

A Literature Review on the Impact of Digital Cross-Border Mergers and Acquisitions on Firms' Digital Technology Innovation

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Abstract: In the era of digital economy, digital technology innovation becomes the point of international competition for multinational corporation. Digital cross-border mergers and acquisitions (M&As) are utilized to create an open and collaborative innovation ecosystem to narrow the technological gap between different countries and enhance the ability of independent innovation in the host country. This paper elaborates the connotation, extension and quantification of the two concepts of digital cross-border M&As and digital technology innovation, and states the mechanism and effects how digital cross-border M&As affect the digital technology innovation in firms from both theoretical and empirical perspectives. Some research in this field has been accumulated but it is still in the first stage, the impact mechanism and empirical evidence need to be further enriched.

Keywords: Digital Cross-Border Mergers and Acquisitions; Digital Technology Innovation; Influence Mechanisms; Literature Review

1. Introduction

In the 21st century, digital technology innovation becomes the main ability of multinational corporations. Compared with the developed countries, there is a lag of the original innovation ability for Chinese enterprises, especially in the development of digital technology, a new quality of productivity represented by “arithmetic power” (Blackburn, 2020)^[1]. Greenfield investment in manufacturing sector decreases dramatically and is replaced by international trade. Cross-border M&As become the dominant form of digital FDI in the digital economy era (Jiang et al., 2020)^[2]. At the same time, the M&As market is booming and international project finance is growing rapidly thanks to the relatively loose financing conditions and large infrastructure stimulus packages. Over the past five years, traditional multinationals have become more involved in greenfield investments, while digital multinationals have become more involved in M&As (UNCTAD, 2022; Tang and Jiang, 2021)^{[3] [4]}.

This paper focuses on the connotation and measurement of digital cross-border M&As and digital technology innovation, and summarizes the mechanism and effects of how digital cross-border M&As affect enterprises' digital technology innovation from both theoretical and empirical aspects.

2. Studies on digital cross-border mergers and acquisitions

2.1 The connotation of digital cross-border M&As

In terms of connotation, digital cross-border M&As are conducted by enterprises to build the digital capabilities they need to take digital technology as the key asset of their business model (Huang et al., 2017, Tumbas et al., 2017)^{[5][6]}. It focuses on digital market expansion and digital business ability enhancement by acquiring digital technologies and services or seizing the local digital market and reduces the digital disruption risk through the business model transformation and innovation (Tang and Jiang, 2021). From the perspective of antitrust studies, Lu Junxiao (2021)^[7] defines digital cross-border M&As as an economic activity, which affects competition in the respective markets of two or more countries by gaining a decisive advantage over the seller through the acquisition of data processing and storage services, information products, and other related resources owned by the buyer.

In terms of extension, Li et al. (2022)^[8] argued that cross-border M&As in which both the acquirer and the target are digital firms are digital cross-border M&As. Lu's (2021) definition emphasizes that an M&A in which the target is a digital enterprise is a digital cross-border

M&As. Jiang and Tang (2021)^[9] further emphasized that cross-border M&As completed with digital enterprises as a target and digital technology resources as the target assets are digital cross-border M&As.

2.2 The measurement of digital cross-border M&As

Based on the above discussion of digital cross-border M&As, the premise of digital cross-border M&As measurement is to be able to identify the industry in which the firms in the M&As event are located as a digital industry or not. However, the existing literature is not consistent in identifying digital industries due to large differences in division of digital economy industries as well as the level of digital economy development in each country. Lu et al. (2022)^[10] matched the digital M&As events completed by Chinese firms based on the definition of digital industries and their corresponding codes by the U.S. Bureau of Economic Analysis (BEA). The G20 Initiative on Development and Cooperation in the Digital Economy defines the nature of the digital economy as the production of value with digital factors, and Fang et al. (2022)^[11] filtered the digital industry using this definition.

Existing studies use the dummy variables (Fang, et al., 2022; Tang et al., 2022)^[12], the value and quantity of events to measure the digital cross-border M&As. The setting of dummy variable indicates that the year in which a firm implements a digital cross-border M&A and beyond is assigned a value of 1, otherwise it is assigned a value of 0, if the enterprises conducted digital cross-border M&As several times. The setting of value of events is selecting the largest value of M&As if a firm conducts multiple digital cross-border M&As in the current year. The setting of quantity of events is the number of completed M&As transactions for the firm-year.

