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EXPLORING THE STRATEGIES, BARRIERS, AND MANAGEMENT PRACTICES IN INDUSTRIAL MANUFACTURING TRADE IN CHINA

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Abstract

This paper carefully analyzes the strategies, challenges, and management practices influencing industrial manufacturing trade in China, with a specific focus on the impact of trade policy stability, digitalization, and sustainability-oriented governance. Utilizing a Systematic Literature Review (SLR) informed by the PRISMA 2020 paradigm, this study amalgamates peer-reviewed empirical and theoretical literature published from 2021 to 2025 and cataloged in the Scopus database. The results show that institutional stability and trade policy certainty are key factors that promote industrial growth. This growth is mostly caused by new firms entering the market, not by existing firms becoming more productive. Digitalization is a game-changer that lowers transaction costs, makes it easier for companies to work together throughout the world, and encourages new technologies and environmentally friendly upgrades. However, these advantages are not fairly spread out among companies and areas, which often makes structural and environmental differences worse. The analysis also points out that there are still problems with sustainable trade management, such as indirect carbon emissions, moving resources to less developed areas, uneven trade barriers, and a lack of clear governance. The study shows that trade liberalization and digital transformation have made China's manufacturing more competitive, but for these changes to last, they need to be part of a larger policy framework that connects technological innovation with environmental control and regional coordination. The paper provides a comprehensive conceptual framework that guides managerial decision-making and policy formulation for sustainable industrial trade management in China.

Keywords: Industrial manufacturing trade; Digitalization; Sustainable trade management; Global value chain; China

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1 Introduction

China's swift rise as a leading global manufacturing and trading nation has been propelled by trade liberalization, institutional reforms, and, more recently, an expedited digital transformation. Since it acceded to the World Trade Organization, China's industrial manufacturing sector has experienced advantages such as diminished trade policy uncertainty, enhanced market access, and increased integration into global value chains (Q. Li et al., 2026; Yuan & Ouyang, 2025a; Zheng, 2023). Simultaneously, progress in digital commerce, software implementation, and

innovation-driven management methodologies has transformed the manner in which manufacturing companies structure production, handle international transactions, and pursue modernizing initiatives (Das et al., 2025; Kumari & Sudha, 2025; R. Li & Song, 2025; Wen et al., 2022). These advancements have facilitated companies in lowering transaction costs, augmenting technological capabilities, and strengthening their competitive position. However, in addition to these accomplishments, increasing environmental pressures (Ma et al., 2026), regional disparities (Z. Zhao et al., 2026), and governance challenges (Wei & Xu, 2025), particularly regarding carbon emissions, resource transfers, and uneven digital adoption, have raised concerns about the sustainability and inclusiveness of China's trade-driven growth model.

In light of these circumstances, extant research has yielded significant understanding of the impacts of trade policy, digitalization, and sustainability on manufacturing performance; however, a considerable portion of this scholarship remains disaggregated. Research frequently investigates these dimensions in isolation, thereby neglecting their interconnectedness in influencing trade management practices. Although trade liberalization and digitalization have demonstrably fostered innovation and export growth (Y. Li et al., 2025; Shu & Steinwender, 2019), they have also indirectly contributed to carbon emissions (Fan et al., 2023), resource redistribution to less-developed regions (Qi et al., 2025), and disparities in firm-level advantages (Iacovone, 2012). This fragmentation impedes a holistic comprehension of how manufacturing enterprises and policymakers can strategically govern trade to simultaneously optimize efficiency, foster innovation, and uphold environmental stewardship. Therefore, an integrated synthesis is required to critically assess the combined influence of institutional contexts, digital transformation, and sustainability considerations on industrial manufacturing trade management within China.

In response to this gap, the current study endeavors to systematically synthesize existing empirical and theoretical evidence to elucidate how China's industrial manufacturing trade has been influenced by the interplay of trade policy stability, digitalization, and sustainability-focused management practices. This study aims to elucidate the strategic mechanisms by which trade policy certainty and digital adoption impact manufacturing performance and participation in the global value chain. It also seeks to critically evaluate the extent to which digitalization promotes technological innovation and green upgrading, as well as to identify the structural barriers and enabling conditions that influence the effectiveness of sustainable trade management. By examining these objectives through a comprehensive analytical framework, the study offers a more profound understanding of the intricate trade-offs confronting China's manufacturing sector.

