ability to sense users' needs.

3.1.2. Promote knowledge generation and knowledge reorganization

By processing all the diverse data from various departments of a company, artificial intelligence can automatically learn about the innovation process through knowledge and experience, organize this information reasonably, construct intelligent associations, promote the sharing and use of internal knowledge across the entire company, and lay the foundation for digital innovation. According to the China Academy of Information and Communications Technology, a certain enterprise that has applied artificial intelligence to knowledge management has achieved an increase of 60% in the efficiency of knowledge retrieval and a rise of 50% in knowledge reuse; thus, it has broken the knowledge bottleneck in innovation.

3.2. Optimize the innovation process of enterprises through the application of AI technology

3.2.1. Intelligentization of the research and development process

Artificial Intelligence technology can also be applied to research and development, design, testing, optimization, etc. To reduce the time of innovation and improve the efficiency of innovation, automatic test generation and intelligent review functions will be added. According to data, the application of artificial intelligence technology has raised the coverage rate of software development and test cases from 70 per cent to more than 85 per cent; at the same time, it has greatly reduced the time for defect repair and increased the intelligence level of the research and development process.

3.2.2. Precision in the decision-making process

Based on the algorithm's analysis and prediction abilities, artificial intelligence can help enterprises make decisions about product development, market entry, allocation of resources, etc., and thus improve the scientificity of innovation decisions. According to the results of the application of artificial intelligence technology in data analysis and risk control, a certain enterprise has increased the accuracy of project decisions by 20% and reduced the risk of innovation decisions.

3.2.3. Innovation, iteration and agility

With the help of artificial intelligence technology, enterprises can adjust their products and services in response to changes in reality in a timely manner, respond to the shifts in the market and demands from consumers promptly, and continually improve through digital innovation. According to the research data of the China Academy of Information and Communications Technology, a certain enterprise introduced an AI-driven agile iteration solution and has thus been able to shorten the digital innovation iteration cycle, raise the on-time product delivery rate from 70% to 80%, and speed up the speed of innovation response.

3.3. The application of AI technology is reshaping the organizational and collaborative models of enterprises.

3.3.1. Promote cross-departmental collaborative innovation

AI technology can help to overcome the data and processing bottlenecks among different departments of R&D, production, and marketing, automate task handoff and information synchronization, etc. It promotes digital collaboration and innovation linkage among the members of

the company. According to the above data, after applying artificial intelligence to promote cross-departmental cooperation in a large company, it has been found that both the speed of communication among team members and information-sharing efficiency have increased by 20%-30%, thereby strengthening organizational transparency and innovation.

3.3.2. Promote the construction of an open innovation network

To strengthen the link of information and resources among suppliers, customers, platform enterprises, research institutions, etc., enterprises can employ artificial intelligence technology to construct an open digital innovation network. According to the report released by China Software Testing Center, deep integration of artificial intelligence with the real economy has promoted collaborative innovation among industries, research and development, the supply chain, etc. Currently, one of the ways for a company to enhance its openness to digital innovation is through data interconnection and sharing.

3.4. The application of AI technology enhances the innovation performance and competitive advantage of enterprises

3.4.1. Promote innovation in digital products and services

AI technology can deeply empower enterprises in terms of research and development design as well as service upgrades, promoting the formation of intelligent products, personalized services and platform-based solutions, and expanding the manifestation forms of enterprises' innovation achievements. According to the report, AI has given rise to a large number of digital innovation products and services in fields such as manufacturing, healthcare and commerce, and has become the core driving force for enterprise innovation.

3.4.2. Enhance market responsiveness and competitive advantage

Through AI-assisted rapid perception and dynamic adjustment, enterprises can respond more efficiently to market changes, shorten the innovation cycle, optimize product supply, and thereby enhance the commercial transformation efficiency of digital innovation. Data shows that a certain enterprise that adopted AI for agile iteration saw a 10% increase in project delivery on-time rate, a significant acceleration in market demand response speed, and effectively strengthened its competitive edge in the market.

