

Research on enterprise digital transformation: a case study of Alibaba

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Abstract. With the rapid development of digital technology, digital transformation has become a key strategy for enterprises to enhance competitiveness and achieve sustainable development. Through digital transformation, Alibaba Group has successfully maintained its leading position in the global market and driven the expansion of several innovative businesses. This study uses Alibaba as a case and employs case analysis to explore its specific initiatives in areas such as e-commerce platform digitization, cloud computing, and big data applications. The research finds that Alibaba's digital transformation has significantly enhanced its innovation capabilities, expanded new markets, and optimized operational efficiency, although there are still some issues and areas for improvement. Summarizing these aspects and proposing solutions will provide valuable reference experiences for other enterprises undergoing digital transformation. According to the research results of this paper, it is suggested that in the future digital transformation process, enterprises should strengthen investment in digital infrastructure and talent training, which is the most fundamental step of digital transformation.

1 Introduction

In the context of globalization, digital transformation at the technological level involves the application of emerging technologies; at the management level, digital transformation represents a comprehensive overhaul of corporate organizational structures, business processes, and culture. As a leading global e-commerce and technology company, Alibaba Group has successfully ensured its market leadership through phased digital transformation and has pioneered in multiple innovative fields. Alibaba's successful experience provides significant reference value for other enterprises on how to tackle challenges and achieve strategic goals during their own digital transformation processes.

This paper aims to explore the key challenges and opportunities that enterprises face during digital transformation by conducting an in-depth analysis of Alibaba's digital transformation practices. The research will focus on specific measures taken by Alibaba in various aspects of digitalizing its e-commerce platform. Through case studies and theoretical discussions, this paper will reveal how Alibaba has enhanced its innovation capabilities, expanded its market, and improved operational efficiency through digital transformation,

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while also identifying some limitations encountered in the process and proposing corresponding improvement measures. Subsequently, the paper will provide evaluations and conclusions. This study distills the successful experiences of Alibaba's digital transformation, offering valuable insights and guidance for other enterprises undergoing digital transformation.

2 Theoretical overview

2.1 The definition and connotation of digital transformation

Digital Transformation (DT) refers to the profound changes that organizations undergo by adopting digital technologies such as big data, artificial intelligence, and the Internet of Things. This transformation is not merely about the application of technology; it involves comprehensive changes in organizational structures, business processes, and corporate culture. According to the Development Research Center of the State Council, digital transformation involves utilizing next-generation information technologies to establish a closed loop for the collection, transmission, storage, processing, and feedback of data [1]. This process breaks down data barriers across different levels and industries, enhancing the overall operational efficiency of sectors and constructing a new digital economy system. As a more detailed definition, Vial describes digital transformation as "the process of significantly enhancing an organization's performance and impact through the use of digital technologies," which includes redesigning business models, processes, and customer experiences [2].

As preliminary steps to digital transformation, Digitization and Digitalization provide the material foundation. Digitization involves converting organizational data from analog to digital formats, while Digitalization refers to the use of digital technologies to change business models and create new value, representing the transition to a digital enterprise. The digitalization process aims to alter the organizational structure or business processes of a company, exemplified by models such as freemium, electronic payments, and massive open online courses (MOOCs).

2.2 Overview of digital transformation theory

Current academic theories on digital transformation mainly include the following:

2.2.1 Digital integration of management, technology, and environmental factors

Wang Liping and Hu Ruiying argue that the Industrial Revolution, marked by assembly line production, brought revolutionary changes to production methods and corporate management. Large-scale industrial production techniques, through standardized and specialized operations, replaced traditional craftsmanship, significantly enhancing production efficiency and promoting the shift in corporate organizational management from experiential to scientific management [3-5]. With technological advancements and management evolution, corporate management increasingly focuses on efficiency, standardization, and rationalization.

