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Study of the Impact of Digital Finance Development on Dual Innovation in Firms

Sihao Chen*

School of Economics and Management, Guangxi Normal University, Guilin 541000, China

*Corresponding Author

Abstract

This paper systematically reviews the relevant literature on the impact of digital financial development on enterprise dual innovation. It clarifies the conceptual definitions of digital finance and enterprise dual innovation, and examines the role of digital finance from both macro and micro perspectives. Additionally, it investigates the factors influencing enterprise dual innovation within the internal and external environments of the enterprise. The paper provides a comprehensive analysis of the research concerning the impact of digital financial development on enterprise dual innovation. Finally, it summarizes the current state of research and outlines future research directions regarding the effects of digital financial development on enterprise dual innovation, which is essential for advancing both theoretical and empirical studies.

Keywords

Digital Finance; Dual Innovation; Utilized Innovation; Exploratory Innovation.

1. Introduction

In recent years, digital technology has become increasingly prevalent, transforming social resource allocation and enhancing enterprise management through innovation. This shift has expanded the scope of corporate innovation and fostered collaborative efforts. As a primary driver of high-quality economic development, innovation serves as the foundation for sustained growth and long-term competitive advantage for enterprises. Furthermore, it plays a crucial role in the transformation of China's economic development model and the execution of the innovation-driven strategy.

Organizational Dual Theory posits that the long-term success of an organization hinges on its ability to identify and explore new business opportunities collaboratively. This approach fosters the development of dynamic capabilities centered on dual innovation, which is essential for technological advancement and market expansion. As a critical driver of sustained growth, achieving an appropriate balance and effective complementarity between these two innovative forces is vital for maximizing the impact of innovation on economic development. Consequently, addressing the genuine challenges of enterprise innovation and enhancing the innovation capacity of organizations holds significant practical importance for increasing enterprise value and achieving high-quality economic development.

Digital finance integrates emerging information technologies such as big data, blockchain, the Internet of Things, and artificial intelligence, undoubtedly injecting significant momentum into economic development. Additionally, digital finance is characterized by universality and inclusiveness, establishing a strong connection with enterprise dual innovation. Therefore, can digital finance promote the development of enterprise dual innovation? How can it facilitate this process?

In order to answer the above questions, in recent years, academics have carried out extensive research on digital finance and enterprise dual innovation, covering a wide range of levels and

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fields. These rich research results help deepen people's understanding of digital finance itself and promote the development of digital finance on the one hand; on the other hand, they help explore the synergistic effect of digital finance and make it play a role in promoting the healthy operation of the economic chain of the whole enterprise, so as to promote the high-quality development of enterprise dual innovation. However, the existing literature studies are somewhat fragmented although they cover a wide range; the conclusions are generally consistent but there are some contradictions; and the research methodology is still relatively homogenous although there are some attempts to explore it. Therefore, it is necessary to systematically organize the relevant literature on digital finance in supporting dual innovation in enterprises in order to establish a basic framework and guidelines for future research.

2. Research on Digital Finance

2.1. Development and Conceptualization of Digital Finance

As early as the 1980s, John Reed, the CEO of Citibank, stated, "Banking is made up of bits and bytes." This assertion sparked academic discussions and research on digital finance, marking the inception of the concept. Currently, there is no uniform interpretation or definition of digital finance within academia, leading to ongoing debates. However, most existing research and analysis of digital finance are grounded in the concepts of "Internet finance" and "financial technology".Early concepts of Internet finance pointed out that Internet finance was not the same as indirect financing in commercial banks and direct financing in capital markets, and existed as a new type of financial model.Gomber 's (2017) [1] research shows that digital finance covers innovative financial products, financial services, finance-related software and new forms of customer communication. forms of customer communication; in addition to this, the concept of digital financial cube is also proposed, specifically the connotation of digital finance is analyzed from the three dimensions of financial services, related technologies and financial institutions. The concepts of digital finance, Internet finance and financial technology are highly interrelated, but the more neutral and broader concept is "digital finance" than "financial technology" which emphasizes the technical characteristics; digital finance enables traditional financial institutions and Internet companies to Digital finance enables traditional financial institutions and Internet companies to carry out financing, payment, investment and other new financial business models, which can be realized with the help of digital technology.

