

Review on the Research of Enterprise Digital Transformation

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Abstract: Digital transformation has become a strategic imperative for enterprises, playing an increasingly pivotal role in driving business model innovation, transforming the way organizations create value, and shaping the innovation and entrepreneurship process and outcomes. However, previous research has predominantly focused on identifying favorable factors that drive the formation of digital transformation and emphasizing their positive effects, while overlooking the unfavorable factors that constrain digital transformation. Consequently, the mechanism for realizing digital transformation remains unclear. This study reviews the relevant literature on digital transformation, elucidates its connotation and significance, and explores the driving and constraining factors of enterprise digital transformation. Finally, the paper proposes future research directions for enterprise digital transformation.

Keywords: Digital transformation, Driving factors, Constraining factors, Implementation mechanism.

1. Introduction

In the context of the digital economy, digital technologies and industries such as big data, cloud computing, the Internet of Things, artificial intelligence, and blockchain are rapidly converging, driving the transformation of enterprise strategies towards digital strategies. For example, a collaborative study by MIT Digital Business Center and McKinsey & Company based on 330 North American companies showed that the higher the degree of data-driven decision-making in enterprises, the better their target economic performance and operational results. The top one-third of companies using data-driven decision-making had 5% higher average productivity and 6% higher profit margins than their competitors.

In the academic community, digital transformation strategies have also received increasing attention. Scholars have started to interpret issues related to digital transformation from its connotation and composition to how to implement it. On the one hand, scholars emphasize the significance of digital transformation, believing that it can create value for enterprises, improve operational efficiency, enhance customer relationships, and increase competitive advantage [1-3]. On the other hand, there is still controversy over scholars' understanding of digital transformation. Some

scholars believe that digitization is not just a technical issue but should also involve strategic, cultural, and talent management issues [4]. Similar to research on IT-enabled transformation in information systems, technology itself is only part of the complex problems that enterprises must solve to remain competitive in the digital world. Transformation should involve a better understanding of strategic and organizational change [5].

However, previous research has mainly focused on what digital transformation is or the positive effects of digital transformation, with only a few studies exploring the process of digital transformation, namely the causal problems. For example, Liere-Netheler et al. (2018) identified 12 factors driving the adoption of digital technologies in the manufacturing industry [6]. Similarly, Kristin proposed an organizational-environment-technology framework. At the same time, Kristin et al. (2019) also believed that digital transformation also faces obstacles and difficulties, such as lack of skills, technological barriers, personal and organizational cultural barriers, and environmental barriers, which may constrain digital transformation in the manufacturing industry [7]. It can be seen that there are different reasons for the success and failure of digital strategies. However, it is still not clear which factors drive or constrain the formation of digital transformation, and a clear theoretical framework is lacking.

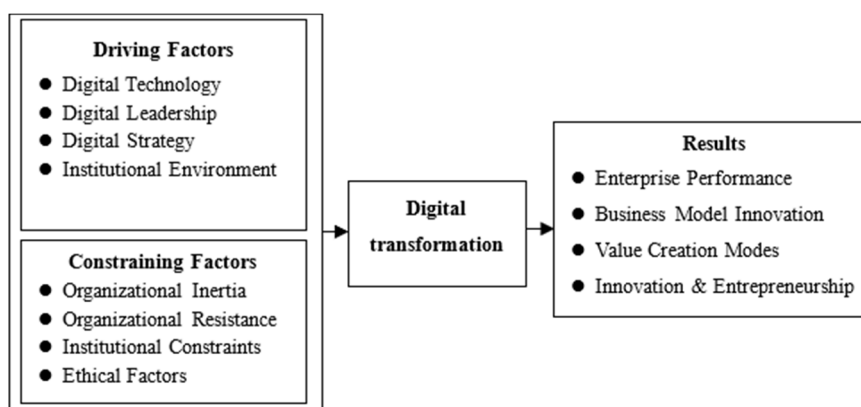


Figure 1. Research Framework

Based on this, this article first defines the connotation of enterprise digital transformation through literature review; secondly, this article deeply explores the factors driving and constraining enterprise digital transformation and elaborates on their implementation mechanisms; then, this article explores the results of enterprise digital transformation; finally, this article provides a research framework to systematically summarize the implementation mechanism of enterprise digital transformation and prospects for future research.

