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How Lead Firm Ecosystem Leadership Enhances Industrial Chain Resilience: A Case Study of Chery

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ABSTRACT

Against the backdrop of a profound restructuring of global industrial chains, how to systematically enhance the resilience of these chains has become a central issue. As the leading entities within industrial chains, the ecosystem leadership of lead firms serves as a key driving force in enhancing their resilience. This paper takes Chery Automobile as its case study and employs the grounded theory methodology to conduct an exploratory single-case study, constructing a theoretical framework through open coding, axial coding and selective coding. The research findings are as follows: Firstly, the ecosystem leadership of lead firms comprises five dimensions: the ability to lead technological innovation, the ability to govern the industry and build ecosystems, the ability to empower through digital transformation, the ability to implement globalization strategies, and the ability to foster collaboration between government and enterprises. Secondly, lead firms strengthen the structural, spatial and evolutionary resilience of the industrial chain through four pathways: technological innovation drives breakthroughs in key core technologies; industrial governance and ecosystem building drive collaborative support and standard-setting; digital transformation drives the digital upgrading of the industrial chain; and globalization drives the diversification of supply chain risks. Thirdly, the capacity for government-enterprise collaboration, as an institutional safeguard variable running throughout the entire process, plays a moderating and supportive role through three mechanisms: legitimization, reduction of institutional transaction costs, and scaling of resource allocation. This paper examines the five-dimensional structure of the ecosystem leadership of lead firms and the transmission mechanisms via these four distinct pathways, ultimately achieving a systematic enhancement of industrial chain resilience, thereby establishing a complete causal chain between capability dimensions, intermediary pathways and levels of resilience. This study expands upon the dimensional structure of the ecosystem leadership of lead firms, providing a theoretical reference and practical insights for understanding how such enterprises can systematically enhance industrial chain resilience under open economic conditions.

KEYWORDS

Lead firm; Ecosystem leadership; Industrial chain resilience; Chery Automobile; Grounded theory

1. INTRODUCTION

Enhancing the resilience and security of industrial and supply chains constitutes a foundational imperative for building a new development paradigm. It represents a major strategic choice with far-reaching implications for medium- to long-term economic and social development, and serves as a critical pillar for advancing manufacturing strength. At present, the world is undergoing unprecedented transformation: anti-globalization sentiments are resurgent, geopolitical conflicts continue to escalate, and unilateralism and trade protectionism are gaining ground—collectively exposing global production networks to unparalleled uncertainty. According to the McKinsey Global Institute, industries within the global division of labor face, on average, a supply-chain disruption crisis every 3.7 years. Against this backdrop, developing systematic defenses against external risks and rebuilding competitive advantages within domestic industrial chains has become an urgent priority.

The resilience and security of industrial and supply chains fundamentally hinge on the capacity for autonomous control over critical segments. Industrial policies in China have increasingly emphasized enhancing industrial and supply chain resilience and security, calling for the cultivation of lead firms endowed with ecosystem leadership and core competitiveness. Consequently, policies at both national and sub-national levels have increasingly focused on nurturing such lead firms to drive coordinated development across entire industrial chains. As the lead firms within their respective ecosystems, lead firms function as rule-makers, ecosystem architects, and primary beneficiaries; they play an indispensable role in safeguarding the security, stability, and modernization of national industrial and supply chains.

Lead firms serve as the critical nodes for overcoming strategic bottlenecks in core technologies and represent a pivotal force in ensuring the stable operation of domestic industrial chains whilst advancing into high-value segments of the global industrial network. Their technological leadership and resource-integration capabilities determine their governance position within the industrial division of labor. Extant research indicates that lead-firm governance significantly enhances industrial chain resilience, specifically by improving resistance, recovery, and transformation capabilities. Lead firms further strengthen resilience by reducing operational costs, elevating innovation levels, and lowering supply chain concentration. Nevertheless, the specific mechanisms through which the multidimensional ecosystem leadership of lead firms translates into distinct layers of industrial chain resilience—structural, spatial, and evolutionary—remain under-theorized. Prior studies have tended to treat ecosystem leadership as a simple construct or have examined its outcomes in isolation, leaving the interplay between distinct capability dimensions, intermediary pathways, and resilience levels insufficiently articulated.

Accordingly, this study examines Chery Automobile Co., Ltd. (hereafter, 'Chery Automobile') as an exploratory single case. Using grounded theory and systematic coding procedures, we construct a theoretical model elucidating how the ecosystem leadership of lead firms enhances industrial chain resilience, and identify the specific pathways through which this occurs. This study develops a five-dimensional framework of ecosystem leadership and examines how each dimension affects structural, spatial, and evolutionary resilience.

2. LITERATURE REVIEW

2.1. Lead Firms: Conceptual Foundations and Identification Criteria

An industrial chain comprises a network of interdependent upstream and downstream firms organized around specific techno-economic logic[1]. Within this architecture, lead firms occupy structurally central positions, exercising substantial influence by integrating resources across organizational boundaries, coordinating vertical stages, and driving chain-level development [2,3].

Scholarly conceptualizations of lead firms have converged around three complementary theoretical lenses. From a chain-governance perspective, Liu and Kong [2] argue that lead firms function as technological and market hubs whose innovative capacity determines the evolutionary trajectory of the entire chain. Adopting an industrial-evolution lens, Lin and Ni [3] characterize lead firms as market-selected champions distinguished by scale, extensive inter-firm linkages, and brand equity. Drawing on value-chain theory, Zhang and Zhang [4] define lead firms as core firms commanding the most value-creating segments and possessing ultimate decision-making authority. Chen and Chen [5] further emphasize that lead firms drive continuous innovation by orchestrating resources and aligning upstream and downstream actors. Despite these divergent emphases, a consensus has emerged around three defining attributes: structural centrality, resource-integration capability, and directional leadership in shaping industrial development.

