

# Research Status Quo, Conceptual Connotation, and Advantages of Enterprise-led Innovation Consortia

**Qiang Yan\***

School of Economics and Management, Southwest University of Science and Technology, Mianyang 621010, Sichuan, China

*\*Author to whom correspondence should be addressed.*

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**Abstract:** In line with the national strategy of achieving greater self-reliance and strength in science and technology, enterprise-led innovation consortia have emerged as crucial vehicles for implementing the new system for mobilizing resources nationwide. They tackling the ‘chokehold’ challenges in core technologies in key fields, bridge the innovation chain with the industrial chain, and serve as vital carriers for China’s strength in strategic science and technology. Facing the dual challenges of intensified global technological competition and inefficient traditional industry-university-research (IUR) collaboration in China, this paper systematically reviews domestic and international research on innovation consortia based on integrated innovative theory. It deconstructs their component elements and unique conceptual connotations, while deeply analyzing their advantages across five aspects: the new system for mobilizing resources nationwide, China’s strength in strategic science and technology, resource integration, collaborative organization, and market-based resource allocation. This research provides academic insights for the efficient operation of enterprise-led innovation consortia and their contribution to achieving high-level scientific and technological self-reliance.

**Keywords:** Innovation consortia; Research status quo; Conceptual connotation; Advantages

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## 1. Introduction

At present, sci-tech innovation has become the focus of national competition, with the autonomous control of core technologies in key fields serving as the strategic cornerstone for safeguarding national development security. Former IUR collaboration struggle to meet the systemic demands of tackling major scientific and technological challenges due to issues such as dispersed entities, inefficient resource allocation, and insufficient coordination of interests. Against this backdrop, enterprise-led innovation consortia have emerged as a vital organizational model for integrating innovation resources and overcoming technological bottlenecks within the new system for mobilizing resources nationwide.

### 1.1. Policy evolution

The second meeting of the Central Commission for Financial and Economic Affairs in 2018 proposed ‘establishing a technology innovation system centered on enterprises, guided by the market, and featuring deep integration of industry,

academia, and research’, laying the policy foundation for the initial form of innovation consortia. The 2022 report of the 20th CPC National Congress focused on ‘promoting closer enterprise-led IUR collaboration’, propelling innovation consortia from pilot exploration to systematic promotion. The Central Committee of the Communist Party of China and the State Council have issued the opinions on strengthening the leading role of enterprises in scientific and technological innovation in 2023. According to the official document, support should be provided for leading enterprises to spearhead the formation of innovation consortia and undertake major national science and technology projects, offering institutional safeguards for their standardized development. Recommendations of the Central Committee of the Communist Party of China for Formulating the 15th Five-Year Plan for National Economic and Social Development further suggest ‘the principal role of enterprises in technological innovation should be reinforced. We should facilitate the flow of innovation resources toward enterprises, support them in spearheading the creation of innovation consortia and in playing a greater role in major national science and technology programs’. This will accelerate the formation of a national innovation system centered on enterprises with deep integration of industry, academia, and research.

## 1.2. Academic research

Existing literature has yet to establish a unified paradigm for defining innovation consortia, with research primarily focusing on two dimensions: organizational attributes and subject roles. Bai Jinyu et al. view them as an advanced form of industry-academic-research collaboration, emphasizing their deeper integration and goal-focused nature compared to traditional industry-academia-research alliances <sup>[1]</sup>. Liu Jiejiao et al. and Xu Tiantian adopt a function-oriented approach, defining innovation consortia as an innovation model for making breakthroughs in core technologies in key fields, highlighting their task-driven nature <sup>[2,3]</sup>. Zhang Chidong transcends the limitations of the previous two perspectives, proposing that innovation consortia are essentially task-oriented, systematic innovation cooperation organizations requiring three core characteristics national strategic <sup>[4]</sup>. These research viewpoints indicate that innovation consortia are neither purely organizational innovations nor singular technical research and development (R&D) models, but rather an organic unity of strategic orientation, stakeholder collaboration, and institutional innovation.