2. What Is Digital Transformation?

In recent years, the concept of digital transformation has become increasingly prevalent, with the term “digital” being appended to numerous management concepts, such as digital business strategy, digital technology, digital innovation, and digital transformation. However, these academic concepts are often used interchangeably, leading to confusion and uncertainty around what digital transformation truly entails.

From a content perspective, digital transformation encompasses multiple aspects, including technology, organization, and strategy. Technological transformation involves the emergence of big data, cloud computing, artificial intelligence, blockchain, and other technologies, which have provided an open and flexible environment with the reprogrammability and data uniformity of digital technology. This has caused an industrial revolution and transformation across the industry. At the organizational level, the logic of organizational innovation has changed in the digital age. Digital technology fundamentally changes the process and results of organizational innovation, making innovation converge and generate characteristics such as distributed innovation and combined innovation during organizational transformation. From the perspective of strategic transformation, digital business strategy goes beyond traditional IT strategy. It is an organizational strategy that uses digital resources to create differentiated value, emphasizing the integration of IT strategy and business strategy.

Regarding the process of digital transformation, Karl (2019) posits that it is a process of strategic renewal that uses advances in digital technology to establish the ability to refresh or replace an organization's business model, collaborative methods, and culture[8]. Gregory (2019) views digital transformation as a process in which digital technology disrupts and organizations seek strategic responses to change the path of value creation. Digital technology also affects organizational structural change positively and negatively[5]. Verhoef et al. (2019) view digital transformation as a change in which enterprises use digital technology to develop a new digital business model that helps create and adapt to more value for enterprises. Digital transformation involves three stages: digitization, digitalization, and digital transformation[9]. Digitization refers to the process of converting analog information into digital form. Digitalization involves using digital technologies to improve existing processes and operations. Digital transformation is the process of using digital technologies to fundamentally change business operations, create new business models, and provide new value to customers, resulting in improved business performance and increased competitiveness.

In conclusion, the concept of digital transformation is complex and multifaceted, encompassing various aspects of

technology, organization, and strategy. Understanding the nuances of each aspect is crucial for organizations seeking to embark on a successful digital transformation journey.

3. Driving Factors of Digital Transformation

3.1. Digital technology

The emergence of digital technologies such as big data, cloud computing, the Internet of Things, artificial intelligence, and 3D printing has greatly changed enterprise activities, driving enterprises to undergo digital transformation and enhancing their innovation capabilities. Scholars generally recognize the role of digital technologies in digital transformation. When numerous digital technologies emerge, the technology itself is not the key, but rather the innovation and growth of the enterprise. Brynjolfsson et al. (2018) studied the economic benefits of “machine translation” based on digital platforms. The study found that the introduction of upgraded machine translation systems greatly increased international trade on the platform, increasing exports by 10.9%[10]. Huang et al. (2017) studied WeCash, a Chinese digital start-up, and found that there are three mechanisms for scaling up digital enterprises: data-driven operations, real-time release, and rapid transformation[11]. The tremendous digital dividends brought by digital technologies have made most enterprises eager to pursue them. For example, in the United States, 14 out of the 20 most valuable non-technology companies consider digitalization as an important strategic dimension.