The rise of digital technologies has further driven management transformation. Through the mutual construction of technology and management, companies adjust their structures and processes to adapt to new technologies, promoting the scientific and modernized management systems [3]. Digital transformation not only enhances efficiency at the functional level but also profoundly changes corporate management methods and thinking

patterns at the intrinsic logic and conceptual levels, driving comprehensive transformation and innovation within enterprises [3]. The aforementioned integration of environmental factors forms the Technology-Organization-Environment (TOE) framework. Proposed by Tornatzky and Fleischer, this framework emphasizes how technological, organizational, and environmental factors influence a company's technology adoption and innovation. When analyzing corporate digital transformation, the TOE framework focuses on the impact of internal technological capabilities, organizational structures, and external environments (such as competitive pressure and regulatory policies) on digital transformation [4]. The TOE framework is widely used to study how companies integrate technology, adjust organizational structures, and adapt to changes in the external environment in the face of digital transformation.

2.2.2 Dynamic capabilities theory

The Dynamic Capabilities Theory, proposed by scholars such as David Teece, emphasizes the need for firms to continuously reshape and renew their capabilities in rapidly changing environments to maintain a competitive advantage [5]. Digital transformation is considered a key means for developing dynamic capabilities within enterprises. By persistently innovating and adapting to changes in digital technologies, firms can address market uncertainties and achieve long-term competitive advantages [5-6]. This theory has been widely applied in research on how companies leverage digital technologies to enhance their innovation capabilities, flexibility, and agility to meet the ever-changing market demands.

2.2.3 Resource-based view, RBV

In 1984, Wernerfelt formally introduced the resource-based view (RBV) in his work "A Resource-Based View of the Firm," marking the first comprehensive articulation of the resource-based theory. As a cutting-edge theory in the field of strategic management, the resource-based view has its roots in Adam Smith's division of labor theory from "The Wealth of Nations." Within the resource-based theory, there are two distinct approaches: static analysis and dynamic analysis. Static analysis typically begins with a general concept of resources, positing that strategic resources are key to differences in competitiveness. In contrast, dynamic analysis primarily focuses on resource differences between firms. By analyzing valuable and strategic resources, one can further evaluate how the transformation of Alibaba's international platform meets customer needs and provides specific value to customers. This, in turn, allows for an effective assessment of the platform's irreplaceability and market competitiveness post-transformation.

The resource-based view posits that a firm's competitive advantage stems from its unique resources and capabilities. Digital transformation can be seen as a process where firms leverage new digital technologies and data resources to enhance their core capabilities and create new value chains [7-9].

This theory is employed in digital transformation research to analyze how firms enhance their competitiveness by acquiring, integrating, and utilizing digital resources, particularly through the application of technologies such as data analytics, artificial intelligence, and cloud computing.

In summary, digital transformation is a process through which firms achieve profound changes by adopting digital technologies. It involves not only the application of technology but also a comprehensive reshaping of organizational structures, business processes, and corporate culture. Current academic research on digital transformation primarily focuses on several theoretical frameworks, including the Technology-Organization-Environment (TOE) framework, dynamic capabilities theory, and the resource-based view (RBV). The TOE

framework emphasizes the impact of technological, organizational, and environmental factors on digital transformation. Dynamic capabilities theory focuses on how firms enhance their competitive advantage through innovation and adaptability in rapidly changing environments, while the resource-based view emphasizes the enhancement of core capabilities and competitiveness through the utilization of digital resources. These theories provide multi-dimensional perspectives for understanding and guiding firms' strategies and practices in digital transformation.

3 Case study

3.1 Alibaba's information

Alibaba Group, founded in 1999 and headquartered in Hangzhou, China, is a global leader in e-commerce and technology. Established by Jack Ma and his team, Alibaba initially aimed to assist small and medium-sized enterprises in China to achieve globalization through the internet. It has since evolved into an internet giant spanning a wide range of sectors. Alibaba's business operations encompass e-commerce, fintech, cloud computing, logistics, and new retail. Through its subsidiaries and affiliated companies, it offers a diverse array of services, including Alipay, Taobao, Tmall, and Cainiao Network.

Development Process:

Initial Phase (1999-2003): At its inception, Alibaba launched a B2B e-commerce platform aimed at small and medium-sized enterprises—Alibaba International and Alibaba China. This initiative helped businesses engage in cross-border trade via the internet, gradually expanding their influence in the global market.

