WEP Warwick Evans Publishing

International Journal of Global Economics and Management

ISSN: 3005-9690 (Print), ISSN: 3005-8090 (Online) | Volume 9, Number 1, Year 2025
DOI: https://doi.org/10.62051/ijgem.v9n1.06
Journal homepage: https://ijgem.org

The Reshaping of the Global Value Chain and the Evolution of the International Trade Landscape under the Sustainable Development Goals

Zehua Zheng

Faculty of Business and Economics, The University of Melbourne, Parkville VIC 3010, Australia

ABSTRACT

The United Nations Sustainable Development Goals (SDGs) have become a global consensus, driving a paradigm shift in the global value chain from one prioritizing efficiency to one prioritizing sustainability, profoundly impacting the logic of the international division of labor and the system of trade rules. Drawing on the latest data from international organizations such as UNCTAD and the WTO, this article systematically examines the inherent coupling between the SDGs and the global value chain, analyzes the triple mechanism by which policy regulation, market demand, and technological innovation drive the reshaping of the value chain, and explores the core directions of regionalization, greening, and digitalization in this reshaping. The results show that this reshaping of the value chain is leading to a dual dynamic of "multipolarization" and "reconstruction of rules" in the international trade landscape: the trade share of BRICS countries has increased to 22%, and emerging economies and low-income countries within developing countries are showing differentiated participation. Emerging economies have significantly strengthened their voice in the rules, but green barriers such as the EU's Carbon Border Adjustment Mechanism (CBAM) have a more significant impact on low-income countries, exacerbating trade stratification. Based on practical cases such as Midea's overseas lighthouse factories and Jinhua's corporate carbon labeling, it is demonstrated that green technological innovation and regional collaboration are key pathways to overcoming the challenges of this transition. The research conclusions of this article can provide practical reference for countries to participate in the upgrading of the global value chain and adapt to the evolution of the international trade pattern.

KEYWORDS

Sustainable Development Goals (SDGs); Reshaping of Global Value Chains; International Trade Structure; Carbon Tariffs; Regional Coordination

1. INTRODUCTION

The United Nations Sustainable Development Goals (SDGs) have become a global consensus, driving a paradigm shift in the global value chain from one prioritizing efficiency to one prioritizing sustainability, profoundly impacting the logic of the international division of labor and the system of trade rules. Drawing on the latest data from international organizations such as UNCTAD and the WTO, this article systematically examines the inherent coupling between the SDGs and the global value chain, analyze the triple mechanism by which policy regulation, market demand, and technological innovation drive the reshaping of the value chain, and explores the core directions of regionalization, greening, and digitalization in this reshaping. The results show that this reshaping of the value chain is leading to a dual dynamic of "multipolarization" and "reconstruction of rules" in the international trade landscape: the trade share of BRICS countries has increased to 22%, and emerging economies and low-income countries within developing countries are showing

differentiated participation. EU's Carbon Border Adjustment Mechanism (CBAM) have a more significant impact on low-income countries, exacerbating trade stratification. Based on practical cases such as Midea's overseas lighthouse factories and Jinhua's corporate carbon labeling, it is demonstrated that green technological innovation and regional collaboration are key pathways to overcoming the challenges of this transition. The research conclusions of this article can provide practical reference for countries to participate in the upgrading of the global value chain and adapt to the evolution of the international trade pattern.