3.2. Digital leadership

The digital age calls for digital leadership, and successful digital transformation requires digital leadership even more so. The Chief Digital Officer (CDO) has become an increasingly important leadership role, and many companies are beginning to design CDO positions. Singh and Hess (2017) believe that the role of the CDO is to coordinate a company's digital transformation, including supporting top management in developing and executing a dedicated digital transformation strategy, seizing new digital technology opportunities to bring the company to the forefront of digital development, and promoting cross-functional collaboration and mobilizing the entire cross-level company internally[12]. Tumbas et al. (2018) further studied 35 organizations and found that the CDO, as an institutional entrepreneur, distinguishes himself from existing executive roles through “digital” terminology and plays a key role in clarifying and developing emerging “digital” action logic and developing digital logic to address the tension between existing and emerging technologies through strategies such as grafting, bridging, and decoupling[13]. Singh et al. (2019) believe that the CDO's role in promoting digital transformation includes vertical and horizontal organizational design. In terms of vertical organizational design, the CDO needs to embed themselves into the organization based on the company's digital strategy and task priorities[14]. In terms of horizontal organizational design, the CDO needs to coordinate relationships between different units and different levels of employees by combining formal and informal activities. Only when the CDO's hierarchical status and work focus match can enterprise digital transformation be achieved.

3.3. Digital strategy

Strategic scholars believe that digital transformation is not fundamentally about technology, but about strategy. Whether it is shaping enterprise competitive advantages or changing business models, it relies on the driving force of enterprise resources and capabilities. Yeow et al. (2017) argue that dynamic capabilities are the key driving factors for enterprise digital transformation [15]. Through longitudinal analysis of the implementation of a B2C digital strategy by a B2B company, they found that when an organization undergoes digital transformation, the matching of strategy and resources includes three stages: exploratory, constructive, and expansive. This produces organizational adjustment actions, forming the perception, capture, and transformation capabilities of the organization. These adjustment actions repeatedly reconfigure organizational resources and improve strategy to respond to environmental changes and internal tensions. Warner et al. (2019) constructed dynamic digital capabilities into three dimensions: digital perception capability, digital capture capability, and digital transformation capability [16]. By combining dynamic capability literature with strategic renewal literature, their research further explores the core mechanism of achieving strategic renewal in digital transformation, which is agility. The process involves multiple aspects such as business models, collaboration methods, and culture.

3.4. Institutional environment

Institutional theory holds that under a specific institutional framework, an enterprise's strategic choices are influenced by both formal and informal institutions. At this point, institutions are no longer seen as exogenous variables of enterprise choice and action background, but rather crucial "endogenous variables" in formulating strategy. Therefore, the formal or informal institutional environment plays an important driving role in the digital transformation strategy of enterprises. On the one hand, various countries are introducing formal digital strategy policies. For example, the United States' "Digital Twin", Germany's "Industry 4.0", the UK's digital transformation strategy "Seven Tasks", and China's "Made in China 2025". Based on national development strategies, enterprise digital transformation faces more friendly government policies or subsidies, which will greatly reduce transaction costs and create a better business environment. In the digital context, enterprise digital transformation strategies face digital pressure. Whether it is the process of enterprises being passively embedded in the digital institutional environment or enterprises taking the initiative to exert their subjective initiative, they are driving the transformation of enterprise digital strategies.

4. Constraints of Digital Transformation

4.1. Organizational inertia

Digital transformation is not just about reengineering organizational processes, but a form of organizational change that integrates digital technology and business processes in the digital economy. Inevitably, organizational inertia will be a problem in organizational change. Organizational inertia is the root cause of an organization's inability to adapt to environmental change and resistance to strategic change beyond existing strategies [17]. Organizational inertia arises

from the rigidity of resource investment patterns, i.e., resource rigidity, and the difficulty of changing organizational processes for applying resources, i.e., convention rigidity. For example, existing companies are deeply rooted in existing relationships with customers and suppliers, have highly optimized mature production processes, but are often rigid and rely on resources that are not easily reconfigured.

4.2. Organizational resistance

From an employee's perspective, when disruptive technology is introduced into an organization, employees can exhibit resistance, one of which is "innovation fatigue" [18]. CDO position can be used to ensure that the use of digital technology is consistent with the organizational culture of employee habits and facilitates employee acceptance. Conversely, resistance is a product of inertia rooted in daily work and cannot be solved simply by changing employee behavior. It requires changes to processes to achieve flexibility in the face of change. Resistance can be also explained as a lack of visibility into the potential benefits of digital technology. They found that workshops on organizational behavior affected by digital transformation can help prevent resistance and improve cross-functional collaboration.

