The Impact of Artificial Intelligence and Robotics on International Trade: A Study on the Reshaping of the Global Value Chain and the Transformation of Trade Patterns

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ABSTRACT

Artificial intelligence (AI) and robotics are reshaping global trade, driving manufacturing automation, supply chain optimization, and trade digitization. AI improves trade efficiency through smart manufacturing, automated logistics, and cross-border e-commerce, while triggering technical barriers, supply chain adjustments, and policy changes. This article explores how AI changes the global value chain (GVC), promotes localization of production, and accelerates the shift of international trade patterns toward regionalization and localization. In addition, the article analyzes cases such as Tesla's smart manufacturing, Alibaba and Amazon's smart supply chain, and JD's unmanned warehouses to reveal how AI optimizes supply chain networks and enhances trade competitiveness. As the advantage of low-cost manufacturing declines, developing countries face the challenge of industrial upgrading, while developed countries rely on AI technology to consolidate their trade dominance. Finally, this article summarizes the long-term impact of AI on international trade and puts forward policy recommendations to help governments and businesses cope with AI-driven trade changes and achieve sustainable global economic growth.

Keywords: Artificial Intelligence (AI), Global Value Chain (GVC), Supply Chain Optimization, Trade Digitalization.

JEL classification: F14, O33, F63

1 INTRODUCTION

1.1 Research Background and Significance

With the rapid development of technology, artificial intelligence (AI) and robotics are profoundly affecting the global economic landscape, especially all aspects of international trade. In recent years, the application of AI and robots in production, logistics, supply chain management, trade models, etc. has greatly improved the

efficiency and complexity of global trade. Through innovations such as automated production, intelligent logistics and cross-border e-commerce, the global value chain (GVC) is undergoing reconstruction, and the traditional globalization model is shifting towards regionalization and localization. However, with the intensification of technological barriers, policy games between countries and changes in industrial structure, the impact of AI and robotics on international trade is becoming more and more profound.

The significance of this study is to explore in depth how AI and robotics can promote the intelligent transformation of global trade, especially in the application of manufacturing automation, supply chain optimization and trade digitization. By analyzing the multi-dimensional impact of AI on international trade, this paper hopes to provide policymakers and enterprises with ideas and suggestions on how to gain a favorable position in global technological competition.

1.2 Research Questions and Objectives

This study revolves around the following core issues:

1. How do AI and robotics promote the reconstruction of the global value chain?
2. How does AI affect the pattern of international trade, especially in the fields of cross-border e-commerce, smart manufacturing and automated logistics?
3. In the face of changes brought about by AI, how do countries and companies adapt to the new trade pattern?

Through these questions, this article aims to reveal the profound impact of AI and robots on international trade and explore how countries can leverage these technological advantages to enhance their competitiveness in global trade.

1.3 Research Methods

This paper adopts a combination of literature review, case analysis and quantitative research. First, by reviewing relevant literature, we understand the current status and prospects of the application of AI and robots in international trade. Secondly, by analyzing the cases of companies such as Tesla, Alibaba, Amazon and JD.com, we deeply analyze how AI technology reshapes the global supply chain and trade model. Finally, combining data analysis and policy research, we put forward policy recommendations for governments and companies to cope with AI-driven trade changes.

2 TRADE IMPACT MECHANISM OF ARTIFICIAL INTELLIGENCE AND ROBOTICS

2.1 Core Features of Artificial Intelligence and Robotics

As emerging technologies, AI and robotics are changing the global industrial landscape from multiple dimensions. Recent comprehensive reviews show that

artificial intelligence technologies are being applied widely across multiple sectors, including financial services, healthcare diagnostic systems, autonomous vehicles, and customer support systems, reflecting their transformative potential across both high-tech and traditional domains (Rashid & Kausik, 2024). Especially during the COVID-19 pandemic, AI has demonstrated significant public welfare value in many key areas such as health, education, agriculture, energy, law enforcement and judicial decision-making, further proving its deep integration and mutual promotion with the real economy (Tian et al., 2022).