2. THEORETICAL LOGIC: THE DEEP COUPLING OF SDGS AND GLOBAL VALUE CHAINS

The coupling of the SDGs and the global value chain is essentially a systematic transformation of the international division of labor by the concept of sustainable development. This coupling stems from both the upgrading of development concepts and the synergy of governance mechanisms. The traditional "center-periphery" structure of the global value chain leads to an imbalance in value distribution and the externalization of environmental costs. Developed countries dominate high-value-added processes such as R&D and branding, while environmental costs such as carbon emissions are primarily borne by developing countries. Emerging economies bear the carbon costs of mid- and high-end manufacturing, while low-income countries bear the environmental costs of resource extraction and primary processing. This model fundamentally conflicts with SDG10 (Reduced Inequality) and SDG12 (Responsible Consumption and Production). By setting global development goals, the SDGs provide a unified value framework for the reshaping of value chains. The implementation of the United Nations Global Compact initiative shows that by integrating the SDGs into supply chain management, 12,000 participating companies worldwide have achieved an average increase in resource efficiency of 18% and a 22% increase in brand value, demonstrating that sustainable transformation and economic benefits can form a positive cycle. From a theoretical perspective, this coupling is reflected in three dimensions: in terms of value goals, the transformation from "profit maximization" to "maximization of the comprehensive value of economy, environment and society" is achieved; in terms of the logic of division of labor, a new division of labor standard of "low-carbonization, circularization and digitalization" is formed; in terms of the governance system, a multi-level coordination mechanism of "multilateral rules-regional agreements-corporate practices" is established. In practice, SDGs have become a core issue in the governance of the global value chain. The OECD report shows that 75% of countries have incorporated carbon emission indicators into the trade licensing process. Developed economies such as the EU and the United States have promoted upstream and downstream companies in the value chain to implement the SDG13 "climate action" goals by formulating green standards; developing countries, through participating in regional cooperation, embed SDG8 "decent work and economic growth" and other demands in the value chain - emerging economies focus on independent technology research and development to adapt to standards, and low-income countries rely more on cooperation to gain a period of adaptation to the rules. This coupling not only promotes the quality upgrade of the value chain, but also reconstructs the value judgment criteria of international trade, making "sustainability" a core indicator for measuring the competitiveness of the industrial chain [1].

3. RESHAPING THE DRIVING FORCE: A TRIPLE DRIVING MECHANISM OF POLICY, MARKET, AND TECHNOLOGY

The reshaping of the global value chain towards sustainability is not accidental; it is the inevitable result of the convergence of policy regulation, market demand, and technological innovation, which mutually reinforce each other to form a closed-loop driving system. Policy regulation constitutes the hard constraint on this reshaping. The most iconic green policy is represented by the EU's Carbon

Border Adjustment Mechanism (CBAM). After a transition period from 2023 to 2025, the mechanism will officially take effect in 2026, covering six high-carbon industries, including steel, aluminum, and cement. It requires imported products to pay a fee based on their carbon emissions, with the price linked to the EU Emissions Trading System (ETS) allowance price. This policy, through "border carbon adjustment," forces companies in exporting countries to reduce their carbon emissions. According to European Commission estimates, the CBAM will reduce global carbon emissions in related industries by 10%. Furthermore, the proportion of sustainable development clauses in regional trade agreements has increased significantly. Of the regional trade agreements that came into effect in 2023, 82% included environmental provisions, a 50 percentage point increase from 2010. Agreements such as the RCEP and the CPTPP have incorporated SDG-related targets into their trade rules, setting graduated emission reduction requirements for emerging economies and granting low-income countries a 5-10 year grace period for compliance [2]. Market demand is creating an internal driving force for this restructuring. Consumer preference for sustainable products continues to rise, and labels such as FSC forest certification and ISO 14064 carbon certification have become important factors in market competition. Multinational retail giants such as Walmart have established carbon emissions databases covering 100,000 suppliers, directly linking emission reduction performance with procurement quotas, and promoting low-carbon transformation throughout the supply chain. UNCTAD data shows that global trade in consumer goods with eco-labels will grow by 12% in 2023, far exceeding the 5% growth rate for traditional products. Emerging economies contribute 60% of exports of eco-friendly consumer goods, while low-income countries account for only 5% (primarily organic agricultural products), demonstrating that sustainability attributes have become an integral part of a product's core competitiveness. Technological innovation provides key support for this restructuring. The integrated application of digitalization and green technologies has broken the spatial and temporal constraints of traditional value chains. Blockchain technology has increased the carbon footprint traceability coverage of supply chains to 23%, and smart logistics systems have improved global supply chain processing efficiency by 40%. Midea Air Conditioning's Thailand factory uses a photovoltaic system combined with a water storage microgrid system to achieve energy savings of 40.2% and a 68.3% reduction in carbon emissions per unit. Furthermore, by leveraging 72 digital/AI solutions, it has reduced order lead times by 43%, demonstrating the role of technological innovation in supporting the dual goals of "green" and "efficiency." The benefits of these technologies have tended to accrue to emerging economies. Low-income countries, facing high costs, have been limited to applying basic technologies in niche areas such as the agricultural Internet of Things [3].