4.3. Institutional constraints

When digital transformation is a fundamental institutional change, including three important institutional arrangements: digital organizational form, digital institutional infrastructure, and digital institutional construction, all of which may constrain the digital process [19]. For example, in traditional manufacturing, digital transformation lacks data standards, data security, technological and information infrastructure, employment challenges and other institutional system issues that hinder the further transformation of manufacturing digital strategy. In terms of institutional differences, different countries' markets, cultures, or consumption habits also affect the effectiveness of digital transformation. Especially in developing countries, enterprise digital transformation will face institutional uncertainty or institutional gaps. In the process of adapting to external institutional environments, enterprises will be subject to institutional constraints operating at a larger environmental level, such as external rules and laws, as well as constraints from norms internalized by participants. To avoid digital tragedy, it is necessary to master the political rules behind the digital economy - the political logic of visual control.

4.4. Ethical factors

The continuous development of digital technology has brought ethical issues such as "privacy invasion", "information leakage", "data security", and "human rights disputes", which also hinder digital transformation. For example, the conflict between private ethics and public ethics in the context of big data is difficult to overcome for a while. The public nature of data is objectively pursuing public ethics, but data generation, use, mining, etc., are not necessarily for public purposes. In many cases, they are behaviors influenced by private ethics.

5. Results of Digital Transformation

5.1. Impact on enterprise performance

Digital transformation changes various aspects of

enterprises, such as products and services, business processes, and value creation, ultimately affecting enterprise performance. Karahanna et al. (2020) found a positive correlation between hospital digital advantage and hospital performance[20]. However, some scholars believe that the impact of digital transformation on enterprise performance is context-dependent and may even be unfavorable. For example, digitalization has a significant positive impact on financial performance, but digitalization only mediates the impact of information technology on financial performance. Park et al. (2020) based on fuzzy qualitative comparative analysis, studied the healthcare, education, manufacturing, and service industries in the United States and found that IT-enabled information analysis capability is neither necessary nor sufficient for achieving high-performance configurations, but it is an important component of configurations that may have supporting effects, no effects, or negative effects; the configuration structure of high-performance organizational capabilities is similar, while the configuration structures of high-performance and low-performance organizations are different[21].

5.2. Impact on business model innovation

Digital-driven business model innovation can be reflected in different industries. For example, Qi et al. (2017) believed that the main driving force for retail organization's business model innovation comes from the direct promotion of new retail technology brought about by digital technology and the indirect impact of new technology on consumer behavior and retail competition[21]. Li et al. (2019) believed that digital technology is an important factor driving service business model innovation, which is mainly reflected in the improvement of enterprise resource capabilities[22]. The drive of digital technology not only improves the efficiency of business tools and transaction efficiency but also promotes the change of service enterprises' positioning in transactions, from undertaking specific service tasks to being responsible for users' final operational performance. This is the embodiment of the driving role of digital technology in the evolution of business model innovation.

5.3. Impact on value creation modes

From the perspective of value proposition, digital technology has the potential for disruptive innovation, which can significantly change existing value propositions. Moreover, digital technology makes creating new value propositions increasingly dependent on services. Enterprises use digital technology to provide innovative solutions to meet customer needs and collect their feedback on products and services. For example, Netflix uses data collected from the use of streaming services to better understand what content viewers like and how to use content to help produce their own content. Secondly, digital technology can also redefine value networks[23]. In the disintermediation strategy, digital technology bypasses intermediaries to achieve direct communication between value network participants (such as customers). In the remediation strategy, the coupling between value network participants is strengthened because digital technology can facilitate close collaboration and coordination among participants, such as coordinating communication within the supply chain using a platform. In network-based mediation, complex relationships are established between multiple stakeholders with potential competitive interests for the benefit of customers.

