Evaluating the Effectiveness of Digital Business Transformation using The Example of Chinese IT Ecosystems

Tatyana Kuzovkova[a], Olga Sharavova[b] and Maria Sharavova[c]
Moscow Technical University of Communication and Informatics, Moscow, 123423 Moscow, Russia
t.a.kuzovkova@mtuci.ru, o.i.sharavova@mtuci.ru, m.m.sharavova@mtuci.ru

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Abstract: The relevance of digital business transformation dictates the need to identify the success factors of companies, analyze digitalization tools and comprehensively measure the effectiveness of these processes. To solve this problem, the high-tech ecosystems of China are taken as an example. The solution to the problem is to scientifically substantiate the importance of digital business transformation for the formation of a new technological order using world statistics, classify its directions by types of digital technologies and target areas, as well as identify the specifics of the business of Chinese companies in the IT sector, key aspects and prospects for their development. To ensure the consistency of the research results, a qualitative method of comprehensive assessment of the effectiveness of three companies was used, which allows not only to carry out their quantitative ranking, but also to assess technological leadership.

1 INTRODUCTION

The widespread adoption of digital platforms and the Internet contributes to the development of global network business models embodying ecosystems. As a result of the transformation of the digital economy, markets based on digital platforms are emerging, which facilitates the rapid exchange of goods and services. In addition, these platforms support close communication and interaction between business stakeholders through digital means (T. Yu. Salutina et al., 2022).

A comprehensive assessment of the effectiveness of digital business transformation helps companies formulate strategies and serves as a guide for companies and the government management system. The development of methods for quantitative analysis of synergetic efficiency in the digitization of enterprises is necessary to promote national and international strategies for high-tech development and progress in the methodology of comprehensive multilateral analysis of the results of digital transformation.

Companies actively implementing digital innovations strive for technological leadership that provides them with competitive advantages (P. Lindgren, 2016).

2 THE IMPORTANCE OF DIGITAL BUSINESS TRANSFORMATION FOR THE FORMATION OF A NEW TECHNOLOGICAL ORDER

The widespread and uniform introduction of digital technologies both in the market as a whole and within specific companies has led to the emergence of the concept of digital transformation. This concept reflects the complex goals of digitalization and integration of digital technologies into each functional subsystem of the business (G. P. Platunina et al., 2023).

Digital transformation means a radical change in the management system of an economic unit by

[a] https://orcid.org/0000-0002-0883-0469
[b] https://orcid.org/0000-0002-5910-829X
[c] https://orcid.org/0000-0002-9898-5121

revising the strategy, business models, operations, products, marketing strategies and goals provided by the introduction of digital technologies. Digital transformation is also understood as the process of adaptation by an organization of digital technologies, accompanied by optimization of the control system of the main technological processes.

According to Gartner analysts, global sales of digital goods and services in 2023 will amount to $4.6 trillion, which is 5.1% more than in 2022 (Table 1).

Digital transformation currently underpins the strategic planning of many corporations, as well as having an impact on entire countries, industries, and regulators. This shift requires a complete revision of the methodologies of interaction between the public and government agencies, improvement of production processes through digital technologies and automation, promotion of infrastructure development for data exchange and innovation, thereby contributing to the growth of economic productivity and social progress (T. Y. Salutina et al., 2021).

In the midst of the ongoing digital evolution, digital enterprises have emerged that are shifting their core business operations to the digital realm, developing digital platforms and ecosystems (Kuzovkova et al., 2021).

Table 1: Indicators of the global digital technology market.

Indicators	Sales volume, billion dollars			Growth in 2021-2023, %
	2021	2022	2023	
Data centers	189,5	209,2	216,3	3,4
Corporate software	732,0	790,4	879,6	11,3
Devices	807,6	740,0	735,4	-0,6
IT services	1208,0	1258,2	1357,9	7,9
Communication services	1459,5	1435,4	1469,2	2,4
Total	4396,6	4433,1	4658,4	5,1

The largest segment of the digital economy remains E-commerce, the dynamics of which were significantly influenced by covid and the post-covid recession. The dynamics of e-commerce market revenue, shown in Figure 1, showed its decline by 2.5% in 2022, which led to a sharp deterioration in the stock performance of many key players.

The business models of digital companies are shown in Figure 2, and a comparison of typical models of digital companies is shown in Table 2.

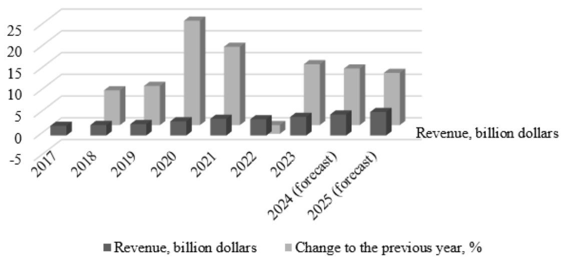

Figure 1: Revenue dynamics of the e-commerce market.

