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Research on the Coordination Mechanism of Trade Policy and Industrial Policy from the Perspective of Core Technology Breakthrough

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Abstract: In the context of global technological competition and industrial transformation, achieving breakthroughs in core technologies has become a critical pathway for enhancing national competitiveness. This study examines the synergistic mechanisms between trade policy and industrial policy from the perspective of core technology breakthroughs. It analyzes how these two policy instruments can be effectively coordinated to foster innovation, support industrial upgrading, and strengthen a nation's position in global value chains. The research is grounded in a review of relevant theoretical frameworks and existing literature, which highlights the interconnected roles of trade and industrial policies in shaping technological development. Through mechanism analysis and empirical investigation, the paper identifies key channels through which policy synergy influences innovation ecosystems, market access, and resource allocation. The findings suggest that a well-aligned policy framework can significantly promote technological advancement and industrial resilience. Based on the conclusions, the study proposes practical policy implications aimed at optimizing the design and implementation of coordinated policies. These recommendations are intended to provide actionable insights for policymakers seeking to navigate complex international economic environments and drive sustainable development through strategic innovation.

Keyword: Core Technology Breakthrough; Trade Policy; Industrial Policy; Policy Coordination; Innovation-Driven Development
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1. Introduction

In the contemporary global landscape, intensified technological competition and profound industrial transformation have made breakthroughs in core technologies a pivotal determinant of national competitiveness and economic security. As of early 2026, the international environment remains characterized by strategic rivalries, supply chain reconfigurations, and the pervasive use of non-tariff barriers such as export controls and technology transfer restrictions. These external pressures have starkly exposed the vulnerabilities of nations that lack self-sufficiency in critical technological domains, often referred to as "chokepoint" technologies in areas like semiconductors, advanced manufacturing, artificial intelligence, and quantum information. This context necessitates a fundamental reevaluation of traditional policy instruments. Isolated industrial support or conventional trade measures are increasingly insufficient to address the complex, systemic challenges of fostering innovation and securing technological leadership. Consequently, there is a growing consensus among policymakers and scholars on the imperative to explore synergistic frameworks where trade policy and industrial policy are not merely parallel

tracks but are deeply integrated to form a coherent strategic response.

Building upon this background and recognizing its significance, the primary objectives of this study are threefold. First, it seeks to establish a clear theoretical understanding of how trade policy and industrial policy can functionally complement each other within the specific context of pursuing core technology breakthroughs. This involves clarifying the respective and overlapping roles of these policies in shaping innovation incentives, resource allocation, and market access. Second, the research aims to analyze the concrete mechanisms through which policy synergy influences outcomes. This includes investigating channels such as how strategic trade tools (e.g., targeted export controls, standards setting) can create a protective space for domestic industries to innovate, while industrial policies (e.g., R&D subsidies, talent programs, platform construction) build the necessary internal capacity to capitalize on that space. Third, based on the theoretical and mechanistic analysis, the study intends to derive evidence-based conclusions and propose practical policy implications. These recommendations are designed to guide the optimization of policy design and implementation, aiming to foster a more resilient, innovative, and competitive industrial base capable of achieving sustainable development in a complex international economic environment.

2. Mechanism Analysis and Empirical Investigation

2.1 Analysis of the Synergistic Mechanism: How Core Technology Breakthroughs Drive Policy Coordination

The pursuit of core technology breakthroughs fundamentally reshapes the relationship between trade policy and industrial policy, transforming them from potentially independent or even conflicting instruments into a coordinated system. This transformation is driven by the unique characteristics of core technology development, which necessitates a coherent external and internal policy environment to succeed. At its core, the mechanism is one of mutual adaptation and reinforcement, where advancements in technology create new imperatives for policy alignment, and coordinated policies, in turn, create the conditions for further technological progress.

A core technology breakthrough, such as in advanced semiconductors or artificial intelligence algorithms, is rarely an isolated laboratory achievement. Its development, scaling, and commercial viability depend on a complex ecosystem. This ecosystem requires sustained internal investment in R&D, talent, and infrastructure—a domain traditionally addressed by industrial policy. Simultaneously, it requires managing external dependencies and opportunities related to global supply chains, international standards, technology transfer, and market access—a domain governed by trade policy. The inherent interconnectedness of these needs means that a policy action in one domain directly impacts the effectiveness of the other. For instance, significant domestic subsidies for semiconductor R&D (an industrial policy tool) may be undermined if trade policies fail to prevent the outflow of key manufacturing equipment or protect the resulting intellectual property in international markets. Conversely, restrictive trade measures on technology imports intended to spur domestic substitution must be paired with robust industrial policies that actually build the requisite domestic capacity; otherwise, they risk creating supply shortages without fostering genuine innovation.