Although the concept of digital finance is still controversial, most scholars are supportive of the idea that "digital finance is a new financial model and financial industry".Ji Yu et al. (2022) [2] pointed out that digital finance is a new model that integrates traditional financial activities by utilizing the emerging technologies such as artificial intelligence, blockchain technology, Internet technology and so on. technology to integrate traditional financial activities into a new model, which is closely related to the concept of Internet finance and financial technology.

2.2. A study on the Role of Digital Finance

2.2.1. Macro-level Study on the Role of Digital Finance

Current academic research at the macro level focuses on the impact of digital finance on economic growth, consumer spending, and employment. In studies examining the relationship between digital finance and economic growth as well as consumer spending, some scholars have employed a general equilibrium theoretical framework and empirical analysis. Their findings indicate that the development of digital finance has facilitated more convenient payment methods and reduced shopping time, thereby promoting residents' consumption. Other scholars have subdivided residents' consumption into urban and rural residents and found through empirical research that the development of digital finance has significantly

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increased the consumption level of urban residents, but the impact on the consumption of rural residents is less significant.

In the impact study on employment, some scholars believe that digital inclusive finance can enhance the employment rate, thereby improving the viability of small and medium-sized enterprises (SMEs) facing financing challenges. Other studies have found that the development of digital finance influences the employment structure of the labor force. An increased level of digital financial development can offer residents more employment opportunities and higher expected income, which may facilitate the accelerated mobility of the labor force across different regions.

2.2.2. Micro-level Studies on the Role of Digital Finance

At the micro level, the existing literature can be categorized into two main research directions based on the focus of the study: the impact of digital finance on traditional financial institutions and the effect of digital finance on enterprises.

In studies examining the impact of digital finance on traditional financial institutions, it has been found that digital finance significantly influences the traditional financial sector while simultaneously fostering a beneficial competitive relationship with it. This dynamic has prompted the upgrading and transformation of financial institutions, ultimately enhancing the efficiency of financial services. Numerous studies indicate that the development of fintech has catalyzed the process of interest rate marketization, allowing residents to achieve more market-oriented returns, while also exerting a certain degree of influence on the traditional banking system. In 2021, a scholar noted the existence of a threshold effect of digital finance on the enhancement of financial service levels. Specifically, as digital finance matures, its positive impact on the quality of financial services tends to diminish gradually. Furthermore, a 2022 study contends that although fintech companies are rapidly emerging, banks are also proactively developing digital financial products and service platforms. Consequently, current fintech lenders are not yet sufficient to undermine the core position of banks within the financial system. Reason: Improved clarity, vocabulary, and technical accuracy while maintaining the original meaning.

In a study examining the impact of digital finance on businesses, some scholars have found that digital finance mitigates the tendency of enterprises to financialize and enhances their investment in real economic activities by diminishing their precautionary and short-term profit-seeking motives. An empirical study conducted in 2022 revealed that digital finance effectively alleviates the burden of financing costs on firms, particularly by lowering the costs associated with debt financing. Additionally, another study from the same year noted that the advancement of digital finance significantly decreased the level of credit financing for firms, thereby reducing their dependence on traditional bank credit.

3. A Study on Dual Innovation in Firms

3.1. Development and Conceptualization of Dual Innovation in Firms

The concept of enterprise dual innovation originated from organizational dual theory. As times have evolved, the notion of expanded into the field of management to examine organizational structures. For enterprises to effectively implement organizational structures and management practices, they must be capable of responding to potential environmental changes. This adaptability is crucial for achieving overall strategic objectives. As early as 1991, the dual organizational learning model, which encompasses exploratory and exploitative learning, was first proposed. Subsequent research has gradually broadened the concept of dyadic organizational learning and applied it to the study of corporate innovation activities, thereby enriching the understanding of dyadic innovation.