In the economic field, AI enables machines to make autonomous decisions and optimize operations through data analysis, machine learning and deep learning algorithms, significantly improving production efficiency, reducing costs and improving product quality. Robotics replaces traditional labor with automated systems to improve the speed and accuracy of production processes. In the manufacturing and logistics industries, AI and robots work together to achieve large-scale automation and intelligence. Such technology applications are not limited to the production process, but also cover supply chain management, market forecasting, customer service and other fields, bringing profound changes to global trade.

2.2 Direct Impact of Artificial Intelligence and Robots on Trade

The direct impact of artificial intelligence (AI) and robotics on trade can be roughly summarized into the following five aspects.

1. In terms of improving production efficiency and reducing costs. Research shows that industrial robots, as a key component of AI and automation, significantly enhance productivity and reduce production costs by enabling more accurate, efficient operations and improving product quality across manufacturing sectors (Wu, 2025).

2. In terms of optimizing supply chain and logistics management. Recent research indicates that artificial intelligence and robotics significantly enhance supply chain and logistics management by optimizing inventory control, reducing backlogs, and improving transportation efficiency through big data analytics and machine learning techniques (Chen et al., 2024).

3. In terms of accelerating product customization and market response. Research shows that AI-personalized recommendation technology can significantly enhance e-commerce user engagement and conversion rates by analyzing multidimensional consumer data to predict preferences and tailor product offerings (Yin, 2025).

4. In terms of changing comparative advantages and trade structure. Research shows that industrial robot adoption significantly alters countries' positions in manufacturing global value chains, reshaping comparative advantages traditionally based on cheap labor and contributing to redistributions in trade and cooperation structures (Yuan & Lu, 2023).

5. In terms of promoting the growth of digital trade and service trade. AI models, algorithms, software, etc. have become tradable "digital commodities". AI-assisted telemedicine, education, design, law and other services can be exported across borders.

2.3 Artificial Intelligence Reshapes the Global Value Chain

Review of the Basic Concepts of the Global Value Chain. The concept of the global value chain originated from the earlier theoretical framework of global commodity chains, first articulated by Gereffi and Korzeniewicz in 1994, which analyzed how international production is organized across dispersed networks of firms and retailers and laid the groundwork for later GVC research (Gereffi & Korzeniewicz, 1994). It refers to a cross-border production and trade system in which different countries/regions share multiple links, from raw material acquisition, parts processing, assembly manufacturing to sales and services. Traditionally, GVCs rely on: comparative advantages (such as labor costs), transportation and communication infrastructure, and market access and tariff policies.

Artificial Intelligence Reshapes the Global Value Chain. Recent empirical research shows that artificial intelligence significantly reshapes the organizational structure and operational mechanisms of global value chains by enhancing production capabilities and reallocating industrial positions across countries and industries (Liu, Kuang, & Wang, 2024).

First, with the high automation of manufacturing processes, AI and robotics have significantly boosted production efficiency, driving a trend of manufacturing “reshoring” in developed countries. For instance, recent evidence indicates that the adoption of advanced robotics and automation encourages firms to reshore production, reducing dependence on low-cost labor abroad and potentially eroding traditional comparative advantages of developing countries in global value chains (Calatayud, 2025).

Second, AI is driving the evolution of high-value-added segments like design, marketing, and customer service toward virtualization and cloud-based operations, forming the so-called “digital slicing” trend. This has given rise to “digital value chains” centered on software, algorithms, and platforms, disrupting the traditional division of labor dominated by physical trade.

Simultaneously, data is increasingly becoming a critical input resource within global value chains. The training and optimization of AI models heavily depend on large-scale data acquisition and processing capabilities, granting platform-based enterprises (such as Google and Alibaba) that control data resources a dominant position in the value chain.

Moreover, artificial intelligence applications in supply chain management—including predictive analytics, demand forecasting, and inventory optimization—significantly

enhance operational efficiency and decision-making, enabling dynamic logistics adjustments and improved risk management (Daios & Stefanou, 2025). Particularly post-pandemic, many multinational corporations increasingly favor establishing multi-hub or regional value chain layouts to enhance resilience and navigate globalization uncertainties.