Identification criteria have evolved from simple metrics toward multifaceted assessment frameworks. Sheng [6] proposes that lead firms should simultaneously possess core technologies, innovation capacity, management excellence, global vision, and brand influence. Bai et al. [7] stress dominance across four domains: technological innovation, standard-setting, brand effect, and market control. Chen and Zhang [8] distill identification criteria into three core dimensions: innovation capacity, firm scale, and market share. Ye and Zhuang [9] further suggest that total asset scale can serve as a threshold indicator of a lead firm's influence.

Yet existing research is insufficient in one critical respect. Identification criteria remain dominated by static attributes of scale and market power, paying inadequate attention to the dynamic governance capabilities required for cross-stage integration and systemic coordination within complex supply networks [6]. The functional role of lead firms as governance—rather than merely influential participants—has not been fully theorized.

2.2. Ecosystem Leadership: Dimensional Structure and Theoretical Gaps

The national policy framework has called for cultivating lead firms endowed with ecosystem leadership and core competitiveness [10]. Ecosystem leadership refers to the influence, control, and directional capacity exercised by a lead firm within its industrial ecosystem. Understanding its dimensional structure is essential for delineating the functional boundaries of lead firms and evaluating their chain-governance capabilities.

Existing research has classified the dimensions of ecosystem leadership from various perspectives. Sheng [6] identifies five authorities: industry standard-setting, product-technology leadership, end-market control, key-resource integration, and industrial-development guidance. Chen and Yu [11] propose four capabilities: industrial collaboration and integration, technological innovation leadership, target-market creation, and digital-transformation empowerment. Using BYD as a case study, Wang et al. [12] synthesize ecosystem leadership into three dimensions—technological innovation leadership, industrial collaboration and integration, and digital-transformation empowerment—and explicate the sub-structures and mechanisms underpinning each. Ji et al. [13] construct an evaluation indicator system covering technological innovation leadership, industrial collaboration and integration, and industrial development leadership. Hao et al. [14] categorize inter-firm leadership into three hierarchical levels: technological, platform-based, and institutional. Li et al. [15] find that core enterprises play a positive role in coordinating relational dynamics among ecosystem participants and enhancing overall ecosystem efficiency.

These studies provide an important foundation for understanding the architecture of ecosystem leadership. Nevertheless, existing research is insufficient in two specific areas. First, existing frameworks have focused primarily on the integration and leadership functions of lead firms within domestic chains, paying limited attention to their governance capabilities within the international division of labor—specifically, the cross-regional resource allocation, overseas market expansion, and international supply-chain integration necessitated by globalized operations. Second, while most studies adopt a purely market-based logic, the deep collaboration between government and lead firms in the Chinese context—encompassing industrial planning, joint innovation-platform construction, and institutional provision—has not been adequately incorporated into the analytical framework of ecosystem leadership. These gaps suggest that the dimensional structure of ecosystem leadership may benefit from expansion along the dual dimensions of globalization and government-enterprise collaboration.

2.3. Industrial Chain Resilience: From Binary Logic to Multi-Dimensional Conceptualization

Resilience originated as a concept in physics, denoting a system's capacity to recover its original form following external shock [16]. Holling [17] introduced the term into ecosystem research to characterize the capacity of ecosystems to absorb disturbance and reorganize while undergoing change. Subsequently, resilience theory has extended into economics and management, spawning research streams on economic resilience, urban resilience, and organizational resilience [18].

Within the industrial-chain context, the concept has evolved from passive recovery toward active adaptation and, subsequently, toward systemic evolution. Chen et al. [20] define industrial chain resilience as the capacity of a chain to prevent disruption, maintain stability, adjust and recover rapidly when subjected to internal and external shocks, and achieve chain-level upgrading through crisis response. Duan [21] interprets it as the comprehensive capacity to preserve system stability, prevent breakdown, and withstand shocks. Xiao and Li [19], viewing the concept through the lens of profound global transformation, identify transformation capacity, recovery capacity, and resistance capacity as key dimensions.

Synthesizing these perspectives, industrial chain resilience can be distilled into three core dimensions: resistance—the capacity to maintain chain stability and prevent disruption; recovery—the capacity to adjust and return to stable operation following shock; and upgrading—the capacity to achieve qualitative advancement through resource reconfiguration [6, 22]. Notably, existing research is insufficient in capturing the full complexity of resilience under contemporary conditions. Prior studies have largely confined their understanding of industrial chain resilience to a resistance-recovery binary logic, with limited attention to spatial resilience and evolutionary resilience under conditions of globalization and digitalization.

2.4. Pathways to Resilience: Multi-Level Perspectives and Unresolved Questions

Research on pathways for enhancing industrial chain resilience can be organized across three analytical levels: macro, industry, micro-enterprise level.

At the macro level, Chen et al. [20] advocate leveraging the digital economy to advance chain-level digital upgrading and achieve breakthroughs in core technologies. Lü and Zhang [23] demonstrate the positive effect of artificial intelligence on industrial chain resilience. Li and Rong [24] find that intellectual property pilot city policies significantly enhance industrial chain resilience. Zhang et al. [25] conduct an empirical analysis of the spatial spillover effects of the digital economy on manufacturing chain resilience. These studies establish that institutional and technological factors at the macro level shape resilience outcomes, yet they rarely examine how lead firms mediate these macro-level forces into micro-level chain governance.

At the industrial level, He et al. [26] show that industrial synergy and agglomeration enhance manufacturing chain resilience through technological innovation. Zhang et al. [22] construct a measurement system based on four dimensions: resistance, recovery, evolutionary capacity, and government-enabled capacity. Gu and Zhang [27] establish a five-dimensional evaluation indicator system covering chain foundation, resistance, recovery, sustainability, and leadership. While these sectoral studies advance our understanding of resilience measurement, they tend to treat resilience as an aggregate industrial attribute rather than tracing its origins to specific firm-level governance mechanisms.