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In 1996, a new definition of was established, interpreted as the ability of firms to integrate both continuous and discontinuous innovation. From the organizational dual perspective, innovation activities can be classified into exploratory innovation, which seeks new areas of research and development, and developmental innovation, which focuses on enhancing existing technologies. In 2004, some scholars contended that exploratory innovation and utilization innovation are viewed from the firm's perspective, while breakthrough innovation and incremental innovation are considered from the industry's perspective. Furthermore, there is a distinction in their viewpoints, which can be categorized as exploratory and exploitative innovations based on the behavioral perspective, and breakthrough and incremental innovations based on the structural perspective. Zhao (2021) [3] stated that dual innovation is characterized by the combination of both breakthrough change and incremental practice. This synergy reflects the integration of breakthrough and exploratory innovation. In recent years, research on dual innovation has increasingly examined exploratory innovation and utilization innovation as independent components. However, some studies have integrated the two, exploring their complementary, balanced, and synergistic effects within the framework of dual innovation.

3.2. Corporate Dual Innovation Influencing Factors

3.2.1. Intra-firm Environment and Dual Innovation

In terms of management traits, which are basically explored on the lens of high-ranking echelon theory, existing studies predominantly focus on the areas of overconfidence, professional background, and leadership style of corporate executives to analyze the impact of individual executives on dual innovation at the corporate level. Zhai Shuping and Bi Xiaofang (2016) [4] found that the level of executive self-confidence enhances a firm's exploratory innovation; however, it does not significantly affect exploitative innovation. Additionally, environmental uncertainty and the nature of property rights can moderate the relationship between these two types of innovation. Nevertheless, managerial overconfidence may result in an imbalance between exploratory and exploitative innovations in firms' innovation decisions, as overconfident managers are prone to overinvest in projects they approve of themselves, which may lead to irrational decision-making. From a principal-agent perspective, some scholars have observed that independent directors tend to adopt a more conservative innovation strategy due to financial monitoring, and they are more likely to increase the proportion of investment in design and utility model patents. Furthermore, other studies, some scholars have pointed out that the academic background of managers has a more pronounced positive impact on the dual innovation of enterprises, and leaders with a transformational leadership style can significantly enhance the dual innovation activities of organizations.

At the level of firm operations, one of the main factors influencing these antecedent variables is the financial position of the firm. Studies have shown that firm cash flow is a more significant driver of exploratory innovation, while financing constraints play a moderating role in this process. Other studies point out that the alleviation of financing constraints and its signaling effect can promote SMEs' exploratory innovation inputs, but the investment crowding-out effect and the risk transmission effect may inhibit SMEs' exploratory innovation inputs. From the perspective of dual innovation switching, the rational use of redundant funds can enhance the business performance of an enterprise in the process of shifting from developmental to exploratory innovation. However, when an enterprise has a large amount of redundant capital, it should not recklessly invest in exploratory innovation in order to avoid the negative impact of capital miscalculation.

In terms of knowledge capability absorption, research has demonstrated that absorptive capacity is a crucial factor that can significantly enhance a firm's bi-dimensional innovation activities. Existing studies have explored the significance of bi-dimensional innovation, wherein

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a firm's knowledge is regarded as an intangible asset, while knowledge absorptive capacity reflects the firm's ability to acquire and transform relevant expertise. This capacity is essential for improving organizational efficiency and fostering innovation development (Broersma et al., 2016) [5].