## 1.3. Practice

The core value of innovation consortia lies in resolving two major contradictions in traditional technological innovation: First, the disconnect between research and industry, where basic research outcomes from universities and research institutes struggle to translate into commercially viable technologies. Second, the fragmentation of innovation resources, where upstream and downstream enterprises and research institutions operate in isolation, hindering the formation of collaborative R&D synergy. For instance, China’s semiconductor industry has long grappled with insufficient coordination across the ‘design-manufacturing-packaging and testing’ chain. In 2022, the Integrated Circuit Innovation Consortium, spearheaded by SMIC integrated the fundamental research capabilities of universities like Tsinghua University and Peking University with the industrial resources of enterprises such as Yangtze Memory Technologies and Jiangsu Changjiang Electronics Technology. Within just 18 months, it achieved a yield rate improvement for 14 nm chips from 60 to 90 percent, demonstrating the practical value of innovation consortia. Cases like the New Energy Vehicle Innovation Consortium led by GAC Group, which advanced battery energy density, and the Ultrasound Diagnosis and Therapy Innovation Consortium spearheaded by Feiyino, which broke foreign technological monopolies, have fully demonstrated the significant effectiveness of the enterprise-led model in breakthroughs in core technologies in key fields and promotion of the industrial application of scientific and technological advances.

Integrating policy guidance, academic research, and practical cases, this paper defines innovation consortia as systematic, task-oriented innovation cooperation organizations under government guidance centered on innovative leading enterprises. These organizations integrate diverse entities, including upstream and downstream industry players, research universities, and scientific institutions. Their objectives are to achieve breakthroughs in core technologies in key fields and implement major scientific missions through mechanisms of ‘strategic coordination, resource integration, shared benefits,

and risk sharing'. This definition highlights the core position of 'enterprise leadership', emphasizes the supporting roles of 'government guidance', 'multi-stakeholder collaboration' and clarifies the task-driven nature of innovation consortia, laying a conceptual foundation for subsequent research.

## 2. Literature review

The theoretical origins of innovation consortia can be traced back to the 1980s research on 'collaborative R&D organizations'. Their evolution can be broadly divided into three stages: 'international exploration-domestic inception-systematic development'. While existing research has fostered a diverse landscape of exploration, theoretical gaps remain in China's specific conditions.

### 2.1. International research progress

International research on 'collaborative R&D organizations', designed to satisfy corporate needs to address market competition and technological complexity, lays the theoretical foundation for innovation consortia. Nevertheless, foreign studies exhibit limitations, primarily manifested in limited focus on inter-firm collaboration or industry-academia-research coordination without addressing systematic coordination under national strategic guidance and insufficient exploration of integrating the new national innovation system with market mechanisms, making direct application to China's innovation practices challenging.

#### 2.1.1. Early research focused on the rationality and effectiveness of inter-firm collaboration R&D

Crow et al. first defined collaborative R&D organizations as 'cooperative entities formed by two or more firms to achieve shared R&D objectives'. Using the SEMATECH consortium in the U.S. semiconductor industry as an example, they demonstrated that collaborative R&D reduces individual firms' R&D risks and costs<sup>[5]</sup>. D'Aspremont et al. used a duopoly game model to demonstrate that collaborative R&D significantly increases the probability of technological breakthroughs and enhances social welfare compared to non-collaborative R&D<sup>[6]</sup>.

#### 2.1.2. Post-2000 research shifts toward cross-subject collaboration

Hagedoorn et al. proposed that successful collaboration involves voluntary arrangements between organizations, enhancing capabilities for developing new products and services through technology exchange and expertise sharing<sup>[7]</sup>. Kostoff emphasized that scientific collaboration and interdisciplinary interactions share a common lineage<sup>[8]</sup>. Vonortas found that collaborative R&D organizations involving universities and research institutes achieved a 30 percent higher technology conversion rate than corporate R&D alone, with the core factor being the complementary nature of basic research and industrialization capabilities.

#### 2.1.3. Post-2010 research emphasizes ecosystem construction

International research on innovation consortia exhibits multidimensional deepening and systemic integration. Cunningham and Werker proposed that innovation consortia require networks fostering multidisciplinary interaction, bridging public-private sector boundaries, and enabling international coordination. The OECD (the Organisation for Economic Co-operation and Development) released *Innovation for Development Impact* in 2020, which attached great importance to the government's guiding role, recommending policy incentives like tax breaks and R&D subsidies to reduce coordination costs among participants<sup>[9]</sup>. Bertin et al. examined collaborations between technology-based startups and large corporations, finding that the quality of human capital and social capital directly impacts participation levels and success in such partnerships.

## 2.2. Domestic research progress

Domestic research has explored innovation consortia from multiple dimensions, with core findings concentrated in four key areas, forming a research framework encompassing ‘value–essence–construction–mechanisms’.