At the micro-enterprise level, Li and He [28] propose establishing supply-information databases for critical chain segments, with lead firms serving as the organizational hub. Zhao et al. [29] find that large state-owned enterprises fulfill lead-enterprise functions through pathways such as establishing innovation consortia and formulating standardization systems. Wang et al. [12] reveal the micro-level mechanisms through which lead firms enhance chain resilience via three pathways: technological innovation leadership, industrial collaboration and integration, and digital-transformation empowerment. Ye and Zhuang [9] find that lead firms in industrial chains exert a significant influence on the growth of local manufacturing firms.

Taken together, existing research is insufficient in three specific respects. First, theoretical frameworks addressing ecosystem leadership along the dual dimensions of international governance and government-enterprise collaboration remain underdeveloped. Second, the transmission mechanisms through which distinct capability dimensions of lead firms disparate impact industrial chain resilience have not been sufficiently elaborated; most studies remain confined to correlational analyses between individual capabilities and resilience outcomes, failing to articulate the causal chain linking capabilities, mediating pathways, and resilience levels. Third, micro-level research has focused predominantly on state-owned enterprises or centrally administered state-owned enterprises, with limited attention to the distinctive mechanisms through which private-sector lead firms contribute to the construction of industrial chain resilience.

In summary, although prior studies have advanced our understanding of lead firms and industrial chain resilience, existing research is insufficient in the following analytical respects. First, regarding the dimensional structure of ecosystem leadership, existing frameworks inadequately address lead firms' capacity for cross-regional resource allocation and risk diversification under globalized operations, as well as the deep synergy between government and lead firms in institutional provision and joint innovation-platform construction within the Chinese context. Second, the differential transmission mechanisms through which distinct capability dimensions influence industrial chain resilience remain unclear; most studies are limited to correlational analyses between individual capabilities and resilience outcomes, failing to reveal the intrinsic linkages among capability dimensions, mediating pathways, and resilience levels. Third, micro-level case studies have concentrated on state-owned enterprises, leaving the unique mechanisms through which private-sector lead firms contribute to industrial chain resilience insufficiently examined.

3. RESEARCH DESIGN

3.1. Research Methods

This study employs an exploratory single-case study design, selecting Chery Automobile as the research subject to examine the pathways and mechanisms through which a lead firm's ecosystem leadership enhances industrial chain resilience. This methodological choice rests on three considerations. First, the case study method is particularly suited to addressing "how" questions regarding process mechanisms. Second, grounded theory enables the bottom-up extraction of concepts and categories from empirical data, making it appropriate for constructing theoretical frameworks that remain in an exploratory phase, such as ecosystem leadership. Third, as a representative lead firm in China's automotive industry, Chery has accumulated extensive practical experience in independent innovation, global competition, and digital transformation. A single-case design allows for in-depth, context-specific analysis while mitigating confounding factors that often arise in cross-case comparisons.

3.2. Case Selection

Following theoretical sampling principles, this study selects Chery Automobile as the research subject, demonstrating its typicality and representativeness at both the industrial chain and corporate levels.

Typicality at the industrial chain level. The industrial chain in which Chery operates provides an ideal setting for examining how a lead firm's ecosystem leadership enhances industrial chain resilience. Chery has established a complete industrial chain encompassing upstream raw materials and core component supply, midstream vehicle manufacturing and core system integration, and downstream market sales and aftermarket services, forming a dual-track structure integrating both internal combustion engine (ICE) and new energy vehicle (NEV) sectors. Figure 1 presents a panoramic structural diagram of Chery's industrial chain, constructed from industry development reports and publicly available corporate information,see Figure 1.