4. RESHAPING THE PATH: A PARADIGM SHIFT FROM GLOBAL DECENTRALIZATION TO REGIONAL COLLABORATION

Driven by policy, market, and technology, the global value chain is undergoing a profound restructuring, with regional agglomeration, green transformation, and digital empowerment becoming prominent features. The traditional "globally dispersed" model is gradually being replaced by a "regional coordination and sustainability-oriented" model. Regional agglomeration is a core trend in this spatial restructuring. Geopolitical risks and the need to internalize sustainable costs are driving multinational companies to relocate their supply chains to the periphery of core markets. Within the North American Free Trade Area, the reshoring of US manufacturing has driven an 18% increase in Mexican auto parts exports. Southeast Asia, leveraging RCEP tariff preferences and labor advantages, has seen an average annual growth rate of over 8% in manufacturing exports, making it a key node in the regionalization. In the regional division of labor, emerging economies are responsible for mid- to high-end links, while low-income countries are responsible for labor-intensive processes. Midea Air Conditioning's Thailand factory collaborates with 691 local suppliers, with 97.8% of its employees coming from Southeast Asia. This achieves "local production + regional supply," with a production capacity exceeding 5 million units, directly demonstrating the advantages of regionalization. Green transformation permeates the entire value chain, incorporating sustainable

concepts into every link. Brazil is promoting trade in bio-based materials, with annual growth exceeding 12%. Germany passed a circular economy bill, increasing the proportion of remanufactured product exports to 15%. A company in Jinhua, China, leveraged a "time-sharing and zone-based electricity carbon factor accounting platform" to produce during peak photovoltaic power generation periods, reducing carbon emissions per thermos cup by 27%. The "time-sharing carbon label" has also been recognized by European and American customers. Transformation varies across developing countries: emerging economies have achieved full-chain transformation, while low-income countries remain focused on upstream green mining. This transformation reduces environmental costs and creates new trade advantages. Global circular trade is projected to exceed $1 trillion by 2025. Digital empowerment is accelerating efficiency upgrades across the value chain. Digital technology is disrupting traditional linear structures, forming a "platform-based collaborative" network. Cross-border e-commerce is enabling small and medium-sized enterprises in developing countries to directly connect to global markets, with its share of global trade expected to rise from 6% in 2015 to 18% in 2023, with emerging economies accounting for 85% and low-income countries for 15%. Artificial intelligence is optimizing supply chain planning, reducing the average cost of global cross-border payments from 7.1% in 2010 to 3.2% in 2023. The integration of digital and green technologies is also giving rise to a new "digital-green" dual-driven model, providing an efficient path to achieving sustainable development goals [4].