### 2.2.1. Research on the value of enterprise-led formation

Domestic scholars widely acknowledge the pivotal role of enterprise-led models in tackling technological challenges: Bai Chunli emphasized from a national strategic perspective that ‘innovation consortia led by leading technology enterprises are better suited for building national strategic scientific and technological capabilities post-paradigm shift’, enabling systematic arrangements for collaborative innovation among entities and the aggregation of innovation factors. Zhang Chidong emphasizes the ‘bucket effect’ of innovation consortia, where institutional design fosters interdisciplinary collaboration and team integration to compensate for the innovation shortcomings of individual entities, thereby elevating the overall level of national strategic scientific capabilities. Yin Ximing et al., against the backdrop of achieving self-reliance and strength in science and technology, propose that innovation consortia play a role in breaking through core technologies in key fields and addressing bottleneck issues. Their value lies in integrating dispersed innovation entities into a systematic force <sup>[10]</sup>. Meng Xinyu et al. surveyed 120 innovation consortia and found that enterprise-led consortia complete technological breakthrough cycles 25 percent faster than university-led ones, which is attributed to enterprises’ superior grasp of industrial demands and market-oriented directions <sup>[11]</sup>.

### 2.2.2. Research on the interpretation of innovation consortia

Yin Ximing et al. compared traditional industry-academia-research alliances with innovation consortia, highlighting the latter’s core advantage in resolving issues such as incentive misalignment among diverse stakeholders and unreasonable profit distribution. They identified consortia as highly efficient vehicles within market-driven innovation models. Through case analysis, Bai Jinyu et al. identifies four defining characteristics of innovation consortia enterprise leadership (leading enterprises holding over 60 percent of decision-making weight), market orientation (over 80 percent of R&D tasks made to cope with industrial demand), equity alignment (core members forming interest communities through equity partnerships), and data ecosystem (building cross-stakeholder data-sharing platforms) <sup>[1]</sup>. Wang Wei et al. further added the characteristic of ‘dynamic adaptability’, consortia can adjust their membership composition and organizational structure based on specific research tasks <sup>[12]</sup>. Based on the SCP (Structure-Conduct-Performance) analytical framework, Bian Weijun et al. found that the structural characteristics of innovation consortia (e.g., number of members, entity types) directly influence behavioral patterns (e.g., collaboration frequency, resource allocation), which in turn determine innovation performance (e.g., breakthroughs in core technologies in key fields and promotion of the industrial application of scientific and technological advances) <sup>[13]</sup>.

### 2.2.3. Research on innovation consortia development practices

#### (1) Regarding formation methods

Xiao Ziqiang et al. proposed a tripartite model of ‘enterprise-led, government-guided, university-supported’, where the government provides policy safeguards (e.g., R&D subsidies, land support) and fosters an enabling environment (e.g., intellectual property protection) <sup>[14]</sup>. Cao Chunbin et al. using Zhejiang Province’s innovation consortium as a case study, added a ‘provincial-municipal coordination’ mechanism, where provincial governments manage localized resource matching <sup>[15]</sup>.

#### (2) Regarding development pathways

Li Chuncheng proposed an ‘industry-differentiated approach’ by comparing consortia across sectors: high-tech industries require ‘strong government guidance plus high resource investment, while traditional industries need ‘strong market-driven forces plus low-cost collaboration’ <sup>[16]</sup>. Yin Ximing et al. constructed a logical framework of goal aspirations–pathway exploration–guarantee mechanisms. ‘Goal aspirations’ must balance national strategy and

corporate interests; ‘pathway exploration’ includes breakthroughs in core technologies in key fields and promotion of the industrial application of scientific and technological advances, while ‘guarantee mechanisms’ encompass policy, funding, talent, and other elements <sup>[10]</sup>.

(3) Regarding operational mechanisms

Bai Jinyu et al. developed a repeated-game model, finding that ‘long-term cooperation expectations’ and ‘penalty mechanisms for breach’ significantly enhance participants’ willingness to cooperate <sup>[1]</sup>. Zhou Yan et al. proposed multi-oligopoly three-stage R&D game model indicates that ‘government R&D subsidies’ can increase corporate innovation investment <sup>[17]</sup>.

(4) Regarding development models

Wang Wei et al. identified the university-supported model, while Zhang Yufei further categorized four organizational models: government-led, university-led, research institute-led, and enterprise-led. Zhang noted that the enterprise-led model accounted for the highest proportion (approximately 65 percent) and achieved the best innovation performance <sup>[12,18]</sup>.