These transformations are steering global value chains toward greater digitalization, intelligence, and decentralization. Conversely, in international trade, the proportion of high-value-added exports driven by AI adoption rates further reshapes positions within global value chains.

The following chart analyzes the relationship among AI technology adoption density, the share of high-value-added exports, and GVC status, using China, South Korea, and the United States as case studies.

Table 1: Robot density, share of high-value exports, and position in the GVC

Country/Region	Robot density(per 10,000 employees)	Proportion of high value-added exports%	GVC status
South Korea	1,012	65.2	Core
Singapore	730	68.5	Core
Japan	397	60.3	Core
Germany	415	58.4	Core
China	322	35.7	Rising
USA	285	62.5	Core
India	33	12.3	Stability
Vietnam	20	9.8	Low-end

Source: Compiled by the author

The data in the above table are derived from the 2023 data of the International Federation of Robotics (IFR), the statistics of the United Nations Conference on Trade and Development (UNCTAD), and the analysis based on the OECD TiVA database and related literature.

From the table, we can see that, ① the robot density is positively correlated with the proportion of high value-added exports: For example, countries such as South Korea, Singapore, and Germany have high robot density and high value-added exports, indicating that the improvement of automation level helps to increase the added value of products. ② GVC status is closely related to the level of automation: countries at the core of GVC usually have higher robot density and high value-added export share,

while countries at the low end are the opposite. ③ China is in the rising stage: China's robot density and high value-added export share are gradually increasing, indicating that its position in the global value chain is rising.

GVC 1.0. The traditional global value chain (GVC 1.0) was primarily built upon the principle of "comparative advantage," wherein countries assumed distinct roles in global division of labor based on their resource endowments, labor costs, and other factors. Developed countries typically controlled high-value-added segments like design, branding, and R&D, occupying the upper reaches of the value chain. Developing countries, meanwhile, handled processing, assembly, and basic manufacturing, positioning themselves at the lower end. Under this model, international trade centered on the cross-border flow of physical goods, forming a global production collaboration system dominated by goods trade.

GVC 2.0. With the widespread application of artificial intelligence, the global value chain is gradually evolving into a new system centered on technology, data, and algorithms—the Global Value Chain 2.0. In this new phase, dominance shifts from traditional resource and labor advantages to technological capabilities and digital sovereignty, with technology, data, and algorithms becoming the key to controlling the value chain. A new global division of labor system is consequently emerging. Technologically advanced nations control AI platforms, model development, and software/hardware standard-setting, occupying the apex of the global value chain. Smart manufacturing nations deeply integrate AI with automation to build next-generation industrial hubs. Service-providing nations transition from labor exports to "intellectual exports" by remotely delivering digital services via AI technology. Moreover, international trade patterns are undergoing fundamental shifts, evolving from single-dimensional goods trade toward a tripartite integrated model of "goods + services + data." Data flows have emerged as a key element alongside physical goods and services, propelling global value chains into a new era of digitalization and intelligence.

Prospects and Challenges. In the process of reshaping the global value chain, artificial intelligence technology has brought new development opportunities and triggered a series of structural challenges.

From the perspective of opportunities, first, the proportion of high value-added links in the global value chain is rapidly increasing, and knowledge-intensive links such as design, algorithms, and platform operations have become new growth engines. Secondly, artificial intelligence provides developing countries with the opportunity to "overtake on the curve". With the help of digitalization and intelligent means, these countries may skip the traditional industrialization stage and achieve leapfrog

development. In addition, "intelligence" and "greening" are advancing simultaneously, and AI helps to build a more sustainable and efficient new value chain system.