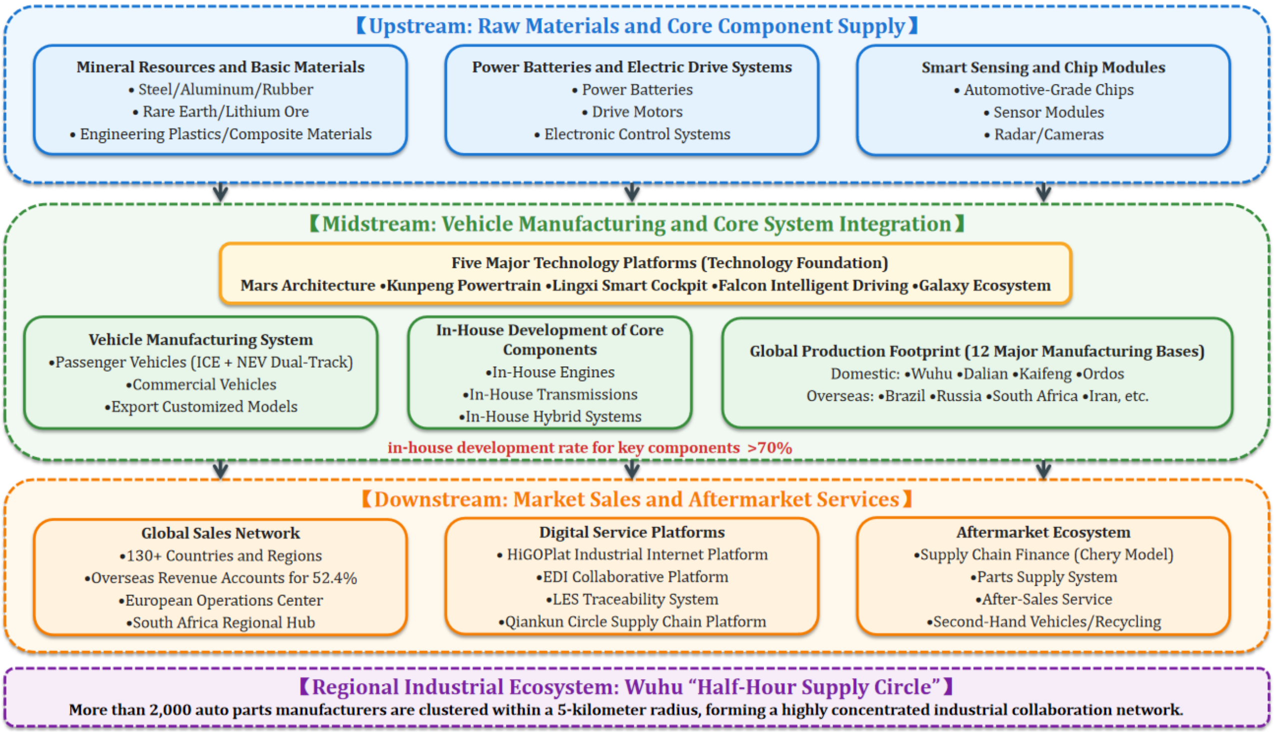

Figure 1. Panoramic Structural Diagram of Chery's Industrial Chain

First, local clustering: a high-density supporting network lays the foundation for production-supply coordination. Centered on Wuhu's "half-hour supply circle," more than 2,000 parts manufacturers are clustered within a 5-kilometer radius, forming a highly concentrated regional industrial collaboration network. This spatial proximity not only reduces logistics costs and communication friction but also enables rapid capacity coordination and resource reallocation in response to external shocks, providing a spatial foundation for structural stability.

Second, global integration: deep embedding in the international division of labor achieves spatial expansion and risk diversification. Chery has ranked first among Chinese passenger vehicle brands in exports for 23 consecutive years, with exports reaching 1.2944 million units in 2025 and business operations spanning more than 130 countries. This global footprint enables the spatial extension of the industrial chain, facilitating cross-regional capacity allocation and risk hedging. Simultaneously, extensive international exposure subjects the chain to external risks such as geopolitical conflicts and trade policy shifts, providing a typical context for examining how lead firms mitigate supply chain shocks under open economic conditions.

Third, technological transformation: the dual-track strategy faces multidimensional transformation pressures. Chery is developing both ICE and NEV sectors in parallel; in 2025, NEV sales reached 826,500 units, a year-over-year increase of 72.5%, while ICE vehicles remain the primary source of sales and profits. This dual-track strategy exposes the enterprise to a wider range of shocks—including cyclical fluctuations in the ICE market, technology route risks in the NEV sector, and trade policy uncertainties in global operations—making the challenge of building supply chain resilience substantially greater than for firms focused on a single technology route.

The overlapping characteristics of local clustering, global integration, and technological transformation provide a rich empirical context for this study.

Representativeness at the corporate level. Chery exhibits the core characteristics of a lead firm. In terms of technological mastery, Chery has built a portfolio of over 400 core technologies across five major domains: Mars Architecture, Kunpeng Powertrain, Lingxi Smart Cockpit, Falcon Intelligent Driving, and Galaxy Ecosystem. The firm independently develops the full stack of engines, transmissions, and hybrid systems, with an in-house R&D rate for key components exceeding 70 percent. The Kaiyang Laboratory collaborates with more than 60 universities worldwide, achieving breakthroughs in eight key core technologies for the industry and driving the development of more than 1,000 enterprises along the industrial chain. In terms of industry governance, Chery officially became a member of the International Automotive Task Force (IATF) Board of Directors in 2026, joining the core group of global automotive standard-setters and achieving a transformative shift from a standard follower to a standard co-creator. In terms of digital transformation, the HiGOPlat industrial internet platform was selected as a national-level cross-industry, cross-domain platform, serving nearly 30,000 enterprises, with its supply chain platform extending to Tier 11 suppliers.

Uniqueness of research value. Compared with BYD's strength in vertical integration for electrification, Geely's reputation for cross-border mergers and acquisitions, and NIO's breakthrough through user operations, Chery's distinctive value lies in its composite strategy of parallel dual tracks and system-level globalization. This characteristic exposes the firm to a more diverse range of challenges—including risks of technological blockades, geographical concentration in the supply chain, and fluctuations in trade policies. Consequently, the complexity of building resilience is substantially greater than for firms operating in a single market or following a single technological path, providing a more illuminating case for researching how lead firms systematically enhance industrial chain resilience under multiple constraints.

Overall, Chery meets the identification criteria for a lead firm in terms of its position within the industrial chain, technological mastery, degree of globalization, and institutional influence. The three overlapping characteristics of its industrial chain—regional clustering, global embedding, and technological transformation—provide rich empirical evidence for this study's exploration of the intrinsic mechanisms through which a lead firm's ecosystem leadership enhances industrial chain resilience.

3.3. Data Collection

This study adheres to the principle of triangulation and collects secondary data through multiple channels. Data sources include: (1) Chery's annual reports, official media coverage, public statements and interviews with corporate leaders, and corporate website materials; (2) in-depth industry reports from securities firms; (3) remarks by experts at industry forums organized by the Ministry of Industry and Information Technology and the China Association of Automobile Manufacturers ; (4) government industrial policy documents; and (5) relevant literature from leading domestic and international journals. After collation and screening, two researchers independently coded the raw materials. Through open coding, axial coding, and selective coding, core categories were ultimately distilled. The coding results passed the theoretical saturation test.

4. DATA PROCESSING

4.1. Open Coding

Open coding involves reading, tagging, conceptualizing, and categorizing collected textual data line by line and sentence by sentence, with the aim of extracting initial concepts and categories from raw data. Through this coding process, this study identified 66 tags, 66 initial concepts, 18 valid concepts, and 11 initial categories. Table 1 presents an example of open coding, see Table 1.

