Research on the Impact Mechanism of Resarch and Development Investment on Jiangling Automobile New Energy Vehicle Export

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Abstract: **The new energy vehicle industry has fully entered a new phase of rapid dual-driven development fueled by both market forces and technological innovation, where technological barriers have become the decisive factor in determining a company's global competitiveness.This study focuses on the micro-level behavior of new energy vehicle enterprises, using Jiangling Motors as a representative case. Employing case analysis methodology, it collects relevant data from Jiangling Motors and the industry from 2015 to 2023. Against the backdrop of industry context, the study conducts an in-depth examination of the relationship between Jiangling Motors' R&D investment strategy, technological breakthrough directions, and its export performance.Findings reveal that JMC's sustained R&D investment has elevated the technological sophistication and product quality of its new energy vehicles, optimized product performance, enhanced competitiveness in international markets, and driven growth in new energy vehicle exports.Simultaneously, R&D investment has driven breakthroughs in critical areas such as battery technology and intelligent driving, establishing unique technological advantages. Consequently, R&D investment exerts a significant positive impact on Jiangling Motors' new energy vehicle exports. The company should continue to increase R&D investment and maintain technological innovation to further expand its international market presence and enhance its global influence.**

Keywords: R&D Investment; New Energy Vehicles; Jiangling Motors; Product Exports

1. Introduction

The global automotive industry is currently undergoing a transformative shift unprecedented in a century.Disruptive technological transformations-including electrification, intelligentization, and connectivity-are driving the restructuring of the global automotive ecosystem, encompassing industrial chains, innovation chains, and value chains. This has intensified international competition in new industrial arenas and accelerated the reshaping of the global automotive competitive landscape, with China emerging as a leader in the industry's transformation and upgrading[1]. According to IEA data, global new energy vehicle exports surged from under 500,000 units in 2015 to over 6 million units in 2023, achieving a compound annual growth rate exceeding 40%. During the same period, China's share of global new energy vehicle exports jumped from less than 5% to over 55% in 2023, establishing it as the world's largest exporter.However, alongside trade expansion, technological barriers continue to intensify globally: Since 2018, the EU has successively introduced the Battery and Waste Battery Regulations and the Carbon Neutrality Directive; the U.S. enacted the Inflation Reduction Act imposing local production requirements; and Japan strengthened battery safety certification standards. These regulations have significantly raised the technical barriers for new energy vehicle exports.Simultaneously, international technology barriers intensified. Japanese and Korean companies monopolized patents for certain core battery materials, while European and American nations restricted exports of intelligent driving algorithm technologies. Against this backdrop of supply chain restructuring, Chinese enterprises must overcome bottlenecks through independent R&D. Despite these challenges, companies like Jiangling Motors continue to pioneer tailored solutions.By developing alternative materials to replace hazardous substances, Jiangling's new energy light trucks achieved E-MARK certification through a specially designed battery thermal management system.Targeting Southeast Asia's high-temperature, high-humidity

environments, the company's specialized waterproof and dustproof battery pack technology reduced product failure rates by 40%, directly driving order growth in the Thai market. Furthermore, Jiangling Motors' participation in establishing commercial vehicle battery swapping standards has secured it a first-mover advantage in the Latin American market. Therefore, focusing specifically on Jiangling Motors Co., Ltd.-a Chinese listed company that consistently invests in R&D-to explore its development trajectory and R&D investment strategies and practices holds significant theoretical value and practical relevance.

2. Literature Review

Existing research has laid a crucial foundation for understanding the relationship between new energy vehicle exports and R&D investment. Scholars widely recognize that under stringent regulatory frameworks like the EU's WLTP and RDE, power batteries and intelligent driving technologies have become the core criteria for market access, with R&D investment being key to overcoming such technological barriers. [2]. Deeper research indicates that R&D serves not only as a technical activity but also as a strategic lever for firms to respond to standard iterations and build long-term competitiveness. From a broader industrial perspective, R&D is viewed as the fundamental driver of enhanced international competitiveness. Shen Yuliang et al. (2007) demonstrate that R&D fosters "product diversification," laying the groundwork for high-level intra-industry trade [3]; Gao Yunsheng and Jin Tianyang (2021) emphasize that concentrated R&D on "chokepoint" technologies constitutes a strategic initiative for value chain upgrading[4]; Li Yongkui et al. (2016) elucidate, from an organizational learning perspective, the importance of efficient R&D management for knowledge conversion and capability building[5]; Liu Wei's (2022) study on export-oriented enterprises revealed that R&D activities can significantly reduce manufacturing costs through process reengineering, particularly in large-scale production stages, where a 1% increase in R&D intensity leads to a 0.3%-0.5% marginal cost reduction [6]. Song Jinglun and Zhang Qirui's (2023) empirical research showed that enterprises with R&D intensity 1.5 standard deviations above the industry average experienced 2.3 times faster growth in overseas market penetration compared to those with lower R&D intensity [2].