5.4. Impact on innovation and entrepreneurship

Digital technology not only provides new opportunities for innovators and entrepreneurs but also has a wider impact on value creation and value capture. The emergence of novel and powerful digital technologies, digital platforms, and digital infrastructures has significantly changed the inherent uncertainty of innovation and entrepreneurship in terms of process and outcomes. Yu et al. (2018) believed that the openness and self-growth of digital platforms reduce the learning costs and resource acquisition thresholds of entrepreneurship, and the open governance model of digital platforms provides a basis for the formation of heterogeneous and dynamic entrepreneurial teams[24]. They further elaborated on the impact mechanism of digital technology on entrepreneurship, mainly reflected in the process of entrepreneurship and the formulation, implementation, and innovation of entrepreneurial plans and products and services. Nambisan et al. (2019) summarized the theme of digital transformation in innovation and entrepreneurship through a special issue[25].

6. Future Research Prospects for Enterprise Digital Transformation

The existing research on enterprise digital transformation strategies lacks clear definition, and mainly focuses on the positive effects of digital transformation strategies, ignoring the factors behind digital tragedies. This article first reviews the relevant literature on digital transformation strategies, and clarifies the connotation and significance of digital transformation strategies. Secondly, this article explores the driving and constraining factors of enterprise digital transformation strategies from the perspectives of "external to internal" and "internal to external", and proposes a framework for the implementation mechanism of digital strategies. This article believes that the implementation mechanism of digital transformation can be further explored in the following aspects:

6.1. Clarify the concept of digital transformation

Currently, the academic definition of digital transformation is not clear enough, so companies are not clear about what digital transformation is and why it should be carried out. This article believes that the formation factors of digital transformation can be based on the antecedents to better explain the origin of digital transformation, rather than defining it based on factual results. Thus, digital transformation can be seen as a process of internal and external cultivation of enterprises, which is not only driven by digital technology, enterprise resources and capabilities, top management cognition, and institutional environment but also constrained by organizational inertia, organizational resistance, institutional constraints, and ethical misconduct.

6.2. Integrate multiple theoretical perspectives to analyze the driving and constraining factors of digital transformation

The choice of digital strategy by enterprises is a difficult problem. In the future, we can judge whether enterprises need digital transformation and how to carry out digital transformation from the perspectives of "external to internal"

and “internal to external”, and analyze it from various theoretical perspectives of strategic management. Furthermore, we can explore other processes of enterprise digital transformation in depth, improve the process of internal and external cultivation of digital transformation, and analyze its mechanism. For example, from the perspective of “external to internal”, we can further consider the impact of institutional change theory and organizational ecosystem theory on digital transformation; from the perspective of “internal to external”, we can further examine resource-based view, resource dependence theory, dynamic capability theory, organizational empowerment, etc.

6.3. Investigate the impact of industry type on digital transformation

The influencing factors of digital transformation are different in different industries. Previous studies have shown that the choice of digital strategy for commercial banks (Xie Zhichun et al., 2018), retail enterprises (Liu Xiangdong et al., 2018), industrial enterprises (Li Jun et al., 2019), manufacturing enterprises (Jing Hao et al., 2017), and operators (Yan Ruosen et al., 2018) are all different in terms of technological maturity, resource allocation, market environment, and organizational conditions. The response methods of digital transformation are also different, and the speed and degree of digitization are also very different. Therefore, it is necessary to further explore the impact differences of industry types on enterprise digital transformation and integrate the influencing factors of digital transformation to strive for a dialectical unity of industry commonality and characteristics.

6.4. Further enrich measurement and research methods

From previous research, it can be seen that research on digital transformation is mainly theoretical description and a few single case studies. In the future, we can further use multi-case comparison, quantitative research methods, etc. digital transformation has exploratory and explanatory characteristics and is suitable for case study analysis.