The scope of this study is restricted to the industrial manufacturing trade in China, based on peer-reviewed literature that investigates firm-, industry-, and region-level dynamics associated with trade management, digitalization, and environmental performance. As a synthesis-oriented analysis, the study does not provide novel empirical estimates, thereby constraining its capacity to establish direct causal relationships. Nonetheless, its importance resides in synthesizing disparate strands of literature into a cohesive framework that enhances theoretical insight and guides managerial and policy decisions. For policymakers, the findings emphasize the significance of integrating trade liberalization and digital strategies with environmental governance, while for managers, they underscore the necessity of implementing innovation-oriented and sustainability-focused trade practices.

The literature examined in this study coalesces around three primary themes: the influence of institutional and trade policy environments in facilitating manufacturing expansion, the transformative effect of digitalization on trade efficiency and innovation, and the environmental and structural limitations linked to trade-driven growth. Together, these elements constitute a conceptual research framework in which trade policy stability and digitalization serve as primary determinants of manufacturing trade performance, influenced by innovation and cost-efficiency mechanisms, and moderated by environmental regulations, regional integration, and resource limitations. This framework offers a comprehensive foundation for assessing the development of effective and sustainable trade

management practices within China's dynamic industrial manufacturing sector.

2 Method

This study utilizes a systematic literature review (SLR) methodology, following the PRISMA 2020 guidelines to ensure a transparent, reproducible, and methodologically rigorous review process. The focus of this review is on empirical investigations of the strategies, barriers, and management practices that are present in the industrial manufacturing trade that takes place in China. A two-stage screening procedure was implemented, consisting of title-abstract review and full-text assessment, both conducted by independent reviewers to reduce potential selection bias. The inclusion criteria consisted of peer-reviewed primary studies published in English between 2021 and 2025. This included research that explicitly addressed the strategies, barriers, and management practices in industrial manufacturing trade, including the use of technology to support the trade, and was conducted using quantitative, qualitative, or mixed-methods. Studies that were non-empirical or did not have a focus on manufacturing trade were excluded. The data were obtained exclusively from the Scopus database due to its comprehensive collection of reputable journals. A refined search query, integrating selected keywords, publication stages, document categories, and country affiliations, was utilized. This study establishes a solid foundation for scholarly discourse and evidence-based policy recommendations by systematically applying these criteria and procedures to synthesize current and pertinent evidence to identify the strategies, barriers, and management practices in industrial manufacturing trade.

3 Results and Discussions

3.1 Results

Table 1: Trade Management and Digitalization

Author(s) and Year	Title of the Article	Research Methodology	Summary of Key Findings
(Yuan & Ouyang, 2025b)	Industrial development and trade policy uncertainty: Evidence from China's WTO accession	Quantitative: Cross-sectional empirical analysis using industry-level data following China's WTO entry.	The elimination of trade policy uncertainty significantly boosts manufacturing input and output. Growth is primarily driven by the extensive margin (new firm entry) rather than incumbents. Management should focus on leveraging stable trade environments to enter new markets and expand labor-intensive operations.
(J. Zhao et al., 2025)	A Research on the Sustainable Impact of FTA Strategy on the Global Value Chain Embedding of Listed Enterprises in China	Quantitative: Gravity model with fixed effects using matched data from China Customs and CSMAR (2000–2006).	Free Trade Area (FTA) strategies substantially enhance the Global Value Chain (GVC) embeddedness of firms by fostering technological innovation. This highlights the importance of innovation-led management in navigating international trade agreements to improve competitive positioning.
(Wang et al., 2025)	The era of digital trade: Exploring new mechanisms and threshold effects for green upgrading of manufacturing	Mixed Quantitative: Panel data analysis of A-share listed companies (2011–2021) using mechanism and	Digital trade serves as a catalyst for the "green transformation" of firms by enhancing the quality and quantity of technological innovation. This underscores the role of digital adoption in achieving sustainability goals and improving environmental management practices.

	companies	threshold effect tests.	
(Q. Niu et al., 2025)	The effect of software registration on manufacturing export	Quantitative: Empirical investigation using Bartik IV estimation and sub-sample analyses (2000–2013).	Digitalization, proxied by software registration, reduces operational costs and information friction in international markets. For management, this suggests that investment in digital assets and software is a critical driver for expanding export reach and operational efficiency.
(Liu et al., 2025)	Digital trade liberalization and quality upgrading: evidence from Chinese intermediate imports	Quantitative: Analysis of Chinese Customs data and the OECD digital trade index (2014–2019).	Digital trade liberalization promotes the quality upgrading of imports through trade cost reduction. This finding emphasizes that liberalized digital environments facilitate the acquisition of higher-quality inputs, thereby improving overall service and product quality.
(Sun & Cheng, 2024)	How Does Manufacturing Servitization Reduce Carbon Emissions? Evidence from China	Quantitative: Multi-regional input-output (MRIO) model and carbon emissions effect decomposition across 16 industries.	A "saddle" relationship exists between manufacturing servitization (integrating services into manufacturing) and carbon emissions. The study advocates for the development of industrial service clusters (finance, design, consulting) to balance economic growth with sustainability targets.