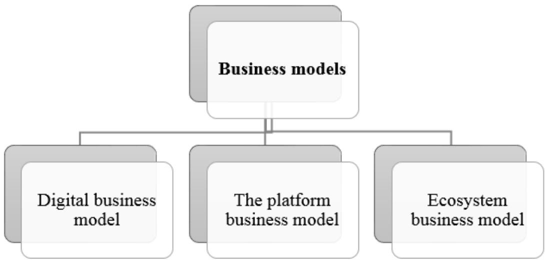

Figure 2: Business models of digital companies.

Table 2: Comparison of typical models of digital companies.

Characteristic	A digital company		
	Platform	Ecosystem	Hybrid
The main business model	A digital platform for creating your own products, services and providing them to other companies	Creating an ecosystem by bringing together participants from different industries and spheres	Combines the features of both a platform and an ecosystem company
Examples	Alibaba, WeChat, Amazon	Google, Apple (App Store), Microsoft (Azure), etc.	Uber, Airbnb, etc.
Flexibility of the business model	It is limited to the main platform, but can provide an API for	Very high - the ecosystem can include a variety of business models	Average, depends on the specific strategy of the company

	third-party developers		
Network effect	The growth in the number of users and the offer of a variety of products and services	Increasing the number of ecosystem participants and diversity of offerings	Various aspects, including the growth of the customer base and the variety of products and services

It is important that the same digitalization project, as a rule, relies on several digital technologies at once, rather than on any one of them. It is fair to say that companies striving for digitalization are gradually expanding the pool of digital technologies used, and thus the directions of digitalization at the internal level, due to which a comprehensive digital transformation is achieved (E. Chang, M. West, 2006).

Other areas of digital transformation of companies include:

- data aggregation and visualization as the collection, systematization and analysis of large amounts of data that are generated into a single repository for in-depth analysis of various business processes;

- creation of data management teams for decision-making, coordination of the functioning of information systems and optimization of their work;

- interaction of business entities in the internal and external environment of companies.;

- automation of business processes using artificial intelligence (AI), machine learning, and robotics (RPA) technologies to solve complex intellectual tasks;

- personalization by creating unique and most suitable offers, products or services for each user and "zero-touch-automation" (automation without intervention) of customer service.

The classification of digital transformation directions by target areas is shown in Figure 3 (V. Liermann, C. Stegmann, 2019).

Digitalization, focused on the systematic development of business, assumes a long-term strategy to create a stable and flexible digital infrastructure of the company and includes the modernization of business processes, the introduction of modern technologies and staff training.

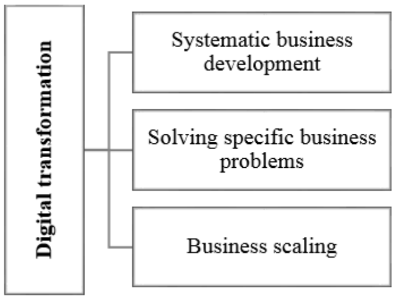

Figure 3: Classification of directions of digital transformation.

When digital transformation is focused on solving specific business problems, the focus begins with identifying problems and finding digital solutions, which allows you to quickly respond to current market challenges (Kuzovkova et al., 2020).

Business scaling is aimed at expanding the company's activities and increasing its market share in terms of products and services offered, which is reflected in strengthening market positions and creating sustainable drivers for long-term growth (Kuzovkova et al., 2022).

3 THE CHARACTERISTIC FEATURES OF THE DIGITAL TRANSFORMATION OF CHINESE COMPANIES' BUSINESS INTO AN ENTITY

China is at the forefront of the digitalization of the economy, emphasizing the need for digital transformation. The leaders in this field are Baidu, Alibaba Group and Tencent, each of which has significant achievements in the field of digital innovation. Baidu prioritizes advances in artificial intelligence and the development of self-driving cars. At the same time, Alibaba Group is a leader in online commerce and cloud services. On the other hand, Tencent dominates the creation and maintenance of social media platforms, instant messaging services and Internet gaming ecosystems. The systematized characteristics of the digital transformation of Baidu, Alibaba Group and Tencent are shown in Table 3.

Table 3: Characteristics of the digital transformation of Baidu, Alibaba Group and Tencent companies.