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References

- [1] Matt C, Hess T, Benlian A. Digital Transformation Strategies[J].*Business & Information Systems Engineering*, 2015, 57(5):1-5.
- [2] Bharadwaj, A., El Sawy, O., Pavlou, P., Venkatraman, N., 2013. Digital business strategy: toward a next generation of insights. *MIS Quart.* 37 (2), 471–482.
- [3] Morakanyane,R.,Grace,A.A.,O'Reilly,P.,2017.Conceptualizing digital transformation in business organizations: a systematic review of literature. In: *BledE Conference*, Bled, Slovenia, pp. 427–444.
- [4] Kane, G.C., 2017b. Digital innovation lights the fuse for better health care outcomes. *MIT Sloan Manage. Rev.* 59 (1), 1–8.
- [5] Gregory Vial.Understanding digital transformation: A review and a research agenda[J].*Journal of Strategic Information Systems* 28 (2019) 118-144.
- [6] Liere-Netheler K , Packmohr S , Vogelsang K . Drivers of Digital Transformation in Manufacturing[C]// Hawaii International Conference on System Sciences. 2018.
- [7] Kristin Vogelsang, Kirsten Liere-Netheler, Sven Packmohr & Uwe Hoppe (2019) Success factors for fostering a digital transformation in manufacturing companies, *Journal of Enterprise Transformation*.
- [8] Karl S.R. Warner,Maximilian Wäger. Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal[J]. *Long Range Planning*,2018.
- [9] Verhoef P C, Broekhuizen T, Bart Y, et al. Digital transformation: A multidisciplinary reflection and research agenda[J].*Journal of Business Research*, 2019, 12(1):1,3-5,7-9,11-33,35-83.
- [10] Brynjolfsson E,Hui X,Liu M. Does Machine Translation Affect International Trade? Evidence from a Large Digital Platform[J]. *Management Science*,2019.
- [11] Jimmy H,Ola H,J. M L, et al. Growing on Steroids: Rapidly Scaling the User Base of Digital Ventures Through Digital Innovation[J]. *MIS Quarterly*,2017,41(1).
- [12] Singh A , Hess T . How Chief Digital Officers Promote the Digital Transformation of their Companies[J]. *MIS Quarterly Executive*, 2017, 16(1):1-17.
- [13] Tumbas S , Berente N , Vom Brocke J . Digital innovation and institutional entrepreneurship: Chief Digital Officer perspectives of their emerging role[J]. *Journal of Information Technology*, 2018.
- [14] Singh A, Klarner P, Hess T.How do chief digital officers pursue digital transformation activities? The role of organization design parameters. [J] *Long Range Planning*, 2019, 7 (9) 101890.
- [15] Yeow A , Soh C , Hansen R . Aligning with new digital strategy: A dynamic capabilities approach[J]. *The Journal of Strategic Information Systems*, 2017:S0963868717303311.
- [16] Warner K S R, Wäger M. Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal[J]. *Long Range Planning*.
- [17] Le Mens G , Hannan M T , Pólos, László. Age-Related Structural Inertia: A Distance-Based Approach[J]. *Organization Science*, 2015, 26(3):756-773.
- [18] Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2014). Embracing digital technology: A new strategic imperative. *MIT Sloan Management Review*, 55(2), 1-12.
- [19] Hinings B , Gegenhuber T , Greenwood R . Digital innovation and transformation: An institutional perspective[J]. *Information and Organization*, 2018:S1471772718300265.
- [20] Karahanna E , Chen A , Liu Q B , et al. Capitalizing on Health Information Technology to Enable Digital Advantage in U.S. Hospitals[J]. *MIS quarterly*, 2019, 43(1):113-140.
- [21] Qi Yan, Si Yajing, Wu Lihong. Research on Business Model Innovation in the Retail Industry under the Background of Digital Technology Revolution [J]. *Management World*, 2017 (12): 182-183.
- [22] Li Fei, Qiao Han. Research on the Evolution of Digital Technology-driven Industrial Product Service Business Models: A Case Study of Goldwind Technology [J]. *Management Review*, 2019, 31 (08): 295-304.
- [23] Delmond, M.-H., Coelho, F., Keravel, A., Mahl, R., 2017. How information systems enable digital transformation: a focus on business models and value co-production.*IUP J. Bus. Strat.* 14 (3), 7–40.
- [24] Yu Jiang, Meng Qingshi, Zhang Yue, Jin Jing. Digital Entrepreneurship: New Trends in Theory and Practice of

Entrepreneurship in the Digital Age [J]. Studies in Science of Science, 2018, 36 (10): 1801-1808.

[25] Nambisan S , Wright M , Feldman M . The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes[J]. Research Policy, 2019.