Table 1 highlights two general themes based on the collected articles. Initially, it addresses the management of the manufacturing industry in China, as investigated by Yuan and Ouyang (2025) who discovered that eliminating trade policy uncertainty significantly boosts manufacturing input and output. Growth is primarily driven by the extensive margin (new firm entry) rather than incumbents. Management should focus on leveraging stable trade environments to enter new markets and expand labor-intensive operations. Besides, the use of industrial service clusters such as finance, design, and consulting aims to balance economic growth with sustainability targets (finance, design, consulting (Sun & Cheng, 2024).

Another theme found out after synthesizing the articles is concerned with the Roles of Digitalization for China's Manufacturing Trade. In this vein, Wang et al. (2025) discovered that the quality and quantity of technological innovation underscore the role of digital adoption in achieving sustainability goals and improving environmental management practices. The benefit of digitalization was also spelled out to be pointful for liberalized digital environments, which facilitate the acquisition of higher-quality inputs, thereby improving overall service and product quality (Liu et al., 2025). Similarly, Q. Niu et al. (2025) spelled out that digitalization, proxied by software registration, reduces operational costs and information friction in international markets. Therefore, Zhao et al. (2025) argued that fostering technological innovation in navigating international trade agreements to improve competitive positioning.

Table 2: The benefits of Digitalization in China's Trade Management, factors influencing trade, and factors fostering trade management practices

Author(s) and Year	Title of the Article	Research Methodology	Summary of Key Findings and Management Implications
(X. Niu et al., 2025)	Social-Hydrological Dynamics along the Yellow River Belt...	Quantitative: Source-to-sink tracking and virtual groundwater transfer analysis.	Findings: A quarter of China's national groundwater use is embedded in trades within the Yellow River Belt, primarily exported to coastal regions by the chemical, mineral, and food manufacturing sectors. Management Implication: Firms must implement water-saving technologies and regional cooperation to mitigate the pressure on scarce resources caused by industrial trade.
(Tabuchi et al., 2024)	A footloose capital model of economic development	Theoretical Modeling: Footloose capital model in a two-country economy with heterogeneous firms.	Findings: China's evolution from a net importer to a net exporter of manufactured goods is explained by technological progress and capital inflows driven by the "home market effect." Management Implication: Understanding technological gaps is crucial for timing market entry and navigating trade liberalization cycles.
(Lin & Zhao, 2024)	Asymmetric trade barriers and CO2 emissions in carbon-intensive industry	Quantitative: IV-2SLS empirical testing of trade barriers across different countries.	Findings: Country-specific trade barriers and implicit subsidies for carbon-intensive products significantly influence global CO2 transfers. Management Implication: Managers in carbon-intensive industries must monitor international trade policy shifts to manage environmental compliance and competitive risks.
(Yang, 2023)	A study of the economic growth effects of market integration: Examination of 27 cities in the Yangtze River Delta...	Quantitative: Empirical analysis of trade, investment, and mobility connections within city clusters.	Findings: Regional market integration reduces entry barriers and promotes industrial restructuring and the concentration of advanced manufacturing in central cities. Management Implication: Geographic clustering in central towns offers optimized synergy and productivity for advanced service and manufacturing firms.
(Chen et al., 2023)	Analyzing the carbon emission effect and systematic emission reduction mechanism of the Sino-USA manufacturing trade	Quantitative: Input-output model for 16 manufacturing sub-sectors (2000–2018).	Findings: Indirect carbon emissions are the primary driver of environmental impact in trade; China's trade surplus with the USA has historically come at an environmental cost. Management Implication: The "dual-carbon" goal requires a shift toward green manufacturing to maintain trade relations without further environmental degradation.
(Peng et	Determinants of the	Quantitative: Absolute	Findings: Labor productivity differences