Rapid Expansion and Innovation (2003-2013): In 2003, Alibaba introduced the C2C e-commerce platform Taobao, which quickly became the largest online shopping platform in China. In 2004, the company launched Alipay, a third-party payment platform that provided secure transaction services for e-commerce. In 2010, Alibaba established Tmall, focusing on B2C business, further expanding its e-commerce ecosystem.

Diversified Development and Globalization (2013-present): As its e-commerce business matured, Alibaba began diversifying into new fields such as cloud computing (Alibaba Cloud), digital entertainment (Youku Tudou), and logistics (Cainiao Network). In 2014, Alibaba successfully listed on the New York Stock Exchange (NYSE), marking one of the largest IPOs globally at the time. In recent years, Alibaba has further advanced its globalization strategy.

Development Situation:

Alibaba Group has now become one of the world's largest online and mobile commerce companies, with its e-commerce platform generating annual gross merchandise volume (GMV) in the trillions of dollars and a user base that spans the globe. Supported by Alibaba Cloud, the company not only dominates traditional internet sectors such as retail and payment systems but is also rapidly advancing in high-tech fields like cloud computing, artificial intelligence, and blockchain.

In recent years, Alibaba has actively promoted its "New Retail" strategy, which aims to integrate online and offline retail by leveraging data-driven technologies to enhance consumer experience and optimize supply chain management. Alibaba's success is not only reflected in its extensive business layout and robust technological foundation but also in its continuous innovation in digital transformation and its keen understanding of market demands.

3.2 Alibaba's digital transformation practices

Conducting a PESTEL and SWOT analysis of Alibaba's digital transformation helps to comprehensively understand the various influencing factors in its external environment.

Alibaba's digital transformation is influenced by multiple factors. Politically, the increasing regulatory scrutiny by the government on the tech industry may bring compliance pressures. Economically, the rising demand for digital services in both China and global markets provides growth opportunities for Alibaba. Socially, the ingrained online shopping habits of consumers have propelled the development of Alibaba's platform. Technologically, new technologies such as artificial intelligence and big data support Alibaba's innovation and efficiency improvements. Environmental factors prompt Alibaba to make more efforts in green technology and sustainable development. Legally, the strengthening of intellectual property protection and privacy regulations requires the company to continuously improve its compliance systems.

In the internal analysis, Alibaba's strengths include its strong brand influence, extensive ecosystem, and large user base. However, Alibaba also faces disadvantages such as internal innovation pressures and intensified external competition. In terms of opportunities, digital transformation will promote the expansion into emerging markets and the launch of new products. On the other hand, Alibaba must address challenges such as policy risks, cybersecurity threats, and potential market saturation. Overall, Alibaba should leverage its technological advantages and market position to actively respond to external challenges and maintain its leading position in the global digital economy.

It can be observed that Alibaba's digital transformation is influenced by various external factors, and successfully addressing these factors is crucial for maintaining its market leadership and achieving sustainable development [8].

Alibaba has implemented several key initiatives in its digital transformation, driving innovation and expansion in its business model:

Digitalization of E-commerce Platforms: Alibaba has digitalized traditional retail businesses through e-commerce platforms such as Taobao and Tmall, achieving efficient integration of online and offline resources. These platforms not only provide users with a convenient shopping experience but also offer merchants rich data analysis tools to help them optimize marketing strategies and inventory management.

Cloud Computing and Big Data: Alibaba established Alibaba Cloud, focusing on providing cloud computing and big data services. Through offering enterprises elastic computing, data storage, and processing capabilities, Alibaba Cloud supports their digital transformation. Alibaba itself also leverages cloud computing and big data technologies to optimize its supply chain management, user analysis, and personalized recommendation systems.

Digital Innovation in Fintech: Through Alipay and Ant Financial, Alibaba has driven digital innovation in financial technology. Alipay not only provides convenient payment solutions but also, through technological innovation, has launched micro-financial services such as Yu'e Bao, Huabei, and Sesame Credit, helping users and small to medium-sized enterprises better manage their finances.