However, the challenges are equally severe. First, the control and governance of artificial intelligence technologies are highly concentrated among a few developed economies and major technology firms, posing the risk of widening the global technological divide if inclusive measures are not adopted (United Nations Conference on Trade and Development, 2025). Secondly, data security and data sovereignty issues have made cross-border data flows face more restrictions, and global trade and cooperation mechanisms are therefore affected. Finally, the employment structure will also undergo profound adjustments, Recent research highlights the need for updated regulatory frameworks to address labour market shifts and employment challenges in contexts of technological change and informal employment. Lassassi & Hammouda (2025) find that labour regulation reforms are critical for balancing flexibility and protection in evolving economies, especially middle-income countries are facing the double squeeze of being "technically suppressed" by developed countries and "catch-up in cost" by low-income countries.

3 CHANGES IN THE INTERNATIONAL TRADE MODEL

3.1 The Transformation of Trade Globalization to Regionalization and Localization

Globalization has long driven international trade toward a model of large-scale, cross-regional production division, primarily relying on cost advantages in different countries or regions, such as cheap labor and resource endowments. However, in recent years, the rapid development of artificial intelligence (AI) and robotics has gradually brought profound changes to this model. The rise in production automation has not only diminished the comparative advantage of cheap labor but also prompted more companies to rethink their global supply chain strategies, increasingly favoring “regionalized” or even “localized” production layouts.

First, automation and robotics significantly raise labor productivity and reduce firms’ reliance on low-cost manual labor in manufacturing, reshaping labor market dynamics and production location decisions (Firooz, Leduc & Liu, 2025). Over the past few decades, manufacturing companies have increasingly shifted production to regions with lower labor costs, such as East and Southeast Asia. However, with the widespread adoption of robotics and automated factories, production processes are now beginning to return to developed countries. Take Tesla as an example: this American electric vehicle manufacturer has established multiple highly automated smart manufacturing plants in domestic locations like California and Texas. Through automated robotic production lines, Tesla has significantly boosted production efficiency while effectively reducing labor costs.

Second, industrial clusters are increasingly recognized as strategic drivers in global value chains, facilitating regional supply chain integration, innovation, and cooperation in response to global economic and societal challenges (Haus-Reve & Gilsing, 2024). The application of smart technologies enables companies to respond more flexibly to shifting market demands, leading them to prefer locating supply chains closer to consumer markets. The rise of regional supply chains shortens the time-to-market for products, reduces logistics costs, and lowers the risk of supply chain disruptions. For instance, following the COVID-19 pandemic, many multinational corporations prioritized supply chain resilience by concentrating operations closer to major markets—a trend particularly pronounced in North America, Europe, and East Asia.

Third, AI-driven "nearshoring" and "reshoring" practices are gaining traction. AI and robotics enable companies to reestablish automated production facilities domestically in developed nations. This "relocalization" trend reduces time delays and uncertainties caused by international shipping in supply chains, further propelling the shift in global trade patterns from globalization toward localization. For instance, Adidas returned production to Germany by deploying its Speedfactory smart manufacturing facilities, successfully achieving rapid market response with customized products and significantly enhancing supply chain efficiency.

In summary, the adoption of digital and automation technologies, including AI and robotics, is closely associated with the regionalization of global value chains, as production networks shift toward more localized and proximity-based configurations in response to technological change (Giunta, Marvasi & Sforza, 2025). This transformation not only enhances production efficiency and supply chain resilience but also profoundly reshapes global industry layouts and trade flow directions. Moving forward, businesses and governments must proactively adjust strategies and policies to address both the opportunities and challenges presented by this new trade paradigm.

The following is a collection of statistics on the global trade structure in 2010 and 2023, and a comparative analysis of the changes in the global trade structure:

Table 2: Global trade structure trend table (2010 vs 2023)

Indicator	2010	2023	Trend	Data source
Share of global goods trade	Approx. 75%	Approx. 73%	Slight decline	UNCTAD
Number of regional trade agreements (RTAs)	Approx. 220	374	Significant increase	WTO RTA Database
Share of services trade in global trade	Approx. 15%	Approx. 27%	Notable rise	UNCTAD
Share of digital services trade in services trade	Approx. 30%	Over 50%	Rapid growth	UNCTAD

Source: Compiled by the author

According to the above statistics, we can find obvious changes in the following three aspects: ① The regionalization trend is strengthening: the number of regional trade agreements has increased from about 220 in 2010 to 374 in 2023, showing the trend of global trade towards regionalization. ② The proportion of service trade has increased: the proportion of service trade in global trade has increased from about 15% in 2010 to about 27% in 2023, indicating that the importance of service trade is increasing. ③ The rapid growth of digital service trade: the proportion of digital service trade in service trade has increased from about 30% in 2010 to more than 50% in 2023, reflecting the increasingly prominent role of digitalization in trade.