These studies have constructed a fundamental analytical framework of "R&D-technology-exports" across dimensions such as macro-industry, technological barriers, and innovation management, providing valuable references for further research. However, existing literature still has room for supplementation and refinement.First, most studies focus on macro-level arguments or static correlation analysis, failing to fully reveal the micro-dynamic processes by which enterprises allocate, manage, and transform R&D resources into tangible export advantages when confronting dynamically changing technical regulations.Second, there is a lack of in-depth case studies explaining how R&D can be strategically targeted at specific market barriers, how to balance immediate breakthroughs, forward-looking planning, and compliance-focused approaches, and how these shape sustained export competitiveness. This creates a gap between theoretical understanding and the concrete, contextualized strategic practices of enterprises.

Therefore, this study aims to address these shortcomings. Using the micro-level case of Jiangling Motors, it seeks to deeply analyze how late-entrant firms transform technological resources into tangible capabilities for overcoming international technical barriers and driving export growth through specific R&D strategies and practices. This approach complements and deepens existing theories at the micro-mechanism level.

3. Case Analysis

Jiangling Motors' industrial development in the new energy vehicle sector is built upon a profound understanding and strategic transformation of its traditional strengths. With nearly two decades of experience exporting conventional commercial vehicles, the company has established mature dealer networks, localized after-sales service systems, and a certain level of brand recognition in key global markets, particularly Southeast Asia, the Middle East, and Latin America. This historical foundation provides indispensable initial conditions for the internationalization of its new energy vehicle business.Building on this foundation, Jiangling Motors has defined a clear core architecture for its new energy business. The company has established a focused product

strategy, concentrating resources on two key categories: pure electric light commercial vehicles and new energy buses. Its production capacity system exhibits a global footprint, anchored by domestic manufacturing hubs in Nanchang and Yantai, while actively developing overseas production sites in Thailand and Mexico.Market expansion follows a differentiated strategy: domestically, it leverages government-enterprise partnerships to deepen penetration in bus electrification and urban logistics, establishing a foundation for scaled development.Overseas, it implements a tiered development strategy: targeting emerging markets in Southeast Asia and Latin America with mature channels and price sensitivity, it focuses on providing cost-effective, locally adapted products; for the high-end European market with stringent regulations, it leverages EU-certified models as strategic entry points, building competitive barriers through comprehensive technical compliance capabilities.

T his study conducts an in-depth analysis of Jiangling Motors' specific practices in R&D investment. Guided by a clear industrial strategy, its R&D expenditures exhibit systematic, focused, and market-aligned characteristics. From 2015 to 2023, the company's total R&D spending grew significantly, with new energy vehicle-related investments rapidly increasing to become the dominant component of the R&D budget.In resource allocation, the company adopts a tiered strategy, concentrating primary resources on applied research and development that can rapidly respond to market demands.Research indicates that material system innovation enabling energy density breakthroughs is crucial for expanding high-end markets, while intelligent connectivity has become a mandatory technological credential for developing mature markets [7]. Consequently, Jiangling Motors has strategically focused R&D efforts on two core technologies: power batteries and intelligent driving/connectivity. The former prioritizes enhancing energy density, optimizing thermal management, and exploring battery swapping models, while the latter concentrates on developing advanced driver assistance systems and intelligent connectivity platforms. This aims to build core competitiveness capable of addressing the technological barriers of high-end markets.To effectively execute this R&D strategy, Jiangling Motors has established a complementary management system. The company has built a global R&D network, including the Nanchang Headquarters R&D Center, the Shanghai Intelligent Driving R&D Center, and the European R&D Center in Munich, Germany. This distributed network integrates global intellectual resources while aligning R&D efforts closely with the practical needs of key target markets.The company has also continuously expanded its R&D team, significantly increasing the proportion of engineers and scientists specializing in new energy vehicles. This ensures the team's expertise is tightly focused on core technologies such as batteries, electronic control systems, and software. By establishing joint laboratories with domestic and international universities and research institutions, and engaging in technical collaborations with leading global suppliers, the company actively promotes open innovation, accelerating the process of technology acquisition and integration. This comprehensive system-spanning strategic focus to organizational support-forms an operational mechanism that effectively translates R&D investment into tangible technological capabilities and product characteristics.