Table 1. Open-coding examples

Raw Data Records (Tagged) (Selected excerpts for illustration)	Initial Conceptualization	Conceptualization	Categorization
In 2025, Chery's R&D investment reached RMB 14.72 billion, a year-over-year increase of 39.6%, of which R&D expenses amounted to RMB 11.44 billion (a1).	aa1 R&D Investment (a1)	A1 Investment in Innovation Resources (aa1, aa2, aa3, aa4, aa6, aa7)	AA1 R&D and Innovation Capabilities (A1, A2)
Chery has built a portfolio of more than 400 core technologies across five major domains: Mars Architecture, Kunpeng Powertrain, Lingxi Smart Cockpit, Falcon Intelligent Driving, and Galaxy Ecosystem (a2).	aa2 Core Technology Portfolio (a2)	A2 Innovation Outputs (aa3, aa5)	AA2 Innovation Leadership Capabilities (A3)
In 2025, invention patent applications increased by nearly 50% year-over-year, with granted patents rising by over 300%, ranking first in Anhui Province for 12 consecutive years (a3).	aa3 Leading Patent Achievements (a3)		AA3 Global Expansion Capabilities (A4, A5)
Chery has established a global R&D network of eight R&D centers, with its R&D and technical workforce continuing to expand (a4).	aa4 Global R&D System (a4)		AA4 Open Innovation Ecosystem (A6)
By the end of 2025, Chery Group had filed more than 45,000 patent applications and been granted nearly 30,000 patents (a5).	aa5 Cumulative Patents (a5)		AA5 Global Standards Leadership Capabilities (A7)
Chery has undertaken more than 170 national-level projects, including the "National Science and Technology Support Program," and has received the National Science and Technology Progress Award on multiple occasions (a6).	aa6 Technology Projects Undertaken (a6)		AA6 Financial Empowerment Capabilities (A8)
Chery has won 17 China Patent Awards and 22 Anhui Provincial Patent Awards (a7).	aa7 Patent Awards (a7)		AA7 Digital Transformation Empowerment Capabilities (A9)
Chery has independently developed a full suite of engines, transmissions, and hybrid systems, filling a gap in domestic transmission technology (a8).	aa8 In-house core technology development (a8)	A3 Breakthroughs in Technological Self-Reliance (aa8, aa9)	AA8 Industrial Collaboration and Integration Capabilities (A11)
On the large screen at the Wuhu Chery Supply Chain Command Center, real-time production capacity data from 1,200 core suppliers is displayed. The in-house development rate for key components exceeds 70%. During the global chip shortage, this system ensured a 92% production plan completion rate (a9).	aa9 In-house system for supply chain security (a9)		AA9 Government-Enterprise Collaboration Capabilities (A13)
......	......	......	......
In 2025, Chery's new energy vehicle sales reached 826,500 units, up 72.5% year-over-year; revenue from new energy vehicles reached RMB 98.02 billion, increasing its share of total revenue from 21.9% to 32.6% (a64).	aa64 Growth in New Energy Vehicle Sales (a64)	A17 Parallel Dual-Track Approach (aa64, aa65, aa66)	AA10 Risk Resilience Capabilities (A16, A17)
In 2025, the gross margin of the new energy business rose to 8.8%, marking a transition from scale expansion to profitable growth (a65).	aa65 Breakthrough in New Energy (a65) Vehicle Profitability		
Chery's global supply chain network spans more than 130 countries, allowing the company to reallocate production capacity from other regions when a single market is disrupted (a66).	aa66 Global Supply Chain Resilience (a66)	A18 Supply Chain Recovery Mechanism (aa66, aa67)	AA11 Shock Recovery Capabilities (A18)
(66 tags in total)	(66 initial concepts in total)	(18 valid concepts in total)	(11 initial categories in total)

4.2. Axial Coding

Axial coding involves clustering and merging the initial categories obtained from open coding based on logical relationships and semantic similarities, ultimately forming main categories. By analyzing the conceptual relationships among the initial categories, this study grouped the 11 initial categories into 5 main categories. Table 2 presents the definitions of each main category and their corresponding initial categories, see Table 2.

Table 2. Axial coding and connotations main categories

Main Category	Definition of the Main Category	Corresponding Initial Category
Technological Innovation Leadership Capability	lead firms possesses strong technological innovation capabilities, backed by R&D talent, funding, and information resources, with deep technical expertise and proven innovative outcomes. Through R&D spillovers and demonstration effects, it stimulates innovation among upstream and downstream firms in the chain.	AA1 R&D and Innovation Capabilities (A1, A2) AA2 Innovation Leadership Capabilities (A3) AA4 Open Innovation Ecosystem (A6) AA5 Global Standards Leadership Capabilities (A7)
Industrial Governance and Ecosystem-Building Capability	lead firms leverage their comparative advantages to consolidate and drive the development of upstream, midstream, and downstream companies along the industrial chain through resource integration, relationship coordination, supply chain finance, risk management, and industrial collaboration, thereby fostering a stable division of labor and a collaborative industrial ecosystem.	AA6 Financial Empowerment Capabilities (A8) AA8 Industrial Collaboration and Integration Capabilities (A11) AA11 Resilience to Shocks (A18)
Digital Transformation Enabling Capability	lead firms leverage their technological strengths in digital transformation to empower businesses and partners, and to promote societal development, while advancing the informatization of R&D, the digitization of production, and the intelligent development of products across the industrial chain.	AA7 Digital Transformation Enablement Capabilities (A9)
Global Expansion Capability	Through exports, overseas R&D, overseas manufacturing, overseas operations centers, and deep penetration of regional markets, lead firms are transitioning from exporting individual products to exporting entire systems, thereby establishing a global industrial footprint.	AA3 Global Expansion Capabilities (A4, A5)
Government-Enterprise Collaboration Capability	lead firms leverage local industrial and talent policies to build a collaborative innovation ecosystem involving government, industry, academia, research institutions, and end-users by co-establishing innovation platforms with the government and conducting joint research with universities and research institutes.	AA9 Government-Enterprise Collaboration Capabilities (A13) AA10 Risk Resilience Capabilities (A16, A17)

4.3. Selective Coding

This study ultimately distills six core categories: the ecosystem leadership of the lead firm (starting point); breakthroughs in key core technologies along the industrial chain; industrial chain synergy, support, and standards leadership; digital transformation of the industrial chain; risk diversification in global supply chains; and industrial chain resilience (end point). Among these, four categories represent intermediary pathways.