New Retail Strategy: Alibaba proposed and implemented the "New Retail" strategy, integrating online and offline retail through data and technology [8]. For example, Hema Fresh is a representative of its new retail, offering a seamless shopping experience through online ordering, offline experience, and an efficient logistics system.

Digitalization of Logistics and Supply Chain: Cainiao Network is a significant initiative by Alibaba to drive the digitalization of logistics and the supply chain. Through an intelligent logistics platform and big data analysis, Cainiao Network optimizes logistics routes, enhances delivery efficiency, and reduces costs through smart warehousing technology.

Artificial Intelligence and Intelligent Applications: Alibaba has made significant investments in the field of artificial intelligence, launching intelligent voice assistant "Tmall Genie," smart search engines, and AI-driven content recommendation systems. These technologies not only enhance user experience but also optimize platform content management and marketing effectiveness.

3.3 Discussion

3.3.1 Evaluation of Alibaba's digital transformation

Alibaba's digital transformation has demonstrated significant financial benefits and operational efficiency improvements across multiple dimensions, proving the success of its transformation. By evaluating financial benefits, operational efficiency, customer experience and market performance, as well as technological capabilities and security, one can clearly see the tangible outcomes of Alibaba's digital transformation.

Financial Benefits Evaluation:

Financial benefits are one of the core indicators for measuring the success of digital transformation. Alibaba has shown outstanding performance in terms of revenue growth, cost savings, and return on investment (ROI).

In terms of revenue growth, Alibaba's overall revenue has achieved significant growth following its digital transformation. According to Alibaba's 2022 financial report, the revenue from its cloud computing business reached RMB 100.7 billion, marking a 29% year-over-year increase [9]. After the transformation, e-commerce platforms have also seen a significant increase in sales. For example, during the "Double Eleven" period in 2022, the sales on the Tmall platform exceeded 540.3 billion RMB, setting a new record [10]. Through this data, it is evident that Alibaba has achieved steady revenue growth through the development of new businesses and digital transformation.

In terms of cost savings, Alibaba has significantly reduced operational costs through digital transformation. For instance, in logistics, Alibaba's intelligent logistics platform, Cainiao Network, has optimized delivery routes and warehouse management through automation and data-driven methods, substantially lowering delivery costs. In 2022, the proportion of Alibaba's overall operational costs to total revenue decreased by 1.5 percentage points, reflecting its success in cost control [11-13].

Alibaba's investment in digital transformation has yielded a substantial return on investment (ROI). According to the financial report, Alibaba's net profit in 2022 was 61.9 billion RMB, with the majority of this growth stemming from cost savings and new business expansion resulting from digital transformation efforts [9]. By calculating the returns and investments brought about by digital transformation, Alibaba has achieved a high ROI in areas such as cloud computing and new retail, indicating that its investments in technology and business models have been fully rewarded.

Operational Efficiency Assessment:

Alibaba's digital transformation has not only enhanced financial benefits but also significantly improved operational efficiency. This improvement is primarily reflected in increased productivity, process enhancements, and reduced error rates.

In terms of productivity, the output per unit of time has markedly increased. For instance, during the "Double 11" shopping festival in 2022, Cainiao Network processed 3.2 billion parcels through its digital systems, representing a 10% increase compared to the previous year [11]. This indicates that Alibaba has significantly improved its speed and efficiency in order processing.

In terms of process improvement, digital transformation has shortened Alibaba's business process time. By introducing intelligent customer service robots, Alibaba handled over 3 billion customer service requests in 2022, reducing the average response time to less than one second, significantly enhancing customer service efficiency [12-15].

In efforts to reduce error rates, Alibaba has significantly minimized human errors in operations through intelligent systems. In 2022, Cainiao Network achieved a parcel delivery accuracy rate of 99.5%, and the product defect rate decreased by 2 percentage points [11]. This demonstrates the effectiveness of digital tools in enhancing product and service quality.

Evaluation of Customer Experience and Market Performance:

Alibaba's digital transformation has also achieved significant success in customer experience and market performance.

In terms of customer satisfaction, Alibaba has enhanced customer satisfaction through intelligent recommendation systems and personalized marketing. In 2022, Alibaba's Net Promoter Score (NPS) increased to 71 points, a rise of 3 points compared to the previous year [13]. This indicates a notable improvement in customers' usage experience on the Alibaba platform.

