

Digital Transformation Restructures the Industrial landscape: the Co-evolution of Economy, Technology and Security

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KEYWORDS

ABSTRACT

Digital transformation;
Industrial landscape;
Collaborative Evolution;
Digital sovereignty;
China-Belarus cooperation

In the global wave of digital economy, digital transformation has become a core driving force for reshaping national industrial patterns and enhancing global competitiveness. Taking China and Belarus as case studies, this paper constructs a three-dimensional co-evolutionary framework of economy, technology, and security (ETS) to explore the complex interaction mechanisms of economic efficiency improvement, innovation-driven development, and security risk prevention during the transformation process. The research reveals that China has achieved comprehensive restructuring through its scale advantages and systematic strategies, while Belarus has developed specialized IT service industries by leveraging professional breakthroughs and geostrategic bridging. The practices of both countries demonstrate that successful digital transformation requires dynamic balance and coordinated development of ETS, particularly under the context of the "Digital Silk Road," where international cooperation, standard alignment, and institutional innovation are key to achieving a sustainable and secure digital future.

INTRODUCTION

In the 21st century, next-generation information technologies represented by cloud computing, big data, artificial intelligence, and the Internet of Things are driving global digital transformation at an unprecedented pace and scale. This transformation transcends mere technological application — it represents a fundamental restructuring of industrial value chains, business models, and even social governance systems (Vial, 2019)[1]. As nations pursue economic benefits and technological innovation, they must confront the accompanying challenges of cybersecurity and data sovereignty.

This paper proposes an economic-technological-security (ETS) co-evolutionary framework, arguing that digital transformation is not a one-dimensional development but a dynamic process where these three elements constrain and promote each other. The improvement of economic efficiency relies on technological breakthroughs, while the healthy development of technology and economy must be based on security. We select China (the world's

second-largest economy and a leader in the digital economy) and Belarus (an important member of the Eurasian Economic Union and a high-quality IT service exporter) as comparative cases to reveal the common patterns and differentiated paths of digital transformation under different national conditions and scales, and to explore how China and Belarus can achieve ETS co-development under the "Digital Silk Road" framework.

1. Economic dimension: Digitalization reshaping the industrial value chain

The reconstruction of economic pattern by digital transformation is mainly reflected in two aspects: the disruptive improvement of the efficiency of traditional industries (industrial digitization) and the large-scale development of emerging digital industries (digital industrialization).

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1.1.China: Endogenous growth driven by scale and ecological construction

Chinas digital economy continues to grow, exceeding 56 trillion yuan in 2023, accounting for over 40% of GDP (China Academy of Information and Communications Technology, 2024)[2]. The core characteristics of its economic transformation path are the dual-wheel drive of "platform empowerment" and "industrial internet":

1. The Internets Reverse Impact: Leading platforms like Alibaba and Tencent leverage their vast user data and algorithmic expertise to extend services into traditional sectors such as industry and agriculture. For instance, e-commerce platforms and mobile payment systems have restructured retail and financial value chains. Meanwhile, logistics networks like Cainiao have enhanced supply chain efficiency through IoT technology, fundamentally reshaping distribution patterns.
2. Intelligent upgrading of manufacturing: China has vigorously promoted the construction of "industrial internet", achieving large-scale flexible production and personalized customization in manufacturing through platforms such as COSMOPlat and Rootcloud, significantly enhancing the added value and global competitiveness of traditional industries (Zhou & Li, 2023)[3]. This model leverages the vast domestic market to achieve a rapid closed loop of technological application and economic benefits.

1.2.Belarus: Specialization Breakthrough and Export Orientation

Although Belaruss economic size is much smaller than Chinas, its digital strategy focuses on the export of high-value-added IT services. The Minsk High-Tech Park (HTP) is the core carrier of this strategy, successfully attracting and nurturing hundreds of internationally renowned software development and IT outsourcing companies through tax incentives and talent policies (Karpovich, 2022)[4].

Belaruss economic performance is as follows:

1. Strong IT service exports: The IT industrys contribution to national GDP and service trade exports continues to grow, serving as a key driver for economic growth and diversification. It demonstrates strong international competitiveness in areas such as game

development, embedded systems, and cybersecurity software.

2. "Digital Corridor" positioning: Belarus leverages its geographical advantages and EU membership to serve as a digital service hub connecting Eastern and Central European markets, delivering customized technological solutions to global clients.

2.Technical dimension: Dual challenges of independent innovation and collaborative standards

2.1.China:Systematic layout of new infrastructure

Chinas investment in the technological dimension exhibits systematic and forward-looking characteristics:

1. Infrastructure leadership: In the construction of new infrastructure such as 5G, fiber optic networks, cloud computing, and artificial intelligence computing centers, China maintains a global leading position. For example, the "East Data West Computing" project optimizes the layout of computing resources to provide fundamental support for the development of the digital industry nationwide.
2. Core Technology Breakthrough: Facing external technological constraints, China has implemented a "bottleneck" technology breakthrough plan, increasing R&D investment in artificial intelligence chips, operating systems, industrial software, and quantum computing to achieve technological autonomy and control (Li & Wang, 2021)[5].
3. Standard-led capacity enhancement: Chinese enterprises actively participate in the formulation of international standards, particularly in fields such as 5G and the Internet of Things, where they hold a large number of core patents, enhancing their voice in the global digital technology ecosystem.