Characteristic	Baidu	Alibaba Group	Tencent
Business areas	Internet search, AI, autonomous vehicles, cloud computing.	E-commerce, cloud computing, financial services, media, various sectors.	Social networks, messengers, online games, financial services, cloud computing.
Key products, platforms	Baidu Core, Apollo, Baidu Cloud.	Alibaba.com, Taobao, Tmall, Alibaba Cloud, Alipay, AliExpress.	WeChat, QQ, Tencent Cloud, Tencent Games.
Innovative technologies	AI, blockchain, cloud computing, autonomous transport.	AI, cloud computing, blockchain, big data, Internet of things.	AI, cloud computing, blockchain, online games, social media.
International expansion	Active research and development, cooperation with foreign companies.	Global e-commerce, active investments in foreign companies (Lazada, AliExpress, Trendyol, Daraz).	Investments in global technology startups, social media expansion beyond China.
Market capitalization	40.9 billion dollars.	224 billion dollars.	427 billion dollars.

Figure 4 shows the key aspects of the digital transformation of Chinese companies.

Therefore, each corporation develops its own technological infrastructure covering several sectors. Baidu specializes in artificial intelligence and self-driving cars, Alibaba Group specializes in digital commerce and cloud services, and Tencent focuses on social networks, instant messaging and digital games. Their commitment to cutting-edge technologies strengthens their position in the context of the digital revolution in China and their growth on a global scale.

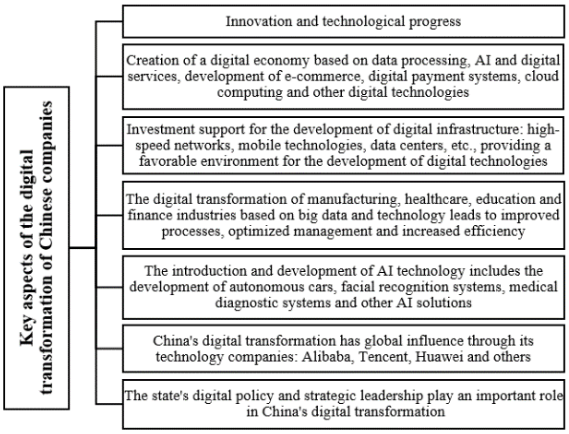

Figure 4: Key aspects of the digital transformation of Chinese companies.

The following are considered as promising trends in the digital transformation of Chinese IT companies:

- widespread adoption of artificial intelligence technologies as an integral part of the development strategy for productivity growth, optimization of business processes, personalization of services and making more informed strategic decisions;
- wide introduction of large amounts of data and analytics into the activities of Chinese corporations helps to identify patterns, predict consumer demand and improve promotion tactics;
- cloud technologies provide increased flexibility, scalability and accessibility of Chinese companies' products, which allows them to interact more effectively with the target market;
- Internet of Things (IoT) (widely implemented in various sectors, including manufacturing, transport, healthcare and smart urban development);
- digital e-commerce platforms continue to be the leading trend in the development of innovative online sales methods, including real-time sales, virtual fitting solutions and image recognition technologies;
- blockchain and digital currencies increase transparency of transactions, enhance security measures and expand support for electronic money transfers;
- Intelligent technologies combined with 5G provide improved high-speed connectivity and underpin complex virtual reality (VR) and augmented reality (AR) applications, as well as the vast ecosystem of the Internet of Things;
- intelligent management systems increase the efficiency of supply chain management of companies as leading exporters).

4 COMPARING THE EFFECTIVENESS OF THE DIGITAL TRANSFORMATION OF CHINESE COMPANIES IN THE IT SECTOR

Qualitative research methods are recommended to assess how various high-tech firms of different sizes, offering a variety of strategies, products and services, have adapted to the digital transformation (Kuzovkova et al., 2023). In particular, for the IT business in China, an approach based on the "diamond" model of H. Levitt, which encompasses structure, people, and technology (H. Leavitt, 1965).

This structure divides corporate functions into three separate elements, reflecting how effectively business process management responds to the challenges of digital innovation. It evaluates the digital skills of employees and their participation in digital transformations, as well as the application of targeted technological solutions and their impact on achieving the goals of digital transformation.

Each indicator of the digital transformation efficiency assessment model is evaluated on a point scale from 1 to 3. The interpretation of the assessment results requires a systematic analysis, therefore, group sums of points (for the components of the model) and integral ones (for the entire model) are used. Table 4 shows the private indicators of the components of the model with minimum and maximum values, Table 5 shows the results of a comprehensive assessment of the effectiveness of digital business transformation of Chinese companies (fragment).

Table 4: Evaluation of the indicators of the digital transformation model of companies.

