Research on the Sustainable Development Path of China-Belarus New Energy Vehicle Trade from the Perspective of Digital Supply Chain Collaboration

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KEYWORDS	ABSTRACT
	The emergence of the Belt and Road Initiative and sustainable development is the background under which China-Belarus new energy vehicle trade has come to the fore as a new highlight in the realm of cooperation. Based on digital supply chain collaboration, this study uses a comprehensive approach-literature analysis, case studies, and empirical methods-to develop a collaborative model and propose policy recommendations. It also presents the results showing that digital collaboration can improve trade efficiency, reduce carbon emissions, and offer institutional safeguards to China-Belarus green cooperation. This study provides new insights into the integration of new energy vehicle trade and digital supply chains, hence serving as an important reference for fostering sustainable trade across the China-Eurasia region.

INTRODUCTION

New energy vehicles have become a key area of international economic and trade cooperation with the promotion of global energy transition and carbon neutrality. Economic and trade cooperation under the framework of the Belt and Road Initiative has become increasingly robust, and there is huge potential for trade in new energy vehicles between China and Belarus. However, in the traditional trade model, there are such problems as obscure supply chains, inefficient logistics, and heavy environmental burdens. Digital supply chains create new paths to improve trade in sustainability through the integration of resources and process optimization using information technology.This article focuses on how digital supply chain collaboration can promote green development in China-Belarus new energy vehicle trade, fully aligning with international trends in sustainable development while providing practical guidance for corporate bilateral cooperation. Using a qualitative analysis-combined quantitative modelling approach, this research tries to contribute novel insights at a theoretical and policy level.

Main part:

Digital supply chain management focuses on the essence of pursuing end-to-end visibility, traceability, and intelligent decision-making across the entire supply chain with technologies such as the Internet of Things, big data, and blockchain. New energy vehicle trade involves multi-dimensional issues, including technical standards, policy coordination, and green logistics. Most of the research by scholars at home and abroad concentrates on single domains, with less systematic research into their integration. Sustainability theory, emphasizing a balance among economic, environmental, and social benefits, is the value orientation of this paper.[1] The literature review shows that digitization can enhance supply chain resilience, and green supply chains are an important approach to realize sustainability. Based on this, the paper integrates relevant literature and constructs a three-dimensional collaborative framework covering technology, organization, and policy, thus filling the gap in existing research on cross-domain coordination mechanisms.

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China is the largest producer and exporter of new energy vehicles in the world, and its BYD, NIO, and others have entered the Belarusian market. Belarus is also promoting the green transition of its transport sector with unprecedented enthusiasm, which is driving up demand for Chinese new energy vehicles. At present, however, trade is mainly limited to traditional maritime and rail transport. In addition, supply chains are facing many obstacles, such as information asymmetry, inefficient customs clearance procedures, and inadequacies regarding after-sales service networks. Digital technologies, including smart warehousing and cross-border e-commerce platforms, have been adopted in China's supply chains but have not been systematically used to coordinate Sino-Belarusian trade. In addition, technical standards and data security related to green transformation and carbon emissions accounting remain aligned between the two countries. These realities confirm not only the opportunities for but also the urgency of synergy between digitalization and green agendas.[2]

Under this background, this chapter proposes the collaborative mechanism model of China-Belarus new energy vehicle digital supply chain, including three dimensions: technological synergy, organizational synergy, and policy synergy. Technological synergy depends on the application of the Internet of Things in vehicle transportation status monitoring, blockchain technology in guaranteeing the authenticity and trustworthiness of trade data, and big data analysis in predicting market demand. Organizational synergy enables Chinese and Belarusian enterprises to jointly establish digital platforms, realizing the integrated management of orders, logistics, customs clearance, and after-sales services. [3] Policy synergy means that both governments have aligned the green standards and standardized data interfaces and given tax and customs declaration facilitation. This mechanism is, therefore, designed to establish a supply chain system that is transparent, efficient, and low carbon, thereby enhancing the overall competitiveness and sustainability in trade, based on the core idea of 'digital empowerment and green leadership'. As shown in Table 1, from 2019 to 2023, the bilateral trade volume of new energy vehicles continued to grow rapidly, with the average annual growth rate exceeding 50%, and the market demand showed a high degree of robustness. The proportion of new energy vehicles in bilateral automotive trade increased from 18.5% to 47.8%, indicating rapid adjustment toward green trade structures. Meanwhile, the average time of logistics transshipment was shortened from 28 to 19 days, which reflects the steady increase of logistics efficiency and provides empirical evidence for the coordination of the supply chain.

Year	Trade volume (US$ billion)	Year-on-year growth rate (%)	Proportion of new energy vehicles (%)	Average delivery time (days)
2019	2.1	–	18.5	28
2020	3.4	61.9	24.2	26
2021	5.8	70.6	31.7	23
2022	9.2	58.6	39.4	21
2023	13.5	46.7	47.8	19

Data sources: General Administration of Customs of China, National Statistical Committee of Belarus.

Table.1.Key Indicators of China-Belarus New Energy Vehicle Trade (2019–2023)

The dependent variables in the following regression model include the Sino-Belarusian new energy vehicle trade volume, carbon emission intensity, and logistics efficiency, while independent variables include the level of digital investment, policy support, and corporate collaboration. Data were collected from China Customs, the Belarusian State Statistics Committee, and corporate surveys from 2019 to 2023. Preliminary results are presented in Table 2, showing that digital investment and policy support positively affect the trade volume and logistics efficiency, while increased levels of collaboration reduce carbon emission intensity. A case study about the localized service network by BYD in Belarus suggested that digital collaboration reduces delivery cycles and ultimately raises customer satisfaction. The validity of these findings is further demonstrated through robust tests using variable substitution and subsample regressions. As shown in Table 2, the regression results indicated that digital investment, policy support, and the level of coordination among corporations were all significantly and positively influencing factors of trade volume. Of these, the coefficient of digital investment is the highest, standing at 0.42, indicating its most active contribution to the growth of trade; there were also positive influences of policy support and corporate coordination at different significance levels. A high goodness-of-fit ($R^2 = 0.87$) was exhibited by the model, indicating that the independent variables explained fluctuations in trade volume satisfactorily.

independent variable	Coefficient	standard error	t-value	p-value
Digital investment	0.42***	0.08	5.25	0.000
Policy support level	0.35**	0.12	2.92	0.006
Corporate collaboration level	0.28*	0.14	2.00	0.047
Constant term	1.05	0.32	3.28	0.002
R²	0.87			

***p<0.01, **p<0.05, p<0.1

Table.2.Regression Analysis Results (Dependent Variable: Trade Volume)

Enterprises should be encouraged to speed up digital transformation with a data-sharing China-Belarus Joint Digital Operation Center. The governments can facilitate bilateral digital trade arrangements and harmonize new energy vehicle standards to offer green corridors.[4] Industry associations can be engaged in setting up a supply chain alliance to promote training and exchange. In the longer run, an integrated model of new energy vehicles, digital supply chains, and green finance will help develop the circular economy. Public awareness campaigns can be launched to create demand for green and digital mobility.

This research corroborates that digital supply chain collaboration enhances efficiency and sustainability in China-Belarus' new energy vehicle trade, relying on synergy across technology, organization, and policy, guided by the government, led by enterprises, and supported by platforms. [5] This serves to theoretically advance interdisciplinary research on sustainable supply chains and international trade, while also giving practical, actionable cooperation pathways. Limitations exist regarding the timeliness of data and the scope of the case; future research could be done on multi-regional comparisons within Central and Eastern Europe or explore supply chains for emerging car types, such as hydrogen-powered cars.

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