3. Studies on digital technology innovation

3.1 The connotation of digital technology innovation

Existing literature on enterprise technological innovation is abundant. However, digital technology innovation contains both the universality of technological theories and the specificity of the digital economy. In terms of connotation, Yoo et al. (2010)^[13] believe that digital technology creation is the process of combining digital and physical components to produce. Furthermore, digital technology innovation is also the process of using digital technology to develop new products and business models (Yoo et al. 2012)^[14]. Nambisan et al. (2017)^[15] defined digital technology innovation from the view of innovation process during which uses the digital technology. Based on innovation input, process and result, Liu et al. (2020)^[16] proposed that digital technology innovation shows it as the integrated use of information, computing, communication and interconnection technologies in the innovation process, including the creation of new products. Hu and Ma (2023)^[17] argued that digital technology innovation refers to the promotion of new things through information and physical components in digital technology.

3.2 The measurement of digital technology innovation

Although the strategy of the digital economy has been emphasized a lot, the digital technology innovation has not been measured accurately trapped in the virtual character of digital. Hu and Ma (2023) explored the impact of market integration on the quantity and quality of enterprises digital innovation and its mechanism by identifying digital technology innovations based on matching the China's industrial enterprise database and Tianyancha database. Zhao (2023)^[18] identified the number of digital technology invention patents and utility model patents finally authorized by listed enterprises using text analysis combined with the IPC classification number of digital technology patents. More literature measure the enterprise digital technology innovation by identifying the invention patent application information of the digital industry based on the International Patent Classification number (Zapadka et al., 2022; Lin and Lv, 2022; Luo et al. 2023)^{[19][20][21]}.

4. Studies on the impact of digital cross-border mergers and acquisitions on corporate digital technology innovation

4.1 Direct effects of digital cross-border M&As on the impact of firms' digital technology innovation

Yoo et al. (2010, 2012) argued that the inherent dynamism and extensibility of digital technologies will facilitate knowledge integration and learning after M&As. The motivation for firms to acquire digital technologies, services is building digital capabilities within the firm to

meet the internal needs and enhances digital technology innovations. Hanelt et al. (2020)^[22] found that the digital M&As activities can help automobile enterprises establish the digital knowledge database thus enhancing their digital innovation capabilities and improving their innovation performance based on matching the digital M&As data of 30 large automobile manufacturers in the world from 2000 to 2016 with the patent data.

4.2 Mechanisms of digital cross-border M&As affecting firms' digital technology innovation

Based on the existing research, this paper elaborates the impact of digital cross-border M&As on enterprises' innovation from the following three channels:

First, the effect of reduced transaction costs. Nylen and Holmstrom (2017)^[23] argued programmability drives the separation between the form and function of digital technologies and reduces search costs, transportation costs, tracking costs and replication costs in cross-border M&As transactions thus providing M&As with an efficient way of integrating new knowledge and making the transmission and storage of diverse types of data and applications more efficient (Zhang and Dai, 2022)^[24]. Digital cross-border M&As carried out in order to enhance efficiency reduces transaction costs and enhances resources available for economic activities such as R&D investment, which makes M&A-party enterprises seize the digital market and enhance their digital technology innovation capabilities.

Second, the effect of reverse knowledge transfer. Knowledge is the key for enterprises to enhance international competitiveness which breaks the constraints of existing knowledge resources and innovation bottlenecks through the reverse knowledge transferring effect thus developing the firm's digital technology innovation abilities. Therefore, on the basis of the existing digital infrastructure and digital knowledge reserves of enterprises, acquiring digital facilities and technologies of foreign enterprises through M&As largely integrates and revolutionizes the existing resources of enterprises, which in turn makes it possible to break through the constraints of the existing knowledge resources and bottlenecks of innovation, and to enhance its own digital technology innovation capability (Chen and Zhang, 2019; Lin and Lv, 2022)^[25].

Third, the effect of optimization of human capital structure. After the digital cross-border M&As, digital technologies and digital talents are directly introduced into the production process further promoting the ratio of high-skilled labor in firms. On the one hand, the digital talents acquired through M&As replace the labor-intensive work that cannot be automated to realize the increase of digital talents in the enterprise innovation. On the other hand, changes in capital structure and organizational structure brought about by M&As motivate the transformation of low-skilled employees to high-skilled ones, thus realizing the incremental increase of digital talents in the enterprise and promoting corporate innovation (Tang et al., 2022).

In summary, with data becoming a new factor, digital cross-border M&As began to be noticed in recent years, and research on the innovation effects of digital cross-border M&As is being actively carried out, and some worthwhile research results have already been accumulated. However, the research on how digital cross-border M&As affects digital technology innovation in firms is still in the preliminary stage. More research is needed and the theoretical mechanisms and empirical evidence need to be explored.

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