The resulting narrative is as follows. As the lead firm in its automotive industrial chain, Chery leverages the five capability dimensions of its ecosystem leadership to enhance industrial chain resilience through four pathways. The ability to lead technological innovation drives breakthroughs in key core technologies, achieving structural resilience (strengthening and supplementing the chain). The ability to govern the industry and build ecosystems promotes collaborative support and standard-setting leadership, achieving regulatory governance (stabilizing and solidifying the chain). The capability for digital transformation empowerment promotes the digital upgrading of the industrial chain, achieving evolutionary resilience (extending and optimizing the chain). The capability for global deployment enables the diversification of supply chain risks and cross-regional allocation of production capacity, achieving spatial resilience (expanding and strengthening the chain). The capability for government-enterprise collaboration runs throughout the entire process, providing legitimacy and ensuring resource allocation for the aforementioned pathways through institutional coordination and the joint construction of innovation platforms.Following the storyline developed above, this paper constructs a theoretical model in which lead firm ecosystem leadership enhances industrial chain resilience,see Figure 2.

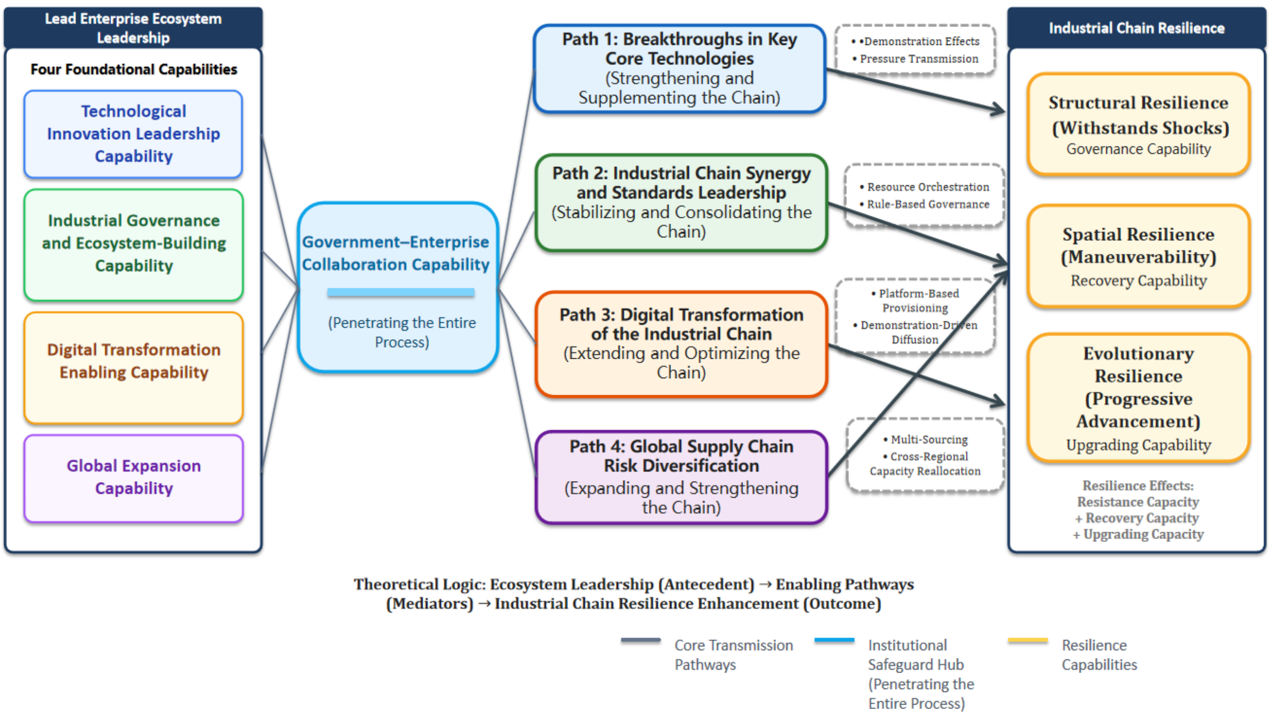

Figure 2. Theoretical Model of Lead Firm Ecosystem Leadership Enabling Industrial Chain Resilience

4.4. Test of Theoretical Saturation

The test results indicate that no new categories or narrative threads were identified, and no new modes of connection emerged among the logical relationships between the core categories. This suggests that the theoretical framework constructed in this study possesses a high degree of theoretical saturation.

5. CASE ANALYSIS AND DISCUSSION

5.1. Dimensions of Ecosystem Leadership

Lead firms gradually accumulate ecosystem leadership—defined as influence, governance capacity, and directional authority over the industrial ecosystem—by building resources and advantages in frontier technologies, industry standards, and end markets. Through grounded theory analysis, this study identifies five dimensions of ecosystem leadership.

Technological innovation leadership denotes a lead firm's capacity to drive collaborative innovation among chain members through R&D spillovers and innovation demonstration. Chery operates eight R&D centers globally. In 2025, its R&D investment totaled 14.715 billion yuan, with a portfolio of more than 400 core technologies across five major technical fields and cumulative patent applications exceeding 45,000. The firm established the Kaiyang Laboratory in collaboration with over 60 universities worldwide, achieving breakthroughs in eight key core technologies for the industry and influencing more than 1,000 upstream and downstream enterprises. This marks a paradigm shift from closed, independent R&D toward open innovation.

Industrial governance and ecosystem building reflects a lead firm's capacity to consolidate resources, coordinate relationships, and set industry standards, thereby aligning upstream and downstream actors into a stable division of labor and industrial ecosystem. Chery has established a half-hour supply circle around Wuhu, aggregating over 2,000 parts manufacturers, built a three-tier due diligence management system, and developed a global supply chain risk map. In 2026, Chery became a member of the IATF Board of Directors, joining the core group of global automotive standard-setters and achieving a shift from standard follower to standard co-creator.

