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THE ANALYSIS OF ENTERPRISE OPEN INNOVATION PLATFORM CONSTRUCTION AND MANAGEMENT MODE IN THE ERA OF DIGITAL ECONOMY

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Abstract: This study aims to explore the construction and management models of enterprise open innovation platforms in the era of the digital economy and analyze their impact on innovation efficiency and outcomes. Through a literature review and theoretical analysis, the study summarizes the design principles, technological architecture, and management models of open innovation platforms. The results show that the construction of enterprise open innovation platforms relies on clear strategic positioning and scalable technological architecture. Successful platforms require a clear definition of participants' roles and partnerships to ensure synergy among innovation agents. The study concludes that data-driven management models and a balance between openness and control are crucial for the effective operation of the platform. This paper provides theoretical support and practical guidance for enterprises to implement innovation strategies in the context of the digital economy.
Keywords: Open innovation; Digital economy; Platform construction; Management model; Data-driven; Innovation efficiency

1 INTRODUCTION

The rise of the digital economy, especially the rapid development of big data, cloud computing, artificial intelligence and other technologies, has changed the global business environment and Enterprise Innovation model. The traditional closed innovation model has been unable to meet the rapid changes in market demand and the speed of technological change, the open innovation model emerged[1]. The open innovation not only emphasizes the integration of internal resources but also maximizes innovation outcomes by building a platform to absorb external ideas, technology and resources[2]. With the rapid development of these technologies, the open innovation platform provides an effective tool for enterprises to integrate internal and external resources.

In the era of digital economy, enterprises face not only the rapid iteration of technology, but also the fierce competition from the global market. The open innovation provides a flexible and efficient innovation path that enables firms to leverage external resources for knowledge creation and technological innovation[3]. Open innovation platforms not only effectively connect companies, research institutions, suppliers and customers, but also foster synergy and efficiency in innovation through the sharing and analysis of real-time data[4]. This enables enterprises to identify market needs more quickly, mobilize external resources, and accelerate product development and innovation. These platforms extend the boundary of innovation by digital means and break the limitation of traditional enterprise organization structure to innovation.

To raise the open innovation performance of enterprises and achieve sustainable development, we propose three research questions: (1) how do enterprises build open innovation platforms in the context of the digital economy? (2) how does the management mode of open innovation platforms affect innovation efficiency and results? (3) how do enterprises achieve a balance between openness and control in platform management?

This thesis focuses on how enterprises construct and manage open innovation platforms in the era of digital economy. By analyzing the design principles, technology architecture and management models of open innovation platforms, this paper reveals how enterprises can enhance their innovation capabilities through platform collaboration and data-driven. At the same time, the paper will explore how to balance the relationship between resource opening and core competence protection in the process of open innovation.

This research has important theoretical and practical significance. On the one hand, the discussion of these issues will not only help deepen the application of open innovation theory in the context of the digital economy, but also provide theoretical support and practical guidance for enterprises to implement innovation strategies in practice. For companies, on the other hand, open innovation platforms not only facilitate access to external resources and technologies, but also reduce innovation costs, increase innovation speed and market responsiveness. At the same time, a rational management model ensures that companies retain control over core technologies and protect their competitive advantage while opening up partnerships[5].

2 LITERATURE REVIEW

2.1 The Origin and Evolution of Open Innovation

Chesbrough (2003)first proposed the concept of open innovation, which challenges the traditional closed innovation model and emphasizes that enterprises should not only rely on internal resources, but also actively integrate external

resources to promote the innovation process[1]. According to this theory, companies are no longer confined to in-house R & D, but are using open innovation platforms to maximize the value of innovation by combining the knowledge and capabilities of external partners[2]. The core of this innovation model is to break the traditional innovation boundary, so that enterprises can be more flexible and more efficient to respond to the fast-changing market demand.

The evolution of open innovation follows two main patterns: fission and fusion. Under the fission model, firms create new innovation units or businesses by separating their core business from their innovation resources in order to quickly capture new needs in the market[6]. By contrast, the fusion model emphasizes the cooperation between enterprises and external innovators to realize the integration of internal and external resources, and to promote the scale and systematization of innovation.

Over time, open innovation have evolved from original ideas to important strategies in practice, especially in the context of the digital economy, where they have become more versatile[7]. Through open innovation, companies can obtain new technologies, ideas and even market feedback through external channels, thereby reducing the cost of innovation and shortening the R & D cycle. In addition, there is a growing body of literature suggesting that open innovation can be applied not only to technology-oriented enterprises but also to a wide range of industries[3].

2.2 The Digital Technology's Impact on the Open Innovation Platform

With the rise of digital economy, digital technology has not only changed the production and management of enterprises, but also greatly affected the driving mechanism of innovation. The widespread use of technologies such as digital platforms, cloud computing, and artificial intelligence allows enterprises to share and utilize external knowledge resources more efficiently, greatly increasing the flexibility and openness of innovation[4]. Digital technologies not only enhance the ability of enterprises to respond to market changes, but also accelerate the cooperation between enterprises and external innovators[7]. For example, the rise of open innovation platforms has made cross-border innovation collaborations more common, enabling firms to interact and collaborate with global innovation resources in real time through digital platforms[8].In the healthcare sector, open innovation platforms have also been utilized to enhance educational and collaborative processes. For instance, Wu et al. explored the application of MOOC-based blended teaching models in medical internships, demonstrating how digital platforms can facilitate the integration of external educational resources and promote collaborative learning among students and instructors[9]. This example illustrates the versatility of open innovation platforms beyond traditional business applications, emphasizing their role in fostering knowledge sharing and innovation across various industries.