5. EVOLUTION OF THE LANDSCAPE: DUAL CHARACTERISTICS OF MULTIPOLARIZATION AND RULE RESTRUCTURING

The shift toward sustainable development in the global value chain is driving a historic shift in the international trade landscape, characterized by a multipolar power structure and a green, digitally restructured rules system. This is accelerating the disintegration of the traditional "center-periphery" structure dominated by Europe and the United States. This trend toward multipolar power is evident: emerging economies continue to rise in the value chain, with the BRICS trade share rising from 11% in 2000 to 22% in 2023. China is shifting from being the "world's factory" to the "world's office," with service exports accounting for 16% in 2022. India's digital services and Vietnam's mid-to-high-end electronics manufacturing are also making breakthroughs. Low-income countries are slowly advancing through regional cooperation. The African Continental Free Trade Area is projected to see a 7% increase in internal trade by 2023. Ethiopia's textile industry is driving the "raw cotton to garment" supply chain, increasing local value added from 30% to 45%. Developing countries are also gaining a stronger voice in rule-making. UNCTAD data shows that their participation in WTO reform proposals rose from 35% in 2015 to 48% in 2023. 70% of these proposals came from emerging economies (focusing on carbon footprints and digital rules), while low-income countries prioritized technology transfer and financial support. This multipolarization is also reflected in the upgrading of the division of labor in the value chain: Southeast Asian countries are shifting from assembly to parts manufacturing, while India's digital services are breaking the high-end monopoly of developed countries. Trade rules are undergoing a systematic restructuring: green rules have become a core competitive advantage. The EU is promoting carbon pricing standards through the CBAM, while the US and Japan are exploring carbon tariffs, creating "green barriers." Digital rules are also diverging regionally. The EU's Digital Trade Act emphasizes data privacy, while the US's Chips and Science Act emphasizes technological hegemony. The G20 and G7 have different positions on data flow rules, and global digital trade disputes are expected to increase by 50% in 2023. Emerging economies are actively participating in rule negotiations, while low-income countries rely on regional organizations for their voices. This restructuring has led to regional fragmentation in global trade. The WTO's multilateral negotiations have progressed less than 5% on the 2023 MTN agenda, with regional trade agreements becoming the primary force in rule-making. The trade structure shows a divergence between a "green premium" and a "digital dividend": by 2023, global exports of renewable energy products will increase by 15%, electric vehicles by 22%, and the export cost of high-carbon products

(such as steel and cement) will rise by 10%-15%. By 2024, global digital services trade will reach $4.64 trillion, an increase of 8.3%, with exports of technology services such as AI and cloud computing increasing by over 30%. This divergence is even more pronounced within developing countries: emerging economies account for 35% of global green product exports and 28% of digital services exports, while low-income countries account for less than 3% of both. Countries with green technology and digital advantages will occupy the high end of the supply chain, while technologically lagging countries face marginalization [5].

6. CURRENT CHALLENGES AND RESPONSE STRATEGIES: A GLOBAL COLLABORATIVE SOLUTION

The Sustainable Development Goals are driving the reshaping of value chains and evolving trade patterns. While these opportunities present significant challenges, they also present a widening North-South gap, intensified regulatory conflicts, and rising technological and financial barriers, requiring global collaboration to address. Three core challenges currently exist: First, the North-South development imbalance is deepening. Developed countries are shifting carbon costs through policies like carbon emission reduction (CBAM), leading to a 10%-15% increase in manufacturing export costs in low-income countries, far exceeding the 6%-8% seen in emerging economies. Furthermore, low-income countries' green R&D investment is less than one-tenth of that of developed countries, a gap of three to five times that of emerging economies, creating a "transformation gap." Second, the risk of regulatory fragmentation is significant. Green and digital standards across regional trade agreements are incompatible, forcing companies to address multiple sets of compliance requirements. Global corporate compliance costs are expected to increase by an average of 23% by 2023, with compliance costs for companies in low-income countries exceeding 15% of their revenue, forcing many to exit the international market. Third, technological and financial barriers remain difficult to overcome. 70% of global low-carbon technology patents are held by European and American companies. Emerging economies can overcome some of these barriers through independent R&D, but low-income countries face a shortage of both technology and funding. The Green Climate Fund has received only 40% of its pledged funds, with less than 20% targeted for low-income countries. The response requires a three-tiered approach: international coordination, national action, and corporate practice. At the international level, we should promote the deep integration of WTO reform with the SDGs and promote differentiated implementation of green rules—giving emerging economies a 5-8 year transition period and low-income countries an extended period of 10-15 years. We should also strengthen international technological cooperation, establish a low-carbon technology sharing platform, and encourage developed countries to fulfill their technology transfer commitments. The China-EU carbon footprint accounting consultations have demonstrated that mutual recognition of rules can effectively break down green barriers. At the national level, developed countries should shoulder greater responsibility and expand green financial support to developing countries. Global green bond issuance is expected to reach $1.7 trillion by 2023, with at least 25% targeted for value chain transformation projects in low-income countries. Developing countries should implement differentiated policies: emerging economies should accelerate institutional opening and export applicable technologies to low-income countries. Low-income countries can follow India's lead in simplifying digital services trade barriers. Jinhua's "Time-of-Use Electricity Carbon Factor Accounting Platform" is being adapted for emerging economies, while simplifying accounting indicators for low-income countries. At the corporate level, sustainable development needs to be integrated into core strategies: large companies in emerging economies rely on "digitalization + greening" transformation to break through barriers, and small and medium-sized enterprises in low-income countries can join regional supply chain alliances to share resources; in addition, building a diversified supplier network and reducing dependence on a single region is also critical. Companies that did so in 2023 reduced the risk of supply chain disruptions by 40% [6].