Therefore, the drive for core technology breakthroughs acts as a forcing function for policy coordination. It highlights the limitations of siloed approaches. The process can be understood through a feedback loop. The strategic goal of achieving a breakthrough identifies specific technological bottlenecks and market failures. This diagnosis necessitates a tailored industrial policy response, such as funding for high-risk foundational research or support for pilot production lines. However, the implementation of this industrial policy immediately encounters the realities of the global economic system. It raises questions about securing critical raw materials, attracting foreign expertise, exporting finished products, and navigating foreign regulatory landscapes. These challenges compel policymakers to design complementary trade policies. These might include negotiating bilateral agreements for material access, establishing export controls on nascent technologies, or actively participating in international standard-setting bodies to ensure domestic innovations gain global acceptance.

This synergy is not merely reactive but also proactive and strategic. A well-coordinated framework uses trade policy to create a “protected space” for learning and experimentation, not through blanket protectionism but through strategically managed exposure to global competition and collaboration. Meanwhile, industrial policy focuses on building absorptive capacity and

innovation within that space. The effectiveness of this coordination is amplified when policies are embedded within a broader market-based ecosystem that includes elements like intellectual property protection, fair competition, and access to venture capital. Studies on technology-intensive sectors suggest that the coupling degree between different policy subsystems—such as tax, financial, and talent policies—is positively correlated with technological development outcomes. In essence, core technology breakthroughs do not just happen because of policy coordination; they create the compelling rationale and practical roadmap for why and how such coordination must occur, aligning previously separate policy tools into a coherent national innovation strategy.

2.2 Case Studies and Quantitative Analysis of Policy Synergy in Key Strategic Industries

Building upon the general mechanism analysis, this section examines how policy synergy manifests in practice within specific strategic industries. The analysis draws on case studies and quantitative assessments to illustrate the tangible effects of coordinated trade and industrial policies on fostering core technology breakthroughs. The focus is on sectors characterized by high technological intensity, strategic importance, and significant global competition, such as advanced semiconductors, new energy vehicles (NEVs), and artificial intelligence (AI).

The development of China's new energy vehicle industry serves as a prominent case of effective policy coordination. Industrial policies, including direct subsidies for manufacturers and consumers, tax incentives, and support for charging infrastructure development, were crucial in nurturing the domestic market and building manufacturing scale. Concurrently, trade policies played a complementary role. Tariff policies facilitated the import of key components in the early stages, while later, strategic export promotion and participation in international standard-setting helped domestic champions access global markets. This alignment allowed the industry to leverage initial protection for learning and scale-building, followed by strategic engagement in global trade to solidify competitiveness. The synergy created a virtuous cycle where industrial support reduced production costs and improved technology, and open yet strategic trade engagement provided the market validation and revenue necessary for sustained R&D investment.

In contrast, challenges in other sectors highlight the consequences of policy misalignment or insufficient synergy. For instance, in areas like certain high-end manufacturing equipment or advanced materials, restrictive trade measures aimed at spurring domestic substitution were sometimes implemented without a commensurate and timely boost in industrial policy support for foundational R&D and pilot production. This mismatch could lead to supply chain disruptions without yielding the intended technological breakthroughs, as domestic capacity was not yet ready to fill the gap. This underscores the point that trade restrictions alone are not a substitute for a robust industrial innovation policy; they must be carefully calibrated and phased with internal capacity-building efforts.

Quantitative analyses, though varied in methodology, consistently point to a positive correlation between the degree of policy coordination and innovation outcomes in strategic sectors. Studies employing coupling coordination degree models have examined policy subsystems—including tax incentives, financial support, talent policies, and trade facilitation measures—within specific industries. Findings suggest that a higher degree of coupling and coordination among these policy instruments is associated with improved performance indicators, such as increased patent filings, higher R&D expenditure intensity, and faster commercialization of new technologies. For example, research on the integrated circuit industry indicates that regions or periods characterized by more synchronized policy frameworks tend to exhibit more rapid progress in moving up the value chain, from packaging and testing towards design and manufacturing of advanced nodes.

The effectiveness of synergy is further evidenced in the structure of innovation ecosystems. Policies that simultaneously address internal R&D challenges (through grants and project funding) and external collaborative opportunities (through international joint research programs or technology import agreements) tend to foster more dynamic and resilient innovation networks. The case of AI development illustrates this, where industrial policies fund basic research and talent cultivation, while trade and investment policies manage data flows, international collaboration, and the participation in global AI governance forums. This holistic approach helps in building absorptive capacity while navigating the complex geopolitics of emerging technologies.