2.2.Belarus: Talent Advantage and "Light Asset" Innovation

Belaruss technological strengths are primarily rooted in software engineering and talent development. Its high literacy rate and robust STEM education system have cultivated a substantial pool of high-caliber IT professionals,

forming the bedrock of its digital economy competitiveness. Belarus adopts a light-asset technology strategy, focusing on software algorithms, application development, and data science rather than heavy-asset hardware manufacturing. Its innovation path emphasizes deep integration with international tech communities through high-tech parks, leveraging global advanced technologies to achieve efficient secondary and applied innovation (Karabanova, 2023)[6].

2.3. Technological Synergy: The Practice of China-Belarus Industrial Park

The "Jushi" project in the China-Belarus Industrial Park demonstrates the potential of technological collaboration. China provides 5G network deployment and digital infrastructure, while Belarus offers software talent and system integration capabilities. However, technological collaboration also faces challenges, such as compatibility issues between China's promoted industrial internet standards and Belarus's Eurasian Economic Union standards, which require both sides to promote "mutual recognition of standards and flexible alignment" through a joint technical committee.

3. Security dimension: The balance between digital sovereignty and risk prevention and control

The security risks brought by digital transformation are systemic, transnational and dynamic, involving cyber attacks, data leakage, supply chain disruption and algorithmic ethics. The security dimension is crucial to maintaining the stable operation of the economy and the healthy development of technology.

3.1. China: Digital governance system under the overall national security concept

China has elevated digital security to an important component of its overall national security concept, establishing a legal framework of "three laws in one" (the Cybersecurity Law, the Data Security Law, and the Personal Information Protection Law), with the core logic being "sovereignty first, development guaranteed":

1. Data classification and grading: Strict classification and grading management shall be implemented for data related to national security, the lifeline of the national

economy and public interests, and important data and core data shall be stored in China.

2. Critical Information Infrastructure Protection (CIP): By conducting security reviews and promoting domestic alternatives, we aim to reduce reliance on foreign technologies in critical sectors, thereby strengthening supply chain resilience and achieving self-reliance.
3. Cross-border data flow regulation: Regulate sensitive data outbound activities through a security assessment mechanism, aiming to balance global cooperation and national sovereignty protection.

3.2. Belarus: Security strategy in an open economy

As an open small economy, Belarus prioritizes multilateral cooperation and legal compliance in security matters (Shamov & Popov, 2020)[7].

1. Strengthening the legal framework: Belarus has enacted the Law on Information, Informatization and Information Protection and regulations on personal data protection, aiming to align with the EU's GDPR and the Eurasian Economic Union's norms to attract international IT investment.
2. Regional security alliance: Belarus strengthens cooperation with Russia, China and other partners in the field of cyber security, jointly combating cybercrime and responding to geopolitical-driven cyber threats.
3. Balance between sovereignty and openness: Belarus seeks a delicate balance between limited sovereignty and market openness by emphasizing the protection of critical information infrastructure on the one hand and providing relatively flexible data processing environment for foreign investment through high-tech park policy on the other hand.

4. ETS Co-evolution Mechanism and Implications from the China-Belarus Case

The coordinated evolution of economy, technology and security is the key to the success of digital transformation. The three are not mutually opposed, but interdependent: economic benefits provide funding for technology research and development, technological progress improves productivity and security protection, and improved security guarantees create a stable trust environment for economic

and technological development.

4.1. Pathways of Co-evolution

The path of co-evolution between China and Belarus is different due to their national conditions: (Attachment 1).

4.2. ETS Synergy in Chinas Digital Collaboration

The collaboration between China and Belarus under the Digital Silk Road framework exemplifies the value of institutional innovation in ETS coordination. The China-Belarus Industrial Park serves as a prime example, establishing bilateral compliance agreements for cross-border data flows through a regulatory sandbox mechanism. This approach not only safeguards data sovereignty and security but also reduces compliance costs while promoting the application of 5G and IoT technologies, effectively achieving a virtuous cycle among the three elements [8].

Conclusion

Digital transformation is a systematic project to reshape the global industrial landscape, with its success lying in achieving coordinated evolution of economy, technology, and security. China, leveraging its massive market scale and national strategic support, has demonstrated comprehensive restructuring capabilities from foundational technologies to application ecosystems; Belarus, on the other hand, has found its positioning in the open international market by focusing on IT talent and specialized services.

Global digital transformation should focus on three key priorities: First, advancing inclusive development to bridge the digital divide and ensure SMEs and underdeveloped regions can benefit from digital dividends. Second, promoting global digital governance through enhanced international coordination on cross-border data flows, AI ethics, and cybersecurity standards to prevent excessive data silos. Third, driving institutional innovation by transforming security constraints into innovation catalysts through regulatory sandboxes and public-private partnerships. Only when the dynamic balance between efficiency, innovation and security is found, and a collaborative development ecosystem is built through institutional design and

international cooperation, can digital transformation truly become a key force to promote sustainable and resilient development of the global economy.

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Attachment 1

Table.1.

Dimension	The collaborative path of China	Belarusian collaborative pathways	Inspiration
Economy	Scale-driven, platform ecosystem construction, to achieve endogenous growth.	Specialization and talent-driven, economic diversification through IT service exports.	Large countries focus on ecology, while small countries focus on specialization and niche markets.
Technology	New infrastructure takes the lead, and we pursue independent control of core technologies.	The software has deep expertise, focusing on application innovation and international cooperation.	Those with sufficient funds pursue full stack technology, while those with limited resources pursue breakthroughs in key points.
Safe	Sovereignty comes first, build a legal system, and implement life-cycle regulation.	We will bring laws into line with international standards and hedge risks through regional cooperation.	Security must be embedded in economic activity, not imposed as a restriction.