3.2.2. External Environment and Dual Innovation

In terms of government subsidies, various studies have demonstrated that they have different effects on firms' dual innovation. The effects of government subsidies on firms' dual innovation are both complex and diverse. Research indicates that government subsidies significantly enhance exploratory innovation in publicly listed firms; however, they tend to negatively affect private returns and have a limited impact on exploitative innovation. For high-tech firms, government subsidies similarly promote exploratory innovation but do not provide significant incentives for exploitative innovation. Furthermore, when utilized as a moderating variable, government subsidies can positively influence exploratory innovation in market competition when they are used as a moderating variable. In summary, the impact of government subsidies on firms' innovations varies across different contexts are different, and precise measures are needed to maximize their beneficial effects.

In terms of industry competition, the need for firms in highly competitive industries to increase their investment in exploratory innovation activities in order to differentiate themselves from their rivals, strengthen their core competitiveness, and reduce the risk of being overtaken by their competitors has become increasingly urgent. Thus, it has been shown that the level of competition in an industry can induce firms to increase their investment in exploratory and developmental innovations, i.e., the “competitive flight effect.” Zhang Qingbian et al. (2018) [6] found that for technologically diverse firms, the more frequent the competitive interactions in the sector in which they are located, the more they help to promote the growth and development of the development of exploitative innovation capabilities, but they have a certain adverse effect on the cultivation of exploratory innovation capabilities. Some scholars have argued to the contrary that, given the intense competition in the industry, management from diverse backgrounds is more likely to reach a consensus on innovation decisions and tends to avoid risk-taking, which may therefore be detrimental to both types of innovation activities.

Regarding the regional environment, some scholars concluded that the tax environment has an impact on the innovation performance of firms because high tax levels increase innovation costs and undermine exploratory innovation activities. The market environment, as a formal institutional arrangement, has a positive synergistic effect between relational culture and exploitative innovation, but does not significantly contribute to exploratory innovation behavior. There are also scholars who have studied the impact of digital finance on dual innovation, some of whom believe that the level of digital finance will promote the exploratory and exploitative innovation activities of firms, and the effect is especially more significant in exploratory innovation.

4. A Study on the Impact of Digital Finance on Firms' Dual Innovation

Digital finance transcends the limitations of traditional financial services by addressing the high costs associated with information asymmetry. It overcomes temporal and geographical constraints, thereby enhancing the reach and depth of financial services. In comparison to conventional Internet finance, digital finance is both broader and more impactful. Additionally, e-payment, online banking, and other forms of digital finance create new opportunities for dual innovation within enterprises.

Digital finance, as an emerging technological factor of production, effectively integrates knowledge and resources from various fields. It encourages enterprises to move beyond conventional strategic thinking, broadens the scope of innovation, and offers a more expansive

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development space for exploratory innovation. First, digital finance enhances an enterprise's ability to collect information, accelerating the updating of its internal knowledge base and fostering the intersection and integration of knowledge across multiple domains. As digital finance continues to evolve, the exchange and sharing of heterogeneous resources can help prevent enterprises from becoming constrained by core rigidity and limited innovation capabilities. This evolution enables firms to break free from the confines of existing business models and innovation pathways, thereby creating new possibilities and opportunities for exploratory innovation. Second, digital finance not only alleviates capital constraints but also introduces more flexible innovation activities and management mechanisms for enterprises. It empowers firms to respond effectively to changes in the external environment, transform traditional innovation models, and promote exploratory innovation. Third, the accelerated penetration of digital finance further expands the scope of innovation within firms, allowing customers, suppliers, and even competitors to actively participate in the innovation process. Diverse innovation disciplines enable enterprises to quickly access market information, gain insights into the latest technological trends, and enhance their enthusiasm for expanding into new business areas, thus providing a fresh source of motivation for exploratory innovation.