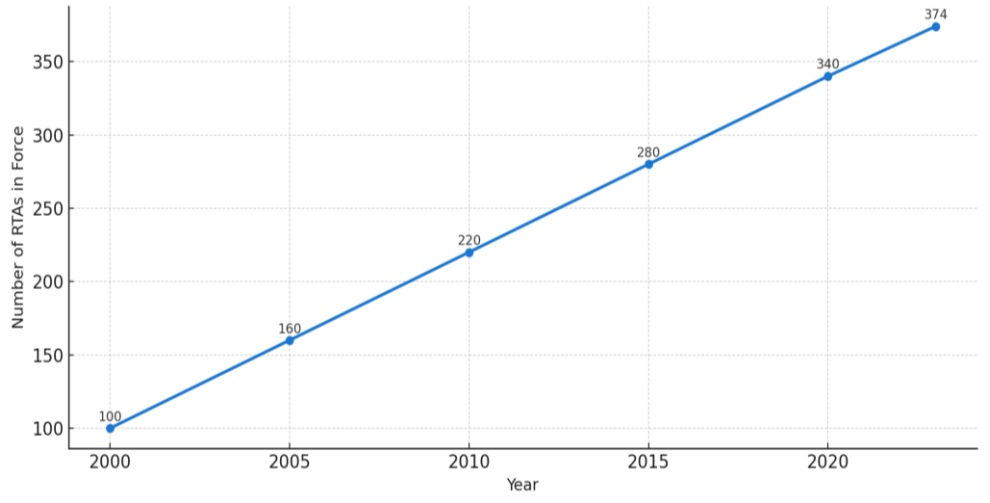

Figure 1: Growth of regional trade agreements (RTAs), 2000–2023

The picture clearly shows the continuous growth trend of the number of regional trade agreements (RTAs) between 2000 and 2023: from about 100 agreements in 2000 to 374 in 2023. The substantial increase in the number of regional trade agreements reflects the shift in the globalization model: international trade is evolving from a global agreement system dominated by the WTO to a regionalized and multilateral framework, forming a new pattern of "regional coordination".

3.2 Emerging Trade Models: Digital Trade and Smart Supply Chain

Against the backdrop of the accelerated integration of technologies such as artificial intelligence (AI), big data, cloud computing and the Internet of Things, global trade is undergoing a deep transformation from traditional commodity trade to a new digital and intelligent trade model. The rise of digital trade and smart supply chains has not only improved the efficiency and transparency of global trade, but also reshaped the interaction mode and value creation logic between trade participants, marking that international trade is entering a new stage driven by technology(Zhang et al., 2020).Recent research demonstrates how AI-enhanced digital tools transform international service trade and digital platforms. Darvidou & Siskos (2025) find that the implementation of AI-driven digital marketing and analytics significantly improves consumer targeting and market demand conversion in cross-border service sectors, highlighting the role of intelligent platforms in reshaping modern trade structures.

Digital Trade Promotes the Intelligentization of Trade Methods. Digital trade involves cross-border transactions of goods, services and data through electronic means, covering e-commerce, digital products and online services. The popularization of AI has accelerated its intelligence and improved precision marketing and transaction conversion rates, such as Alibaba's "Thousand Faces for Thousands of People" and Amazon's customized pages. AI also helps with risk control and payment risk control, and promotes the development of digital trade platforms towards intelligent integration.