Digital transformation empowerment captures a lead firm's capacity to leverage digital advantages and platform-based provisioning to empower partners and industry development. Chery's HiGOPlat industrial internet platform was selected as a national-level cross-industry, cross-domain platform, connecting nearly 1.9 million devices and serving nearly 30,000 enterprises. The Qiankun Circle supply chain platform extends to Tier 11 suppliers, integrating disparate data silos into a unified system and transforming digital capabilities from a private asset of the lead firm into a public good for the entire industrial chain.

Global expansion capability reflects a lead firm's capacity to allocate resources, expand markets, and integrate supply chains on a global scale through its international business network. Chery has ranked first among Chinese passenger vehicle brands in exports for 23 consecutive years. In 2025, it exported 1.2944 million vehicles and generated overseas revenue of 157.42 billion yuan, accounting for 52.4% of total revenue, with operations spanning more than 130 countries. The firm's strategic focus has shifted toward system-level globalization, marked by the launch of a European operations center in Spain and the positioning of the Rosslyn plant in South Africa as a regional hub. This constitutes a "1+7+N" global collaborative innovation network (one headquarters, seven regional centers, and N local nodes).

Government-enterprise collaboration denotes a lead firm's capacity to form synergistic relationships with local governments in institutional design, joint innovation-platform construction, and industrial planning. Anhui Province has designated new energy vehicles as a pillar industry and enacted the first provincial-level legislation of its kind in China. Wuhu City established a lead-firm governance mechanism, with provincial and municipal governments each providing 100 million yuan in annual support to the Kaiyang Laboratory for three consecutive years, while Chery cumulatively invested over 550 million yuan. This created a positive feedback loop of institutional supply, industry response, and policy optimization.

Proposition 1. The ecosystem leadership of a lead firm comprises five dimensions: technological innovation leadership, industrial governance and ecosystem building, digital transformation empowerment, global expansion capability, and government-enterprise collaboration.

5.2. Pathways for Enhancing Industrial Chain Resilience

5.2.1. Pathway 1: Breakthroughs in Key Core Technologies

Technological innovation leadership drives breakthroughs in key core technologies through two complementary mechanisms: demonstration effects and pressure transmission. On one hand, the substantive innovation activities of lead firms expand the industrial chain's technological reserves, and their technological roadmaps shape the chain's evolutionary direction through standard lock-in effects. On the other hand, the continuously rising technical standards of lead firms compel supporting firms to improve their processes to maintain cooperative relationships, thereby generating chain-wide momentum for technological iteration.

Breakthroughs in key core technologies constitute the fundamental pathway to mitigating chokepoint risks. Chery independently develops the full stack of engines, transmissions, and hybrid systems, with an in-house R&D rate for key components exceeding 70%. The Kaiyang Laboratory has achieved breakthroughs in eight key core technologies for the industry. When domestic firms master these technologies, they not only address weaknesses in the chain and reduce dependence on foreign technologies but also secure technological leadership, take the initiative in setting technical standards, and enhance their influence in the international division of labor.

Proposition 2. The technological innovation leadership of lead firms drives breakthroughs in key core technologies along the industrial chain, thereby reinforcing chain structure and remediating capability gaps and enhancing structural resilience.

5.2.2. Pathway 2: Industrial Chain Synergy and Standards Leadership

Industrial governance and ecosystem building drive industrial chain synergy through two mechanisms: resource orchestration and rule-based governance. Through resource orchestration, lead firms integrate heterogeneous resources scattered across various chain segments into a unified allocation framework. Through rule-based governance, they coordinate benefit distribution and mediate disputes among members through contract design, standard-setting, and ecosystem building, transforming short-term transactional relationships into long-term strategic collaboration.

Industrial chain synergy strengthens resilience through two sub-pathways: structural redundancy and rapid response. The former creates distributed support capabilities through a diversified network of suppliers, thereby cushioning the impact of disruptions. The latter ensures unimpeded information channels, enabling rapid coordination among member firms to adjust plans when shocks occur. Chery has established a half-hour supply circle centered on Wuhu, aggregating over 2,000 parts manufacturers. Supply chain finance extends to second- and third-tier suppliers, and its global supply chain network spans more than 130 countries, enabling the firm to reallocate production capacity from other regions when a single market is disrupted.

Proposition 3. The industrial governance and ecosystem-building capabilities of lead firms promote industrial chain synergy and standards leadership, thereby stabilizing and consolidating chain governance and enhancing resilience.

5.2.3. Pathway 3: Digital Transformation of the Industrial Chain

Digital transformation empowerment drives the digital upgrading of the industrial chain through two mechanisms: platform-based provisioning and demonstration-driven diffusion. Through platform-based provisioning, lead firms build digital infrastructure, connect data silos, and transform digital capabilities from private assets into public goods for the industrial chain. Through demonstration-driven diffusion, lead firms integrate suppliers into their digital management systems and disseminate technical specifications and operational standards, transforming digital transformation from individual firm actions into systemic change.

Digital upgrading enhances resilience through two sub-pathways: transparency and flexibility. Transparency enables real-time visualization of supply and demand conditions across the chain, enhancing risk perception. Flexibility enables the chain to evolve from a rigid division-of-labor structure toward a flexible, modular collaboration structure, allowing rapid adjustment in the face of demand fluctuations or supply shocks. Chery's HiGOPlat platform serves nearly 30,000 enterprises, has shortened delivery cycles by 23%, and its EDI platform facilitates data exchange with key suppliers.

Proposition 4. The digital transformation empowerment capabilities of lead firms drive the digital upgrading of the industrial chain, thereby extending and optimizing chain operations and enhancing evolutionary resilience.

5.2.4. Pathway 4: Risk Diversification Through Global Supply Chains

Global expansion capability mitigates supply chain risk through two mechanisms: multi-sourcing and cross-regional capacity reallocation. Multi-sourcing establishes diversified supply sources worldwide, reducing over-reliance on any single supplier or region. Cross-regional capacity reallocation allows the redeployment of production from other regions when a single market faces disruptions, thereby maintaining continuous chain operation.