al., 2023)	embodied CO2 transfers through electricity trade within China	and comparative advantage theory testing via econometric analysis.	are the dominant factor driving CO2 transfers through internal electricity trade, often shifting emissions to less-developed regions. Management Implication: Sustainable corporate strategy must account for the carbon intensity of energy inputs derived from inter-regional power grids.
(Hou et al., 2023)	Decarbonization without borders: Evidence from China	Quantitative: "Decarbonization value-added (DEVA)" indicator framework accounting for trade and investment.	Findings: Pure domestic production linkages are the main source of DEVA, but high-tech manufacturing is increasingly influenced by FDI-related production activities. Management Implication: Strengthening domestic supply chain linkages while leveraging high-tech FDI is key to internalizing environmental costs.
(Shen et al., 2023)	Does the rise of China promote the sustainable development of OECD countries? A geopolitical perspective	Quantitative: By-production model and Luenberger-Hicks-Moorsteen productivity indicator (2000–2019).	Findings: Trade and investment with China actually boost green productivity growth in OECD nations. Management Implication: Geopolitical risks can be minimized by focusing on mutually beneficial green growth and sustainable development partnerships.
(Sarpong et al., 2023)	A step towards carbon neutrality in E7: The role of environmental taxes, structural change, and green energy	Quantitative: Driscoll Kraay fixed effect OLS and MMQ regression for E7 economies (2000–2020).	Findings: Environmental taxes and green energy reduce emissions, while trade openness and FDI can increase them (confirming the Pollutant Haven Hypothesis). Management Implication: Rigorous environmental tax compliance and R&D in green technologies are necessary for firms to transition to sustainable alternatives.
(Cheng et al., 2023)	Analysis of technological innovation on provincial green development levels of logistics industry in China	Quantitative: Provincial-level data analysis on logistics and innovation factors.	Findings: Technological innovation is a pivotal driver for the transition from traditional to green logistics. Management Implication: Investment in logistical technology (e.g., smart routing, low-carbon transport) is essential for supporting sustainable manufacturing trade.

Articles synthesized in Table 2 demonstrate three main themes, which consist of the benefits of Digitalization in China's Trade Management, factors influencing trade, and factors fostering trade management practices. Firstly, Tabuchi et al. (2024) found that China's evolution from a net importer to a net exporter of manufactured goods is explained by technological progress and capital inflows driven by the "home market effect". Besides, the technological innovation was also found to be a pivotal driver for the transition from traditional to green logistics (Cheng et al., 2023).

Despite the crucial roles of digitalization in China's manufacturing trade, the second theme highlights some barriers encountered. Lin and Zhao (2024) found that country-specific trade barriers and implicit subsidies for carbon-intensive products significantly influence global CO₂ transfers. Similarly, Chen et al. (2023) discovered that indirect carbon emissions are the primary driver of environmental impact in trade; China's trade surplus with the USA has historically come at an environmental cost. Besides, the labor productivity differences are the dominant factor driving CO₂ transfers through internal electricity trade, often shifting emissions to less-developed regions (Peng et al., 2023). Lastly, Hou et al. (2023) unearthed that pure domestic production linkages are the main source of DEVA, but high-tech manufacturing is increasingly influenced by FDI-related production activities.

The last main theme identified in the article concerns with Factors Fostering Trade Management Practice. As the initial case, Shen et al. (2023) found that Trade and investment with China actually boost green productivity growth in OECD nations. Sarpong et al. (2023) further discovered that environmental taxes and green energy reduce emissions, while trade openness and FDI can increase them (confirming the Pollutant Haven Hypothesis. Moreover, firms must implement water-saving technologies and regional cooperation to mitigate the pressure on scarce resources caused by industrial trade (X. Niu et al., 2025). The final factor to foster trade management practice is related to regional market integration that can reduce entry barriers and promote industrial restructuring and the concentration of advanced manufacturing in central cities (Yang, 2023).

3.2 Discussion

Addressing the initial research objective related to the strategic determinants of manufacturing trade, the findings consistently indicate that institutional stability and policy certainty serve as essential enablers of industrial growth. The reduction of trade policy uncertainty consequent to WTO accession markedly enhanced manufacturing input and output, primarily driven by the entry of new firms rather than productivity improvements among existing incumbents. This pattern indicates that China's trade-driven development has predominantly depended on substantial margin expansion, prompting important questions regarding the long-term viability of growth models that emphasize scale over efficiency. Although stable trading environments obviously reduce entry barriers, the findings suggest that in the absence of concurrent productivity improvements, such growth may lead to diminishing returns and increased environmental pressures.

Regarding the second research objective, which examines the role of digitalization in trade management, the evidence definitively indicates that digital adoption is not solely operational but also fundamentally structural and transformative. Numerous studies demonstrate that digital trade liberalization, software registration, and innovation-focused digital strategies serve to lower transaction costs, mitigate information frictions, and strengthen integration within the global value chain. More significantly, digitalization functions as a vital mechanism for sustainable advancement, facilitating firms in enhancing both product quality and environmental performance concurrently. Nevertheless, this optimistic narrative requires careful qualification: the advantages of digitalization seem to be unevenly distributed, preferentially benefiting firms with greater absorptive capacity and access to capital, which may consequently exacerbate disparities among firms and regions.