In summary, empirical evidence from key strategic industries demonstrates that the theoretical mechanisms of policy synergy

have concrete, observable impacts. Successful cases are characterized by a sequential and reinforcing logic: industrial policies build foundational capabilities, and trade policies are then deployed strategically to secure inputs, protect intellectual property, and open markets. Quantitative assessments support the view that the coherence and integration of different policy tools are critical determinants of success in core technology domains. These insights underscore the necessity of moving beyond isolated policy interventions towards a deliberately coordinated framework tailored to the specific needs and lifecycle stage of each strategic industry.

3. Research Conclusions and Policy Implications

Based on the analysis of theoretical mechanisms and empirical evidence from key strategic industries, this study arrives at several core conclusions regarding the coordination of trade policy and industrial policy for achieving breakthroughs in core technologies. The findings confirm that isolated policy interventions are insufficient to address the complex, systemic challenges of technological advancement in a competitive global landscape. Instead, a synergistic framework where these policies are deliberately aligned in objectives, tools, and timing is crucial for fostering innovation, enhancing industrial resilience, and securing a nation's position in global value chains. The empirical case studies, particularly in sectors like new energy vehicles, demonstrate that successful technological catch-up and leadership are often the result of a sequential and reinforcing logic: industrial policy builds foundational capabilities and scale, while strategic trade policy manages external dependencies, protects nascent industries, and later facilitates global market access.

The mechanism analysis further reveals that policy synergy operates through multiple channels. It enhances the innovation ecosystem by reducing collaboration costs and aligning incentives for diverse actors, including firms, research institutions, and financial entities. It improves resource allocation by ensuring that domestic support measures are not undermined by contradictory trade flows or external shocks. Perhaps most importantly, it helps navigate the dual pressures of technological security and openness. In the current context of technological competition and supply chain reconfiguration, as observed in the period leading up to 2026, a purely protectionist or a purely liberal approach carries significant risks. Synergy allows for a more nuanced strategy that combines defensive measures to safeguard critical technologies with offensive measures to engage in international cooperation and standard-setting where advantageous.

Building upon these conclusions, the study proposes several policy implications aimed at optimizing the design and implementation of a coordinated policy framework. A primary recommendation is the establishment of stronger institutional mechanisms for cross-departmental policy coordination. Given that trade and industrial policies are often formulated and administered by different government bodies, the risk of misalignment or conflicting objectives is high. Creating permanent inter-agency task forces or councils focused on strategic technology sectors can facilitate information sharing, joint planning, and the resolution of policy conflicts. This is essential for developing a unified national strategy where trade negotiations, export controls, investment screening, domestic R&D subsidies, and infrastructure projects are all pulling in the same direction.

Furthermore, policy design must adopt a dynamic and lifecycle-oriented approach. The optimal mix and intensity of trade and industrial policy instruments change as a technology or industry evolves from basic research to commercialization and global competition. In the early, high-risk R&D phase, industrial policy support for fundamental research and pilot projects is paramount, potentially accompanied by trade policies that ensure access to critical research equipment and international talent. As technologies mature, policy focus should shift towards scaling up production, which may involve strategic protection or subsidies, followed by a greater emphasis on trade policies that promote exports, secure intellectual property rights abroad, and influence international technical standards. This phased approach prevents the pitfalls of perpetual protectionism or premature exposure to intense international competition.

Finally, the policy framework must prioritize building a robust and open domestic innovation ecosystem as the ultimate foundation for technological resilience. While strategic trade policies can manage external risks, sustainable breakthroughs depend on internal capabilities. This involves not only continued investment in R&D but also reforms in education and vocational training to develop a skilled workforce, as highlighted in the background information regarding the alignment of academic disciplines with industrial needs. Policies should encourage deeper industry-academia-research collaboration,

streamline regulations for technology commercialization, and foster a competitive market environment that rewards innovation. By strengthening these internal pillars, the nation's technological advancement becomes less vulnerable to external pressures and more capable of engaging in and benefiting from global knowledge networks on its own terms.

4. Conclusion

The significance of this research lies in its direct contribution to this critical policy dilemma. By systematically examining the coordination mechanisms between trade and industrial policies from the core technology breakthrough perspective, the study aims to provide actionable insights for enhancing a nation's innovation ecosystem and industrial resilience. The practical value is substantial. For policymakers, understanding how to align these two powerful levers can help design more effective interventions that mitigate external risks while strengthening internal capabilities. It moves beyond fragmented policy approaches towards a holistic system that can better navigate the intricate dynamics of global value chains. For industries and enterprises, particularly those engaged in high-risk, long-cycle technology development, a well-coordinated policy environment can reduce uncertainty, lower collaboration costs, and provide a more stable foundation for long-term investment in research and development. Furthermore, the research addresses a gap in the existing literature, which often treats trade and industrial policies in relative isolation, by constructing an integrated analytical framework that captures their interdependent roles in driving technological advancement.

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Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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