Global expansion enhances resilience through two sub-pathways: risk diversification and spatial redundancy. Chery's exports account for 49.2% of total sales volume, with overseas revenue comprising 52.4% of total revenue. The firm operates in more than 130 countries and maintains 12 production bases worldwide. When a particular region is affected by natural disasters, trade barriers, or sudden policy changes, supply capacity in other regions serves as an alternative source. This spatial configuration endows the industrial chain with cross-regional substitution and relocation capacity. Its essence lies not in maintaining stability within a single geographic space but in achieving risk mitigation through the geographic distribution of capabilities.

Proposition 5. The global expansion capabilities of lead firms promote risk diversification in global supply chains, thereby expanding chain reach and enhancing spatial resilience.

5.3. The Institutional Role of Government-Enterprise Collaboration

Government-enterprise collaboration constitutes the institutional infrastructure underpinning the four pathways described above. Through industrial legislation, lead-enterprise governance mechanisms, and joint innovation-platform construction, the government provides legitimacy and resource support for lead firms' technological breakthroughs, industrial governance, digital transformation, and global expansion. Government-enterprise collaboration is not a parallel capability independent of other dimensions; rather, it permeates the entire process through three mechanisms. The legitimacy support mechanism reduces policy uncertainty. The institutional transaction cost reduction mechanism minimizes friction in cross-regional and cross-border operations. The resource amplification mechanism combines limited government resources with lead firm practices to magnify empowerment effects.

Proposition 6. Government-enterprise collaboration functions as an institutional safeguard variable running throughout the entire process. Through the three mechanisms of legitimacy support, reduction of institutional transaction costs, and resource amplification, it plays a moderating and supportive role in the other four pathways.

6. CONCLUSIONS AND IMPLICATIONS

6.1. Research Conclusions

This study examines Chery Automobile using grounded theory to explore the capability dimensions of lead firm ecosystem leadership and the pathways through which it enhances industrial chain resilience. We draw four conclusions.

First, ecosystem leadership can be decomposed into five dimensions: technological innovation leadership, industrial governance and ecosystem building, digital transformation empowerment, global expansion capability, and government-enterprise collaboration. Relative to existing three-dimensional frameworks, this study introduces global expansion capability and government-enterprise collaboration as new dimensions. Global expansion capability reveals the distinctive mechanism through which lead firms enhance spatial resilience via cross-regional resource allocation and capacity reallocation under open economic conditions. Government-enterprise collaboration reflects the deep synergy between government and lead firms in institutional provision and joint innovation-platform construction within the Chinese context, serving as the institutional foundation for the effective exercise of ecosystem leadership.

Second, ecosystem leadership enhances industrial chain resilience through four pathways. Technological innovation leadership drives breakthroughs in key core technologies, reinforcing chain structure and remediating capability gaps. Industrial governance and ecosystem building drive collaborative support and standards leadership, stabilizing and consolidating chain governance. Digital transformation empowerment drives the digital upgrading of the industrial chain, extending and optimizing chain operations. Global expansion capability drives supply chain risk diversification, expanding chain reach and spatial coverage. These four pathways address technological autonomy, structural stability, systemic adaptability, and spatial dispersion, respectively, forming an integrated resilience assurance network that spans the entire life cycle of the industrial chain.

Third, industrial chain resilience encompasses three dimensions: structural resilience, spatial resilience, and evolutionary resilience. Structural resilience refers to the capacity of an industrial chain to maintain organizational integrity and prevent fragmentation when facing shocks. Spatial resilience refers to the capacity to hedge risks and reallocate production capacity through geographically dispersed configurations. Evolutionary resilience refers to the capacity to achieve value growth through resource reorganization and technological innovation following shocks. These three dimensions represent static stress resistance, dynamic reconfiguration capability, and evolutionary adaptability, respectively.

Fourth, government-enterprise collaboration functions as an institutional safeguard variable running throughout the entire process. Through three mechanisms—legitimacy support, reduction of institutional transaction costs, and resource amplification—it plays a moderating and supportive role, providing institutional foundations for lead firms' technological breakthroughs, industrial governance, digital transformation, and global expansion.

6.2. Practical Implications

At the lead firm level, ecosystem leadership should be systematically strengthened across all five dimensions. For technological innovation leadership, lead firms can leverage open innovation platforms—such as the Kaiyang Laboratory—to co-develop R&D projects with suppliers and research institutions, thereby transforming individual innovations into chain-wide innovative capacity. For industrial governance and ecosystem building, firms should deepen supply chain integration and participate actively in standard-setting to cultivate an open and collaborative innovation ecosystem. For digital transformation, firms should utilize industrial internet platforms to drive chain-level digital upgrading. For global expansion, firms should continue advancing system-level globalization, achieving supply chain risk diversification through multi-sourcing and cross-regional capacity reallocation. For government-enterprise collaboration, firms should actively engage in industrial policy design and joint innovation-platform construction, fostering a positive feedback loop of institutional supply, industry response, and policy optimization.

At the government level, institutional support and resource allocation for lead firms should be strengthened. The experience of designating new energy vehicles as a strategic industry and establishing lead-enterprise governance mechanisms at provincial and municipal levels offers a reference model. For breakthroughs in key core technologies, governments should support lead firms in spearheading innovation consortia. For chain coordination and complementary support, governments should refine industrial policy implementation to cultivate distinctive industrial clusters. For digital transformation, governments should strengthen collaborative governance in digital platform development to ensure smooth digital upgrading across all chain segments.

6.3. Limitations and Future Research

This study is based on a single-case design; therefore, the generalizability of its conclusions requires further validation. As a privately owned lead firm, Chery's distinctive combination of a dual-track strategy and system-level globalization exhibits certain context-specific characteristics. Whether the findings apply to other industries or other types of lead firms remains to be examined through comparative multi-case studies or large-sample empirical research.

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