Digital technologies, particularly big data, artificial intelligence and cloud computing, have given a big boost to open innovation platforms. Nambisan et al points out that the digital economy enables enterprises to integrate global innovation resources through platform models, increasing the scale and collaboration of innovation activities[4]. In particular, digital platforms enable companies to collaborate across regions and industries, obtain real-time market information and customer feedback, and facilitate the efficient operation of open innovation platforms. Digital technology has also changed the nature of innovation collaboration. Not only can companies share resources and information through open platforms, but they can also leverage data analysis tools to optimize innovation processes and increase market responsiveness[10] . This makes the open innovation platform more flexible and adaptable in the digital economy, further enhancing the innovation ability and competitive advantage of enterprises.

2.3 Successful Cases of the Open Innovation Platform

Many companies have successfully applied open innovation platforms in practice. Tesla, for example, continues to improve its autonomous driving technology through its open automotive software system, which engages developers and partners from around the world. In addition, the open platform strategy of Alibaba is a typical example of a platform that can quickly respond to market changes and launch innovative products and services by integrating a large number of external partners[5]. These success stories show that companies can effectively integrate external resources and collaborate on innovation by building open innovation platforms. At the same time, the platform's openness and extensibility enable enterprises to keep the core competitiveness at the same time, rapid capture of innovation opportunities, improve market adaptability [11].

2.4 Open Innovation and Intellectual Property Management

Intellectual Property Management is a key challenge in open innovation platforms. The literature points out that enterprises face the problem of how to balance knowledge sharing and protection in the process of open innovation[3]. Intellectual property protection in open innovation platforms often takes the form of patents, copyrights, contracts and the like, but the application of these tools still requires a delicate balance between openness and control. Companies need to ensure openness in order to attract more outside innovators, but also to avoid the leakage of core technology. In addition, many literature also pointed out that enterprises in the global innovation platform also need to consider the different countries of intellectual property rights protection system. This is particularly important for multinationals, as differences in Intellectual Property Law laws across countries can pose potential risks to innovation collaboration across platforms[6].

3 THEORETICAL ANALYSIS

3.1 The Construction Mechanism of Open Innovation Platform

3.1.1 The framework and design principles of the platform

Building open innovation platform relies first and foremost on clear architectural design and technical support. The literature suggests that companies need to adopt modular design open innovation in order to flexibly adjust the platform's functionality and openness to meet the needs of different innovation projects[5]. The Modular design of the platform not only reduces build costs, but also provides greater flexibility for future technology upgrades and resource integration. In addition, at the technical level, digital technologies such as big data and cloud computing are an important foundation for supporting platform construction[4]. Through the Modular design of the platform architecture, companies can quickly adjust their innovation networks to respond flexibly to changes in the external environment. Unlike traditional closed innovation, the core of open innovation platform is to maintain a degree of openness to engage external partners and innovators for efficient integration and sharing of resources[7].

3.1.2 The roles and relationships of platform participants

In open innovation platforms, the roles and partnerships of different players are crucial. In theory, participants in a open innovation platform typically include the enterprise itself, suppliers, customers, research institutions, universities, and so on[2]. The platform promotes synergy and cooperation among participants through effective interaction mechanisms. The literature points out that when designing and managing open innovation platforms, platform managers need to allocate innovation roles in a rational manner according to the strengths and resource advantages of different participants to ensure the efficient operation of innovation networks [12].

The difficulty in managing these external relationships, however, is how companies balance openness with protection. Knowledge flows among participants are an important force driving innovation, but firms need to protect their core technologies and intellectual property at the same time to avoid misuse or leakage by external players[6]. Therefore, enterprises must establish a clear intellectual property management system to ensure that innovation can be reasonable use, while protecting the core competitiveness of enterprises.

3.1.3 The ecosystem of the platform

The open innovation platform is not only a technology platform, but also a dynamic innovation ecosystem. The literature points out that the success of the platform depends on the construction of an innovation ecosystem composed of multiple participants and the design of effective incentive mechanisms, rules and systems, ensuring the sustainability of innovation ecosystems[5]. Through this innovation ecosystem, enterprises can attract more innovation subjects to participate and promote the platform of continuous innovation.Moreover, integrating multidisciplinary approaches can significantly enhance the effectiveness of open innovation platforms. Pang et al. examined the reform of general medical education based on ideological education concepts, demonstrating how incorporating diverse knowledge systems and interdisciplinary collaboration can lead to more comprehensive and sustainable innovation outcomes[13]. This aligns with the notion that open innovation platforms benefit from the inclusion of varied perspectives and expertise, thereby fostering a more robust innovation ecosystem.An ecosystem-based open innovation platform emphasizes deep collaboration and collaborative innovation among different innovation actors. Participants play different roles in the platform and share innovative resources and results. Apple's App Store, for example, is a open innovation ecosystem in which developers innovate through the tools and rules provided by the platform, and Apple manages and coordinates those innovations, ensure the platform runs efficiently and the innovation ecosystem continues to grow healthily[2].