3.5. The heterogeneous impact of AI technology application on enterprise digital innovation

3.5.1. Enterprise size differences

There are significant differences in the impact of AI technology application on enterprises' digital innovation in terms of scale. Large enterprises, with their abundant data resources, computing power reserves, talent teams, and financial strength, have a more prominent effect of applying AI for innovation empowerment; while small and medium-sized enterprises, constrained by resource limitations, have a relatively limited degree of AI enabling digital innovation. The McKinsey survey on the current status of AI application in 2025 shows that the proportion of large enterprises with revenues over 5 billion US dollars that have achieved large-scale deployment of AI (49%) is much

higher than that of small and medium-sized enterprises with revenues less than 100 million US dollars (29%), and the difference in innovation empowerment effect is significant.

3.5.2. Industry differences

The unique business characteristics and innovation challenges of different industries determine the differences in the application scenarios and effects of AI technology. Research shows that the IT/Internet industry focuses on agile iteration and cross-team collaboration; the manufacturing industry concentrates on resource optimization and production coordination; the retail and consumer goods industry relies more on rapid response to demand; and the medical and health industry highlights knowledge management. Therefore, the industry attributes directly lead to the differences in the paths of AI enabling digital innovation.

3.5.3. Organizational foundation differences

The differences in enterprise digital infrastructure, organizational learning capabilities and managers' cognitive levels will lead to varying impacts of AI on digital innovation. According to the McKinsey survey on the current status of AI applications, 55% of high-performing AI enterprises use AI to restructure workflows, which is 2.8 times that of ordinary enterprises. Enterprises with strong top-level support, well-developed digital infrastructure and strong organizational collaboration capabilities can more efficiently unleash the digital innovation value of AI.

4. How can enterprises enhance their digital innovation capabilities through the application of AI technology?

4.1. Integrate AI applications into the overall design of the enterprise's digital innovation strategy

First, clarify the synergy relationship between AI technology and the enterprise's innovation strategy and digitalization strategy. The top management of the enterprise should take the lead in coordinating the layout of AI applications. Second, systematically review the existing digital foundation, resource endowment, and industry characteristics of the enterprise, formulate a medium- and long-term AI application plan, and clearly define the AI application scenarios, stage goals, and implementation paths in each link, such as research and development, production, marketing, and management. Third, incorporate digital innovation indicators such as the innovation cycle and innovation efficiency into the enterprise's annual KPI assessment, and incorporate digital innovation goals into the core strategic system of the enterprise. A certain group has established an integrated design of "strategic decoding - demand governance - intelligent research and development". Through AIGC, the strategic plan is automatically transformed into executable technical requirement trees, and the strategic KPI and research and development tasks are associated and mapped. After implementation, the on-time delivery rate of enterprise projects increased by 41%, the cost of demand changes decreased by 47%, and digital innovation and enterprise development achieved a high degree of synergy.

4.2. Strengthen the data foundation and technical infrastructure

First, build a whole data governance system to set data standards, data formats and norms for data quality management; through multi-source processing, clean up and organize data from all sources,

break down internal data silos, improve the level of data quality, data sharing and data security. Second, in order to lay a solid foundation for artificial intelligence technology, we need to build a digital infrastructure for cloud computing, computing power platforms, algorithm platforms, and so on that can support the application of AI in digital innovation. With the strengthening of data and technology infrastructure, chemical enterprises have been able to realize the closing of the loop for "perception - decision - execution". The accuracy of the key indicator prediction is 99.79% and the annual economic benefits will exceed 20 million yuan. The foundation for the support of digital innovation has been strengthened to a certain extent.

4.3. Establish an AI-driven organizational collaboration mechanism

Build a cooperative system of all departments in the company, such as R&D, production and sales, etc., and use data analysis and algorithms to reduce internal friction. First, an intelligent workflow system based on artificial intelligence should be built to unify the working process of all departments, automate task assignment, monitor progress in real time, and transmit information among various departments. Second, an enterprise knowledge-sharing and collaborative innovation platform needs to be constructed, and artificial intelligence can be utilized to automatically collect, query and use knowledge, reduce cross-departmental communication costs, etc. Third, a dynamic resource allocation mechanism that uses AI algorithms to optimize the allocation of human resources, materials and funds can give more weight to high-value innovation projects to a certain extent and improve the efficiency of innovation resource allocation. A certain enterprise has built a cross-departmental data collaboration and intelligent workflow mechanism to link the entire process of demand, R&D, testing and delivery; it has improved the efficiency of cross-departmental communication, and with the improvement of organizational collaboration efficiency, significant gains have been made in digital innovation efficiency.