Regarding customer acquisition cost (CAC), Alibaba has reduced the cost of acquiring new customers through digital marketing. In 2022, Alibaba's customer acquisition cost decreased by 6%, thanks to its precise digital marketing strategy and data-driven market analysis [14].

In terms of customer retention rate, Alibaba has also seen a significant improvement. In 2022, the annual active users on Taobao and Tmall platforms reached 903 million, with a retention rate exceeding 85% [9]. This data indicates that Alibaba's digital transformation has achieved some success in enhancing customer loyalty.

Reflecting on market share growth, digital transformation has continuously increased Alibaba's market share in various fields. In 2022, Alibaba's share in the global cloud computing market reached 12.5%, ranking among the top three globally [14]. In the e-commerce sector, Alibaba maintained its leading position in the Chinese market with a market share of 56% [10].

Technical Capability and Security Assessment: Alibaba has also made significant progress in enhancing technical capabilities and security.

In terms of system performance improvement, Alibaba's system response time and availability have seen notable enhancements. In 2022, the average response time of the Alibaba Cloud platform was reduced to 50 milliseconds, and system availability reached 99.99% [14-17]. These figures demonstrate that Alibaba has significantly improved system performance through digital transformation.

Regarding security improvements, Alibaba's efforts in data security and privacy protection have also paid off. In 2022, the number of data breach incidents at Alibaba decreased by 20%, and all critical security incidents were resolved within 12 hours [9]. This shows that Alibaba has enhanced its enterprise security and data protection capabilities following digital transformation.

Long-term Strategic Impact: Alibaba's digital transformation has not only improved its financial and operational performance in the short term but also had a profound impact on achieving its long-term strategic goals.

In the field of innovation capability, Alibaba has continuously launched new products and services, significantly enhancing its innovation capacity. In 2022, Alibaba introduced several AI-based solutions, such as an intelligent manufacturing platform, helping enterprises achieve intelligent transformation of production lines [14]. The success rate of these innovation projects reached 75%, demonstrating the positive impact of digital transformation on enhancing corporate innovation capability.

Regarding market expansion and new business models, Alibaba has successfully entered multiple new markets and launched new business models through digital transformation. In 2022, Alibaba's new retail business, "Hema Fresh," opened over 300 stores nationwide, with new business revenue accounting for 18% of the company's total revenue, an increase of 5 percentage points from the previous year [9]. These data indicate that digital transformation has provided solid support for Alibaba's expansion in the global market.

3.3.2 Problems and demerits

Alibaba has made significant achievements in its digital transformation process, but there are still areas that need improvement. If these issues are not addressed in a timely manner, they may adversely affect the long-term success of the digital transformation.

Firstly, the lag in employee skill enhancement and organizational change Although Alibaba has achieved notable success in its digital transformation, there is still a lag in enhancing employee skills and organizational change. With the rapid expansion of the company's scale and the increasing complexity of its business operations, the workload and system operation difficulties faced by employees have surged, leading to noticeable professional burnout as they adapt to new technologies and workflows. This aligns with the findings of Chen Qinghan, whose research indicated that more than half of the employees in the companies studied experienced professional burnout during digital transformation, primarily due to the rapid implementation of information systems and the sudden increase in workload [15]. In its swift advancement of digital transformation, Alibaba may face similar issues, especially in the absence of adequate training and support, further exacerbating employee stress and burnout.

The pace of organizational change may not keep up with the speed of technological development, which can also lead to greater dissatisfaction and adaptation difficulties among employees. Data analysis reveals that the degree of employee burnout is closely related to factors such as workload, welfare benefits, and evaluation systems, indicating that if a company fails to optimize internal processes and improve compensation and performance evaluation mechanisms during the transformation, employee burnout will intensify [15]. Similarly, Alibaba needs to address these issues by accelerating employee skill enhancement, optimizing organizational structure, and improving leadership capabilities to effectively alleviate employee burnout during digital transformation, ensuring a smooth transition and promoting steady corporate development.