3.2 The Management Pattern of Open Innovation Platform

3.2.1 Data-driven management mode

In the era of digital economy, data has become the core tool for managing open innovation platforms. Through technologies such as big data and artificial intelligence, enterprises can monitor innovation activity on the platform in real time, analyze the behavior of external actors and market feedback, and thereby dynamically adjust the innovation process[4]. This data-driven Management model enables enterprises to better control the progress of open innovation, identify potential innovation opportunities or problems, and respond quickly. A data-driven management model not only helps to optimize the innovation process but also improves the accuracy and efficiency of innovation. By analyzing the huge amount of data generated on the platform, enterprises can accurately predict market demand and technology trends, reducing innovation uncertainty and risk[10]. In addition, a data-driven management model enhances the transparency of the platform and promotes trust and collaboration among innovation participants. In addition to technological integration, targeted interventions based on data analysis are crucial for optimizing innovation processes. Cui and Yang investigated the effects of nursing interventions on stress and emotional states in children with scoliosis, demonstrating how data-driven strategies can effectively improve patient outcomes[14]. Furthermore, the integration of diverse data sources is essential for comprehensive innovation management. Huang et al. studied the relationship between traditional Chinese medical diagnostic categories and clinical observations such as tongue and gastroscopic images, illustrating the importance of combining multiple data streams to achieve a holistic understanding. Similarly, open innovation platforms benefit from integrating various data types to enhance decision-making processes and support multifaceted innovation strategies[15].

3.2.2 A balance of openness and control

One of the biggest challenges in managing open innovation platforms is striking a balance between openness and control. The advantage of open innovation is the ability to diversify and collaborate widely on innovation activities through open resource sharing and knowledge flows[3]. But at the same time, companies need to ensure that core technologies and sensitive information will not be abused or leaked, which requires the platform has a certain control mechanism.

Theoretical analysis shows that enterprises can ensure the security of the platform through legal means (such as patents, IP protection agreements) and technical means (such as encryption technology, rights management)[6]. In addition, management should design clear rules and processes to ensure that the core resources and technological advantages of the enterprise are not compromised while opening up [16]. Successful examples of balancing openness and control include Tesla's open patent strategy, which allows outside firms to use their patented technology while ensuring that the long-term interests of the firm are not compromised through laws and contracts.

4 CONCLUSION

4.1 The Path to Build the Enterprise Open Innovation Platform

Based on the analysis of the construction and management models of open innovation platforms in the digital economy era, this study summarizes several key paths. First, the open innovation platform relies on a clear strategic positioning and a modular technology architecture. Enterprises must choose appropriate open innovation models according to their own market needs and technological development directions to ensure that the platform can integrate external resources and effectively collaborate with internal innovation systems[1]. Digital technologies provide powerful data processing and collaboration capabilities for platforms, and companies can leverage technologies such as big data and artificial intelligence to adjust innovation strategies in real time and accelerate the marketization of innovation outcomes [4].

Second, successful open innovation platforms need to clearly define the roles and partnerships of participants to ensure synergy among the innovators. By building an innovation ecosystem that includes external innovators such as suppliers, customers, and universities, firms promote collaborative innovation[2]. This process not only increases the speed of innovation, but also increases the flexibility of enterprises to respond to changes in the market.

4.2 Management Model Optimization Implications

The management model of the open innovation platform is the key to maximizing the value of innovation. The study found that the data-driven management model can significantly improve the platform's innovation efficiency, enterprises through real-time data monitoring and analysis, can quickly optimize the innovation process, and make timely adjustments based on external feedback[10]. In addition, the management model should pay attention to the balance between openness and control. Enterprises need to ensure that core technologies and competitiveness are protected while sharing external resources through intellectual property protection mechanisms and platform rights management[6].

In the practice of innovation, enterprises should establish a flexible and safe management framework, which not only ensures the innovation vitality of open platform, but also controls the risk of innovation activities through rules and processes. The success of the open innovation platform lies in the ability of enterprises to choose appropriate management methods at different levels of openness, maximize the synergy of innovation resources, and protect the long-term interests of enterprises.

4.3 Future Research Directions

This study provides theoretical support for the construction and management of enterprise open innovation platform in the era of digital economy, but there are still some issues worth further exploring in the future. First, open innovation platforms in different industries vary widely in practice, and future research could provide insights into best practices across industries. Secondly, in the context of globalization, cross-border co-operation between open innovation platforms is challenged by different legal and market environments, future studies should further explore how to regulate open innovation activities within the legal frameworks of different countries.

In addition, emerging technologies such as artificial intelligence are likely to have a profound impact on how open innovation platforms are managed as a result of rapid technological development. How these technologies further enhance the security, transparency and efficiency of the innovation platform is an important research direction in the future.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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