Intelligent Supply Chain Improves Global Collaborative Efficiency. Another significant aspect of AI's impact on global trade lies in the intelligent transformation of supply chain management. Smart supply chains leverage big data, AI algorithms, and real-time data processing to optimize the entire process—from production forecasting and inventory management to transportation scheduling—substantially enhancing the responsiveness and resilience of global trade operations. AI can identify market trends and potential bottlenecks in real time within massive datasets, assisting enterprises in precise supply-demand forecasting and dynamic scheduling. For instance, companies like Walmart and JD.com utilize AI for automated inventory replenishment and optimized transportation routes, effectively reducing logistics costs and warehousing losses.

Amid rising global uncertainties like pandemics, conflicts, and natural disasters, intelligent supply chains particularly highlight their flexibility and resilience. Businesses can rapidly reconfigure supply chain structures through AI systems, flexibly switching suppliers and distribution centers to ensure stable trade operations. For instance, Apple leveraged its global AI-driven collaborative system to swiftly reconfigure key component procurement routes during the 2021 global chip shortage crisis, thereby maintaining normal shipments of its flagship products.

Typical Case: Amazon and JD.com's Smart Trade System.

Amazon: Amazon has formed an efficient digital supply chain network covering the world through AI algorithm-driven smart warehousing systems (such as Kiva robots), predictive delivery systems and pricing optimization models. Its "smart forward warehouse" system can predict users' potential purchasing behavior and deliver goods to regional logistics nodes in advance, shortening delivery time.

JD.com: JD.com has established a large number of unmanned warehouses, smart sorting systems and self-driving delivery vehicles in China, and its supply chain efficiency has become the world's leading level. Through the real-time analysis of order data by the AI system, JD.com can accurately control the inventory location and quantity and achieve "minute-level response" cross-regional logistics scheduling.

In summary, digital trade and smart supply chains constitute the new infrastructure for international trade in the AI era. They not only improve the efficiency and flexibility of cross-border transactions, but also promote the evolution of global trade towards a new model of high quality, low cost, personalization and real-time response.

3.3 Trade Barriers and Policy Challenges

Artificial intelligence and robotics are profoundly changing the international trade model, while also bringing new policy challenges and non-traditional trade barriers(Pan et al., 2025). Against the backdrop of the accelerated development of global digital and intelligent trade, technological dominance, data security, standard setting and talent competition have become the focus of competition among countries, and traditional tariff barriers are giving way to "technical barriers" and "institutional barriers".

Rise of Technological Protectionism. The strategic value of AI and related high-end technologies is becoming increasingly prominent, and some developed countries have strengthened export controls on key technologies such as core algorithms, chips, and industrial robot systems. This "new technology cold war" trend has increased the difficulty for developing countries to obtain advanced technologies and raised the threshold for companies to participate in the global value chain. For example, the export restrictions on high-tech products imposed by the United States on China have

not only affected bilateral trade between China and the United States, but also posed a challenge to the security and stability of the global technology supply chain.

Data Sovereignty and Strengthening of Digital Barriers. Data has become a new production factor and trade asset, and countries are rapidly paying more attention to "data sovereignty". The General Data Protection Regulation (GDPR) launched by the European Union, China's data outbound review mechanism, and the digital platform regulatory rules of the United States all reflect the tough stance of various countries in protecting their own data resources and network security. The "digital barriers" formed by this are restricting cross-border data flows and increasing the uncertainty of global digital trade.

Geopoliticization of Standard Setting. Technical standards in fields such as AI, autonomous driving, and intelligent manufacturing are becoming a new frontier of competition between countries. Countries that have the right to set standards will have a first-mover advantage in the international market, while countries that lack the right to speak may be excluded from the new generation of global market access. Taking the European Union as an example, it has gradually established a future-oriented trade rules system through new standards such as green trade, carbon tariffs and digital taxes.

The Necessity of Policy Response and Global Coordination. In the face of new barriers, countries need to strengthen AI industry policies, encourage participation in international standard setting and technical cooperation, and promote fair and transparent global technology and data governance under a multilateral framework, such as WTO e-commerce issues and OECD digital tax negotiations. The trade changes caused by AI are not only technical issues, but also about the reconstruction of rules. In the future, international competition will focus on standards, data and institutional systems, and policy coordination and international cooperation will become the key to winning the initiative in the new trade pattern.