4.4. Cultivate a team of multi-skilled digital innovation talents

First, formulate the "technology + business + innovation" compound talent training plan: carry out business knowledge training for technical personnel, AI technology and data analysis training for business personnel. Second, strengthen the recruitment of AI-related talents, focusing on the recruitment of data engineers, algorithm engineers, AI product managers, and other core talents. Data show that in the past year, large enterprises have carried out a higher proportion of AI-related recruitment, and AI innovation output and value transformation ability are much higher than those of ordinary enterprises. Third, employees are encouraged to learn AI skills, and digital innovation ability is included in the talent evaluation system.

4.5. Improve risk governance and ethical norms

First, build an end-to-end risk control system for the application of artificial intelligence technology, develop specific prevention and control measures for algorithm bias, data privacy, technological dependency, compliance risk, etc., to promote the continuous development of digital innovation; Second, establish an AI model review and verification process, manually verify the results of AI decisions to reduce algorithm errors and deviations in decision-making; Third, set up a risk warning and emergency response mechanism to monitor risks in the application of artificial intelligence in real time and promptly adjust strategies to ensure the progress of compliance.

4.6. Strengthen external cooperation and integrate into the innovation ecosystem

First, enhance the cooperation among industry, academia and research institutions, conduct joint research and development on AI technology and digital innovation, etc. Second, work with technology companies and platform organizations to use external AI technology, computing power, scenario resources, etc., to reduce the cost of independent research and development. A certain enterprise has cooperated with technology companies to conduct joint research and development under the model of industry collaboration with academia and research, integrating chip technology, large models for the edge, and industrial scenario resources; together, they have developed embodied intelligent robots and achieved application of digital innovation in a short period. Third, join the industrial innovation ecosystem and cooperate with suppliers, customers, industry associations, etc., to form an open innovation network.

5. Research conclusions and countermeasure suggestions

5.1. Core research conclusion

Artificial intelligence technology can be used to help drive the digitalization of enterprises in various ways, for example, in data analysis and knowledge integration, process optimization, organisation collaboration, etc. Big data analysis and natural language processing technology are now available; thus, Artificial Intelligence can better know the situation of the market, what people want, and how technology is changing in this area. At the same time, it can automatically collect and organise various pieces of knowledge from all over the company to break down the internal knowledge barrier of the enterprise efficiently and lay a solid foundation of data and knowledge for digital innovation.

The position of artificial intelligence in the digital transformation of enterprises is not simple; instead, at different stages of development, all sorts of changes have occurred in areas such as "technology support", "organisational adjustment" and "innovation results". Big data and algorithm models can be used by artificial intelligence to enhance the ability to process data and extract knowledge for digital innovation in enterprises, providing a foundation for this process. At the same time, AI will be applied at all stages of research and development, decision-making, innovation iteration, etc., to optimise the innovation process and restructure the organisation and collaboration model within the company. Finally, through the joint effects of technological empowerment and organisational restructuring, digital innovation results will be realised to boost the company's innovation performance and market competitiveness.

The extent of a company's digitalisation under artificial intelligence is not the same in all places. The effects of various industries and scales differ based on their own conditions. The effect of AI empowerment on large enterprises is relatively strong; only enterprises with a good digital foundation will be able to enjoy the benefits of AI innovation.

5.2. Research limitations and future prospects

5.2.1. Research limitations

This study mainly relies on case studies and theoretical reasoning to analyze the relationship between AI applications and digital innovation. It did not conduct empirical regression tests using panel data from listed companies. The relevant influence paths and heterogeneity characteristics lack

quantitative results to support. Although industry authoritative report data was cited for verification, there is still a certain degree of subjectivity. The measurement of AI application levels in different enterprises is also relatively complex. This study mainly cited cases from large enterprises such as listed companies, and paid insufficient attention to the empowerment of AI in digital innovation for small and micro enterprises.

5.2.2. Future prospects

Based on the above empirical data, we will further study the effects of artificial intelligence technology on digital innovation. Based on the data, we have reached a theoretical conclusion. At the same time, further divide the types of enterprises, explore the different paths for AI-driven digital innovation in different industries and enterprises of all sizes, and conduct more detailed research from the perspectives of industry, scenario and enterprise life cycle.

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