The third research objective focuses on the barriers and constraints influencing sustainable trade management, with findings indicating notable structural paradoxes. Despite advancements in technology and improvements in digital efficiency, trade-related environmental externalities—particularly indirect carbon emissions and resource transfers—continue to be significant. Research examining carbon leakage via electricity exchanges, water-intensive manufacturing, and export-driven industries underscores that environmental burdens are often shifted to less-developed areas. This raises significant concerns regarding the efficacy of market-driven trade liberalization in attaining sustainability objectives. Furthermore, asymmetric trade barriers and implicit subsidies for carbon-intensive products distort international emission flows, undermining collective decarbonization initiatives and

confounding firms' compliance strategies.

From a critical management perspective, the findings indicate that digitalization by itself is inadequate to address these systemic challenges. Instead, successful trade management increasingly relies on policy coherence, regulatory synchronization, and integrated governance frameworks. Factors promoting sustainable trade practices such as environmental taxation, the adoption of green energy, water conservation technologies, regional market integration, and low-carbon logistics—illustrate that sustainability outcomes are most effective when technological innovation is supported by institutional enforcement and strategic planning. Notably, evidence suggests that trade and investment with China can promote green productivity in OECD countries, thereby challenging the simplistic "pollution haven" narrative and indicating that sustainability outcomes are significantly influenced by governance quality and sectoral composition.

In summary, this discussion underscores that China's industrial manufacturing trade is at a critical strategic juncture. Although digitalization and trade liberalization have unquestionably enhanced competitiveness and facilitated global integration, they have also exacerbated environmental and regional disparities. The findings collectively indicate that future trade management strategies should transition from growth-focused expansion to models that emphasize innovation, environmental integration, and regional coordination. For policymakers and managers alike, the primary challenge is to balance efficiency improvements derived from digital commerce with the necessity of internalizing environmental costs and promoting equitable development across regions and industries.

3.3 Implications of the Study

The findings of this study have substantial implications for theory, management practices, and public policy concerning China's industrial manufacturing trade, demonstrating that the stability of trade policy, digitalization, and sustainability are interconnected determinants of trade performance. The study improves theoretical understanding by incorporating environmental governance and regional equity as essential moderating factors within trade liberalization and digital transformation frameworks, thereby challenging growth models focused on scale rather than efficiency and sustainability. From a managerial perspective, the findings indicate that companies must strategically integrate digital technologies with innovation-oriented and sustainability-centered practices, as mere digital adoption is insufficient for securing long-term competitiveness without environmental improvement, resource efficiency, and regulatory compliance. The results highlight the necessity for unified and coordinated governance structures that incorporate trade liberalization, digital regulation, and environmental policy to tackle carbon leakage, resource transfers, and regional disparities. The report emphasizes the need for a strategic transition towards innovation-focused, environmentally integrated, and regionally balanced trade management frameworks that link economic competitiveness with sustainable development objectives in China's manufacturing sector.

3.4 Future Research Recommendations

Future research should move beyond synthesis-based methods by utilizing longitudinal and firm-level empirical studies to determine causal links among digitalization, trade performance, and environmental effects. Comparative analyses across areas in China would be essential in revealing how institutional capacity and digital readiness influence diverse trade results. Furthermore, cross-national comparative research might investigate the applicability of the integrated trade–digital–sustainability paradigm identified in this study to other growing manufacturing economies. Additional inquiry into the social aspects of trade management is suggested, encompassing labor enhancement, skill polarization, and workforce adjustment to digital trade contexts. Future research should investigate governance structures that effectively synchronize firm-level digital innovation with national and international sustainability objectives, particularly regarding carbon neutrality goals and shifting geopolitical trade dynamics.

4 Conclusion

This study concludes that industrial manufacturing trade in China has been profoundly influenced by the interplay of trade policy stability, digitalization, and the evolution of sustainability governance, collectively enhancing global competitiveness and promoting integration into global value chains. The comprehensive analysis of contemporary literature suggests that institutional certainty and digital transformation have reduced transaction costs, encouraged firm entry, and enhanced innovation and environmental progress; nonetheless, these benefits have been accompanied by ongoing challenges, such as indirect carbon emissions, resource reallocation, and regional inequalities. The results demonstrate that digitization and trade liberalization, in isolation, are inadequate for achieving sustainable outcomes without synchronized environmental regulation, policy consistency, and regional integration. The study underscores the imperative of shifting from scale-driven expansion to innovation-focused, environmentally integrated, and regionally balanced trade management models to align economic performance with long-term sustainability goals in China's manufacturing sector.

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