Based on an analysis of industrial foundations and R&D practices, this study further examines the specific impact of R&D investment on Jiangling Motors' new energy vehicle exports. This impact is first directly reflected in enhanced product technological competitiveness. Export growth is closely linked to technological innovation [8], and sustained R&D investment has yielded quantifiable improvements in product performance, including increased battery energy density, extended vehicle range, accelerated charging speeds, and continuous upgrades to intelligent driving capabilities. These enhanced performance metrics provide a solid foundation for products to compete internationally and meet customer demands.More significantly, R&D investment has become pivotal for the company to overcome international market technical barriers and secure product access qualifications. To comply with EU chemical regulations, energy consumption testing standards, battery safety requirements, and cybersecurity provisions, the company has undertaken extensive targeted R&D and certification efforts.Each major certification obtained signifies the removal of a market access barrier, transforming R&D

investment into valuable market credentials. R&D achievements also extend into intellectual property and standards domains. The company's patent applications in new technology fields have shown sustained growth, with an increasing proportion of invention patents reflecting deeper technological innovation. By participating in the formulation of domestic and international technical standards, the company is integrating its technological roadmap into broader industry norms, thereby shaping a favorable competitive environment over the long term.

The technological competitiveness, market access qualifications, and intellectual property achievements driven by R&D ultimately translate into quantifiable export performance changes. From 2015 to 2023, Jiangling New Energy Vehicle's export volume and value both surged significantly, with growth rates consistently outpacing the industry. Its export structure simultaneously optimized, shifting from an early focus on Southeast Asia to a diversified pattern featuring a notably increased share in Europe's high-end markets.Models equipped with advanced technologies and international certifications commanded higher premiums, driving overall export value. Furthermore, the product reliability and scenario adaptability enabled by R&D helped the company establish segmented competitive advantages in different regional markets, consolidating and expanding its market share. This complete transmission pathway from R&D to market competitiveness clearly demonstrates how strategic R&D investments systematically elevate a company's international standing.

4. Conclusion

Through an in-depth case study of Jiangling Motors' new energy vehicle export practices from 2015 to 2023, this research systematically reveals the mechanism, impact, and boundary conditions of R&D investment on corporate export competitiveness. Findings indicate that R&D investment significantly and quantifiably drives Jiangling Motors' new energy vehicle exports via the transmission pathway: "breakthroughs in core technologies → enhanced product competitiveness → growth in export performance."Specifically, sustained and focused R&D investment-particularly in core technologies like batteries and intelligent driving-directly translates into enhanced key product performance metrics and compliance capabilities for stringent regulations in high-end markets. This technology advantage, built through R&D, further converts into differentiated competitiveness in international markets. Ultimately, it propels export scale to achieve rapid growth exceeding industry averages and drives the optimization and upgrading of export market structure toward high-value-added developed markets.

These findings hold significant implications for both theoretical research and managerial practice. Theoretically, this study empirically validates and refines the classic "R&D-export" linkage theory through micro-level corporate cases. It specifically reveals concrete intermediary mechanisms-such as the breakthrough of technological barriers and market-adaptive R&D in R&D intensity.Practically, the findings provide a clear development paradigm for Chinese new energy vehicle enterprises-especially traditional automakers-facing international competition and transformation pressures: sustained, strategically focused R&D investment is essential. Resources must be precisely allocated to overcoming key technological and regulatory barriers in target markets, while optimizing R&D management enhances input-output efficiency.The study also provides evidence for policymakers, This demonstrates that targeted tax incentives, promoting international mutual recognition of standards, and supporting enterprises 'global R&D layouts are key policy tools to effectively enhance corporate R&D efficiency and strengthen the industry's overall international competitiveness.

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