4 PROSPECTS OF ARTIFICIAL INTELLIGENCE AND ROBOTICS FOR THE FUTURE DEVELOPMENT OF GLOBAL TRADE

4.1 Evolutionary Trends of Global Trade Structure

Artificial intelligence (AI) and robotics are reshaping the fundamental landscape of global trade. Their far-reaching impact extends beyond transforming production methods, manifesting in the restructuring of global value chains, adjustments to industrial layouts, and profound evolution in trade organization models. Traditional globalization emphasized division of labor efficiency and cost minimization, primarily relying on low-cost labor, resource allocation, and cross-border manufacturing networks. In this new phase of widespread AI adoption, manufacturing activities are witnessing the intertwined evolution of two trends: “deglobalization” and “new globalization.”

On one hand, manufacturing processes are "reshoring" to developed nations, exhibiting characteristics of deglobalization. AI and robotics have elevated automation levels, significantly reducing reliance on manual labor in production processes. This has eroded the comparative advantage of developing countries centered on cheap labor. Increasingly, enterprises are opting to establish smart factories domestically or within their regions to enhance flexibility, mitigate logistics risks, and strengthen rapid responsiveness to market shifts. For instance, companies like Tesla and General Electric deploying highly automated production systems in the United States exemplify AI-driven manufacturing localization.

Concurrently, a new wave of globalization driven by platforms, data, and algorithms is emerging. AI is reshaping the logic of value chain division, concentrating high-value-added segments in technology- and knowledge-intensive domains. Through cross-border digital platforms and intelligent service networks, enterprises can effortlessly achieve global market coverage and resource coordination. For instance, multinational tech platforms like Amazon, Alibaba, and ByteDance leverage AI to achieve supply chain coordination, targeted user services, and precise product recommendations. This new globalization no longer relies on physical factories and traditional cross-border investments but centers on the cross-border flow of data, platforms, and algorithmic capabilities. Simultaneously, global value chains are progressively moving toward "intelligent, short-chain, and regionalized" structures. AI enables enterprises to achieve higher efficiency in smaller production units, disrupting the traditional logic of economies of scale. Concurrently, amid rising global uncertainties—such as geopolitical tensions, climate risks, and public health crises—businesses increasingly favor multi-hub, distributed regional supply chains to enhance resilience and controllability. This trend drives the evolution of global value chains from "cross-continental mass outsourcing" toward "regional collaborative networks."

Furthermore, international trade patterns are taking on a new form characterized by the "tripartite convergence of goods, services, and data". The cross-border flow of new digital assets—such as AI algorithms, SaaS platforms, and virtual products—is becoming increasingly frequent. Data and services are gradually replacing traditional physical goods as core components of global trade. This shift signals a transformation in the focus of global trade, evolving from the "manufacturing-transportation-sales" chain toward an "algorithm-distribution-experience" model.

Overall, AI and robotics are propelling global trade from traditional "industry-driven globalization" toward a "technology-driven regionalization-platforming-intelligence convergence" model. This trend will profoundly reshape nations' positions and roles within global trade networks, while also presenting entirely new demands for policymakers and corporate strategic planning.

4.2 Policy Response and National Strategic Path

Policy Reconstruction and Global Governance Participation of Various Countries. Faced with the profound impact of artificial intelligence technology on international trade rules and operational mechanisms, countries must proactively adjust traditional trade policies to incorporate AI-related elements such as cross-border data flows, algorithm regulation, digital taxation, and privacy protection. For instance, the European Union has integrated AI governance into trade and market regulations through the AI Act and Digital Markets Act, striving to establish a dominant position within the digital regulatory framework. Meanwhile, global technology and data regulations remain in a phase of rapid evolution, with multilateral institutions like the WTO, OECD, and G20 emerging as key negotiating platforms. Countries should actively participate in the development of digital trade agreements, AI governance principles, and global data standards promoted by these organizations. This engagement will help secure greater influence in rule-making, preventing nations from being relegated to a passive role in the emerging technology-driven global trade landscape.