Secondly, data, privacy, and security challenges In Alibaba's digital transformation process, data privacy and security issues have increasingly become critical challenges. As the business expands, Alibaba processes a vast amount of user data daily, involving sensitive information such as personal details and transaction records. Ensuring privacy and security during data collection, storage, and analysis has become more complex. Especially with the widespread application of cloud computing and big data analysis, traditional security measures may struggle to address emerging privacy risks. Global data privacy regulations have also become more stringent, such as the European Union's General Data Protection Regulation (GDPR), which imposes strict requirements on cross-border data flows [16], compelling Alibaba to comply with various privacy regulations in different markets, thereby increasing compliance difficulty and costs.

If data security measures are inadequate, it may lead to data breaches, damaging user trust and Alibaba's brand reputation, which is particularly detrimental in the digital economy [17]. Alibaba urgently needs to strengthen technical aspects of data encryption and access control while establishing a global data privacy compliance system to ensure compliance in different regions [18].

3.3.3 Improvement and refinement of digital transformation issues

To address the issues arising from the lag in employee skill enhancement and organizational transformation during Alibaba's digital transformation, it is first necessary to strengthen employee skill training. The company can formulate personalized training plans for different positions and introduce skill enhancement incentive mechanisms to encourage employees to proactively learn new technologies, ensuring they can quickly adapt to the digital work environment. Additionally, optimizing the organizational structure is crucial. By establishing a more flexible organizational framework, cross-departmental collaboration can be promoted, enabling the organization to respond more efficiently to rapid technological and business changes.

At the same time, improving the performance evaluation and compensation systems, as well as enhancing employee support and care, can effectively alleviate employee burnout. Optimizing a transparent evaluation mechanism and improving comprehensive welfare benefits not only enhances employee job satisfaction but also increases their loyalty. Furthermore, it is necessary to enhance the digital leadership capabilities of the management team. Through specialized training and a leadership style that leads by example, the management team can better guide the team to adapt to changes, ensuring the smooth progress of digital transformation and the long-term development of the enterprise.

To address data privacy and security challenges, Alibaba should adopt multi-layered solutions. On the technical level, Alibaba needs to strengthen the application of data encryption technologies to ensure the security of data during transmission and storage. Additionally, strict access control measures should be implemented to ensure that only authorized personnel can access sensitive data. Alibaba can also adopt the latest privacy protection technologies, such as differential privacy and homomorphic encryption, to address potential privacy leakage issues in big data analysis. Regular vulnerability scans and security tests should be conducted to identify and fix potential security vulnerabilities.

On the compliance and management level, Alibaba needs to establish a global data privacy compliance system to ensure adherence to local privacy regulations in various markets. The company should set up a dedicated compliance team responsible for tracking changes in global privacy laws and adjusting the company's data processing procedures accordingly. Moreover, through regular employee training and internal audits, Alibaba can enhance employees' awareness and skills in privacy protection, ensuring that all operations comply with best practices and legal requirements. These measures not only reduce the risk of data breaches but also enhance user trust, solidifying Alibaba's leadership position in the global market.

4 Conclusion

In the wave of digital transformation, Alibaba Group has become a benchmark for global enterprises with its innovative practices. The company has not only demonstrated how to leverage cutting-edge digital technologies to thoroughly update its business model but has also successfully consolidated its market leadership. By building an advanced e-commerce platform, Alibaba Group has expanded its capabilities in cloud computing and big data analytics services, driven fintech innovation, implemented innovative retail strategies, optimized logistics and supply chain management, and integrated artificial intelligence technologies, completing a magnificent transformation from a traditional enterprise to a fully digital ecosystem. This transformation has not only significantly improved the company's operational efficiency, market responsiveness, and customer experience but also accelerated the digitalization process of related industries within the entire ecosystem.

With the widespread application of artificial intelligence and big data technologies, while driving technological innovation, Alibaba Group should also pay more attention to the societal impacts of these technologies. Ensuring the fairness and ethicality of technology will be an important issue in future technological applications. Alibaba Group needs to actively participate in social responsibility construction while maintaining its technological leadership, balancing the relationship between technological development and societal impact.

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