Group of indicators	Indicators	Criteria	
		min score	max score
Structure	BP(S)1 Flexibility and adaptability of business processes	1	3
	BP(S)2 Business process coverage by digitalization	1	3
	BP(S)3 Business process control	1	3
People	BP(P)1 Digital Competence	1	3
	BP(P)2 Digital Engagement	1	3
	BP(P)3 Digital assistance	1	3
Technologies	BP(T)1 Technology innovation	1	3
	BP(T)2 Technology penetration into business processes	1	3
	BP(T)3 Technology coherence in business processes	1	3

A comparison of the effectiveness of digital transformation across the three largest Chinese companies revealed their similar level of success in digital business transformation. All companies demonstrate a high score (3 points) in synergy of efficiency and technology integration, but in technological interaction – 2 points, and in culture of innovation and training – Baidu, Alibaba 3 points, Tencent – 2 points. This indicates the potential for further digital development in the field of technology interaction.

Table 5: The results of a point assessment of the effectiveness of the digital transformation of Chinese companies in the main areas of development.

Charac-teristic	Baidu	Alibaba Group	Tencent
Efficiency synergy	3 [Success-fully integrates AI, cloud technolo-gies and big data]	3 [Actively uses a combination of AI, cloud technologies and big data]	3 [Succes-sfully integrates AI, cloud services and big data]
Techno-logy integra-tion	3 [Impleme nts Research into products and services (AI in search engines)]	3 [Success-fully integrates to create comprehend -sive services]	3 [Actively develops and implements products and services]
Technolo-gical interaction	2 [Research to evaluate the interaction of technolo-gies]	2 [Invests in research for effective interaction]	2 [Invests in research to improve interaction]
Culture of innovation and learning	3 [Supports a culture of	3 [Focus on training and develop-	2 [Great attention is paid to

	innovation and invests in employee training and develop-ment]	ment of employees, launching their own educational programs]	continuous learning, cooperation with universities and the launch of accelerator programs]
Total	11	11	10

Thus, Baidu, Alibaba and Tencent continue to play a key role in technological progress, actively innovating and shaping the future of the digital economy. Their successes and challenges in the process of digital transformation are an important indicator of the state and direction of development of the global technology industry.

The results of evaluating the effectiveness of digital transformation for three companies, presented in Figure 5, can also be used to measure technological leadership.

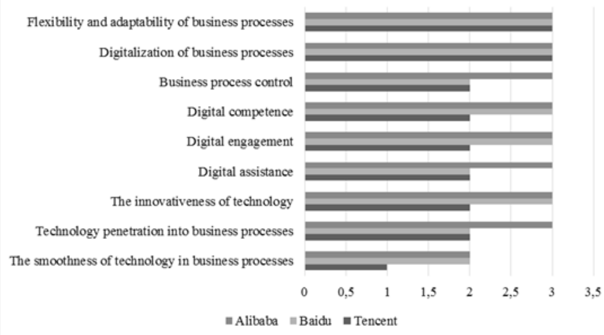

Figure 5: Assessment of the degree of technological leadership of companies based on an assessment of the synergetic effectiveness of digital transformation.

A comparative analysis of the degree of technological leadership of the three Chinese companies showed that the ecosystem companies Alibaba and Baidu have high ratings and advanced positions, demonstrate their ability to innovate and widely use modern technologies. The Tencent ecosystem, with an average result, has a higher potential to improve its position by improving technology integration and strengthening digital competence.

Thus, the results of the assessment of the synergy of the effectiveness of digital business transformation are a key tool for identifying the leading participants in the IT sector in China.

5 CONCLUSIONS

Digital transformation represents a comprehensive and deliberate strategy through which an organization incorporates cutting-edge digital solutions, streamlining its business operations and fostering a culture of innovation. This initiative enhances operational effectiveness, elevates the customer journey, and paves the way for novel avenues to secure competitive edges amidst the fluctuating market conditions and rapid advancements in science and technology.

The study revealed that digital transformation precipitates the emergence of firms, predominantly adopting ecosystem, platform, and hybrid business models, aimed at addressing distinct business challenges.

The systematization of methods, tools, technologies, organizational forms of business development and scaling using the example of high-tech companies in China Baidu, Alibaba Group and Tencent, made it possible, based on their experience, to identify not only promising areas of digital transformation for companies in other countries, but also to quantify the synergy of the effectiveness of these processes.

The application of a qualitative approach to a comprehensive assessment of the effectiveness of key areas of digital business transformation, taking into account the specifics of companies, including technological innovations, changes in business processes and impact on end users, as well as the national specifics of digital development, made it possible to comprehensively measure efficiency in points using the G. Levitt model and expert assessment, to compare activities with the identification of technological leadership and the potential for future development.

The proposed approach makes it possible to systematize the process of analyzing business performance, taking into account its specifics in terms of the specifics of activities, the quality of business processes, the level of digital competence of personnel, and the degree of integration of innovative technologies. These guidelines are a key tool for identifying growth potential and developing strategies in the field of digital transformation.

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