Strategic Path Selection for Developing Countries. Although low-income countries currently lag in AI adoption, advances in artificial intelligence offer an unprecedented opportunity for these economies to leapfrog traditional development constraints and harness AI for social and economic progress in critical sectors such as healthcare, education, and infrastructure (Khan, 2024). These countries should give priority to the construction of digital infrastructure, such as 5G networks, cloud computing platforms and national data centers, to lay the foundation for the subsequent development of intelligent industries. At the same time, local enterprises should be encouraged to adopt AI technology to achieve production upgrades and accelerate the transformation from traditional manufacturing to intelligent manufacturing.

At the strategic level, developing countries should also attach importance to talent training and international cooperation, and enhance their AI application capabilities by introducing foreign capital, technical assistance, and digital capacity building projects. In addition, actively participating in regional cooperation frameworks (such as RCEP, African Continental Free Trade Area) and negotiations on global digital governance rules is a key way to integrate into the global digital economy and break through the "technological divide". Only by achieving dual improvement in technical capabilities and institutional participation can developing countries strive for a more advantageous position in the future global value chain.

5 CONCLUSION AND OUTLOOK

With the rapid development of artificial intelligence and robotics, the global trade pattern is undergoing profound and systematic changes. From industrial chain restructuring to trade model innovation, from global value chain reconstruction to policy response and national strategic reshaping, AI technology has not only improved the efficiency and intelligence level of global trade, but also fundamentally changed the logic of competition and cooperation between countries.

5.1 Conclusion

With the rapid advancement of artificial intelligence and robotics, the global trade landscape is undergoing profound and systemic transformation. From industrial chain restructuring to trade model innovation, from global value chain reconfiguration to policy responses and national strategy reshaping, AI technology has not only enhanced the efficiency and intelligence of global trade but fundamentally altered the competitive logic and cooperative models among nations.

The paper first analyzes the widespread application of AI and robotics across manufacturing, logistics, platforms, and algorithms, highlighting how these technologies directly propel global trade toward “digitalization, intelligence, and platformization.” In this process, the traditional globalization model reliant on low-cost labor is gradually declining, replaced by a new trade structure characterized by shorter chains, greater localization, and smarter distribution. Case studies of companies like Tesla, Amazon, and JD.com demonstrate how highly automated manufacturing systems and intelligent supply chain layouts are reshaping global trade pathways through technological innovation. The paper further argues that global trade is no longer solely about the movement of goods but has evolved into a composite model comprising “goods + services + data.” Emerging digital trade platforms, AI-driven recommendation and scheduling systems, along with global data flows and intelligent delivery, have become new engines driving cross-border trade growth. In this new landscape, AI serves not only as an efficiency enhancer but also as a rule-redefining force. Simultaneously, the global trade transformation driven by AI presents unprecedented challenges. Against a backdrop of rising technological protectionism, data sovereignty concerns, and digital barriers, governments worldwide must rebuild trade policy frameworks and advance transnational standard-setting and digital governance cooperation. For developing nations, AI presents both the risk of marginalization and a historic opportunity to leapfrog ahead. Only by proactively investing in digital infrastructure, developing smart manufacturing capabilities, and strengthening talent cultivation and technological collaboration can they secure advantageous positions in future global value chains.

5.2 Outlook

Looking ahead, global trade will increasingly show the following trends: First, regionalization and platformization coexist, and cross-border trade will transform from globalization to "intelligent regional collaboration"; second, data and algorithms will become new core comparative advantages. Whoever masters the intelligent infrastructure will master the ticket to the global market; third, global rules are facing pressure to reconstruct, and the integration of technology governance and trade agreements will become a new focus of multilateral cooperation.

Therefore, AI is not a force to end globalization, but a technological foundation to promote global trade into the "new globalization" stage. Only by working together in terms of technological innovation, institutional collaboration and strategic response can countries jointly build a smarter, fairer and more sustainable new global trade order.

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