7. CONCLUSION

The global advancement of the United Nations Sustainable Development Goals (SDGs) is triggering a systematic reshaping of the global value chain, from value objectives to operational models, driving a profound evolution of the international trade landscape toward multipolarity and the restructuring of rules. This transformation is not a partial adjustment of the traditional value chain, but rather a paradigm shift focused on efficiency and sustainability. Its core logic is to internalize environmental and social costs as core constraints on value chain operations and transform green and digital technologies into new comparative advantages in the international division of labor. This study shows that policy regulations, market demand, and technological innovation constitute the triple driving force behind value chain reshaping. Policies such as the EU CBAM create rigid constraints, consumer preferences for sustainability generate endogenous pull, and digital green technologies provide a path to implementation. These three factors collectively drive the regionalization, greening, and digitalization of the value chain. This transformation has brought significant new features to the international trade landscape: emerging economies such as the BRICS have become new engines of trade growth, and developing countries have significantly increased their voice in governing rules. However, competition over green and digital rules has exacerbated trade stratification, and the WTO multilateral system faces challenges from regional agreements. However, challenges such as the North-South gap, fragmented rules, and technological barriers faced during this transformation cannot be ignored. The key to addressing these issues lies in building a global coordination mechanism: the international community needs to establish differentiated sustainable rules, and developed countries should fulfill their obligations in providing technical and financial support. Countries need to develop transformation strategies based on their own endowments, and developing countries can accelerate upgrading through regional cooperation and technology transfer. Enterprises need to integrate green and digital transformation into their core strategies and break through trade barriers through innovation. The practices of Midea's overseas lighthouse factories and Jinhua's corporate carbon labeling demonstrate that sustainable transformation and enhanced trade competitiveness can form a positive cycle. In the future, the sustainability of global value chains will become a core factor determining the status of international trade. The multipolarization of the trade landscape and the greening and digitalization of rules will become long-term trends. Only through global coordination, technological innovation, and institutional innovation can we achieve inclusive and sustainable value chain restructuring and trade development, providing solid support for the full realization of the SDGs.

REFERENCES

[1] Zhan Jianxin. Transformation of global value chains and new investment landscape in the 2020s: driving forces, directions, forward-looking research and policy agenda [J]. Journal of International Business Policy, 2021, 4(2): 206-220.

[2] Kaplinsky R, Morris M. Standards, regulation and sustainable development driven by global value chains [J]. International Journal of Technological Learning, Innovation and Development, 2018, 10(3-4): 322-346.

[3] Li Yunting. Evolution of international trade pattern and prediction of potential relationships from the perspective of global value chain [D]. Southwestern University of Finance and Economics, 2022. DOI: 10.27412/d.cnki.gxncu.2022.002112.

[4] Zhao Fengxiang. Research on the impact of RTA on the reshaping of global value chain [D]. Dongbei University of Finance and Economics, 2021. DOI: 10.27006/d.cnki.gdbcu.2021.000761.

[5] Rane J, Amol Chaudhari R, Rane N. Artificial intelligence and machine learning for supply chain resilience: risk assessment and decision-making in manufacturing 4.0 and 5.0 [J]. Artificial intelligence and machine learning for supply chain resilience: risk assessment and decision-making in manufacturing, 2025, 4.

[6] Charles V, Emrouznejad A, Gherman T. A critical analysis of the integration of blockchain and artificial intelligence in supply chain [J]. Annals of Operational Research, 2023, 327(1): 7-47.