Through the combing of related literature, it is found that there are fewer studies on the impact of digital finance on enterprise dual innovation, and probably because digital finance is a hotly debated topic that has emerged in recent years, the research of related literature in the academic community has also focused on recent years. In the research on the impact of digital finance on enterprise dual innovation, Li et al. (2023) [7] explored the empirical analysis of digital finance on enterprise dual innovation using the mediation effect model and the threshold regression model and found that the development of digital finance has a significant positive impact on enterprise dual innovation, and digital finance has a greater role in the promotion of exploratory innovation compared to utilization-based innovation. Some scholars have also found that digital finance enhances the promotion of exploratory innovation by expanding the breadth of coverage and the depth of use, but negatively moderates the relationship between bank debt financing and utilization-based innovation. In the research about the impact of digital inclusive finance on corporate dual innovation, some research scholars found that the development of digital inclusive finance can positively promote corporate dual innovation. From the perspective of exploratory innovation, some scholars have found that the development of digital inclusive finance will have a more significant role in promoting exploratory innovation compared to utilization innovation; however, some scholars' studies have found that the role of digital inclusive finance on exploratory innovation is weaker and has a time lag. From the perspective of utilized innovation, some scholars have found that digital inclusive finance can effectively promote the enhancement of enterprises' utilized innovation capability, and can make exploratory innovation and utilized innovation show certain synergistic effects. The heterogeneity analysis shows that the incentive effect of digital financial development on enterprise dual innovation is mainly reflected in non-state-owned enterprises and SMEs (Li et al., 2023) [7].

5. Conclusion

According to the comprehensive collation and analysis of domestic and international literature, digital finance, as one of the emerging modes of financial industry development, has changed the business model of traditional finance, alleviated the problem of information asymmetry among subjects, and reduced the identification cost and financing cost of enterprises. Digital finance has introduced new financial products and financial services, providing various low-cost financing options for enterprises, guaranteeing continuous investment in the research and development phase of enterprises, and then enhancing the technological innovation ability of

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enterprises. At present, theoretical research on digital finance mainly focuses on the discussion of its popularity and the analysis of the economic and social benefits it brings, but research on its aspect of enterprise innovation is not systematic and comprehensive enough. From the perspective of enterprise innovation, innovation is regarded as a key driving force to promote the sustainable development of enterprises and the dominant position of enterprises in innovation should be strengthened.

Enterprise dual innovation is divided into exploratory innovation and utilization innovation, the development of both of which is of great significance to whether enterprises can adapt to the development of the current economic environment faster and whether they can improve their own resilience faster, and undoubtedly the research on the development of enterprise dual innovation is also of vital importance. However, through the previous literature review, we can find that, firstly, there are relatively few studies on the impact of digital finance development on the dual innovation of enterprises, and no consensus has been formed. The second is that there are also relatively few current studies that explore the impact of digital finance development on corporate dual innovation from the perspective of organizational learning. Therefore, the actual impact of digital finance on dual innovation remains a topic worthy of in-depth research. At the same time, new paths of action regarding digital finance and the related moderating effects are also in need of further in-depth research and study.

Existing research on the impact of digital finance on enterprise dual innovation literature there are still has some gaps, with the need to continue research, future research can continue to explore and analyze from the following aspects: first, when the current literature research on digital financial indicators, due to the uncertainty of its metrics, most of the literature use the digital financial inclusion index constructed by Peking University's Center for Digital Finance Research to conduct research, and this index is mainly constructed based on Alipay's user data, which is not linked to enterprises. This index is mainly constructed based on Alipay's user data, which is not closely related to enterprises; secondly, when exploring the mechanism of action, the mechanism of digital finance's impact on the dual innovation of enterprises may be more focused on the financing constraints and enterprise risk bearing, while the impact of digital technology on the management level and management decision-making ability of listed enterprises based on digital finance has not been explored; thirdly, research on digital finance has only just emerged in recent years, and it is not easy to understand the impact of digital finance. Thirdly, research on digital finance has just emerged in recent years, and there is still room for further research and exploration, so there is a possibility and necessity for further research. To summarize, regarding the outlook of future research, the above are the gaps and possible directions to be explored in the research on the impact of the development of digital finance on the dual innovation of enterprises, and there is the possibility and necessity to continue the research.

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