## 2.2.4. Research on the relationship between innovation consortia and the new system

Lu Feng et al. noted that innovation consortia spearheaded by leading technology enterprises embody the core characteristics of the new national system, achieving the integration of national strategic objectives and market efficiency under the conditions of a socialist market economy <sup>[19]</sup>. Wan Jinbo et al. proposed that the consortia should shift from being ‘market demand-driven’ to ‘a combination of a competent government and an efficient market’ to conduct organized research <sup>[20]</sup>. Shen Haiyan further emphasizes from a practical perspective that these consortia represent ‘the concrete implementation of the new system for mobilizing resources nationwide in achieving breakthroughs in core technologies in key fields’ <sup>[21]</sup>.

Analysis of domestic and international research progress reveals that while existing studies have established a basic theoretical framework, three gaps remain: First, limited perspectives often focus on construction pathways or operational mechanisms, lacking systematic analysis of coordination at critical nodes of the innovation chain. Second, unclear mechanisms underestimate the dominant role of enterprises in knowledge integration and interest coordination. Third, practical disconnects prevail, with most research relying on theoretical deduction rather than supporting evidence from recent data and exemplary cases. This paper adopts an enterprise-led core perspective to systematically review the research status quo and the conceptual connotation of innovation consortia and analyze their advantages, thereby filling the logical gaps in existing research.

## 3. Analytical framework of innovation consortia

### 3.1. Constituent elements

#### 3.1.1. Innovation leading enterprises: Initiators and organizers

Innovative leading enterprises serve as the ‘core engine’ of the consortium. They initiate tasks: to meet China’s strategic needs and industry pain points, they feel the need to break the back of core technologies in key fields. For example, Huawei’s ‘5G-A Innovation Consortium’ developed a task list centered on integrated communication and sensing and trillion-scale connectivity. They also serve as resource integrators, consolidating innovation elements like capital, talent, and technology. For example, BYD’s New Energy Innovation Consortium integrates its R&D teams, university laboratories, and upstream/downstream enterprise resources to form end-to-end support spanning ‘R&D-testing-industrialization’. Additionally, they act as technology commercializers: characterized by high R&D intensity, robust core technology reserves, and strong risk resilience, these enterprises drive the translation of technological achievements into industrial applications. Data from 2024 shows that enterprise-led innovation consortia achieve a technology transfer rate of 68 percent, far exceeding the industry average of 45 percent.

### **3.1.2. Research universities: Providers of fundamental research and talent**

Research universities serve as the ‘knowledge source’ for innovation consortia, providing support through fundamental research and talent supply. In basic research, they focus on original innovation (from 0 to 1) to achieve breakthroughs in core technologies in key fields theoretically. For instance, Peking University led theoretical research on advanced photoresist materials within the Integrated Circuit Innovation Consortium, providing foundational technical support to enterprises. For talent supply, they deliver specialized professionals through ‘customized training’ programs. For example, Zhejiang University collaborates with the ‘New Energy Vehicle Innovation Consortium’ to offer a specialized Energy Storage Technology Class, training over 200 professionals annually.

### **3.1.3. Research institutes: Enablers of applied technology and platform support**

Research institutes serve as the ‘technical bridge’ for the consortia, transforming basic research outcomes into industrializable applied technologies. They fulfill two primary functions: first, they provide technical breakthrough support, focusing on scale-up and commercialization (from 1 to 10) technology development to convert laboratory-stage research into mature products. For example, the Institute of Microelectronics at the Chinese Academy of Sciences transformed novel crystal management theories from universities into mass-producible chip design solutions within the Chip Innovation Consortium. Second, they provide platform support, offering shared resources such as large-scale scientific instruments and testing/validation platforms to various innovation organizations. For instance, the Chinese Academy of Metrology provides ‘precision calibration services’ to the Intelligent Equipment Innovation Consortium, reducing R&D costs.

### **3.1.4. Leading enterprises across the industrial China: Collaborative executors and market feedback providers**

Leading enterprises across the industrial chain serve as the consortium’s ‘practical endpoints’, including core component suppliers and end-user application companies. Their contributions manifest in two key areas: collaborative R&D and market feedback. First, they participate in specialized technical segments. For instance, in the Photovoltaic Innovation Consortium, Longi Green Energy led efforts while GCL Technology and Sungrow Power Supply collaborated to overcome challenges in high-efficiency silicon wafer production. Second, they provide technical, performance, and process optimization recommendations to satisfy end-user demands. For example, home appliance manufacturers in the Smart Home Innovation Consortium proposed requirements for ‘low-power sensors’, driving adjustments in R&D focus. The involvement of upstream and downstream enterprises ensures that the consortium’s technological breakthroughs align more closely with market needs, significantly enhancing product commercialization rates.

## **3.2. Conceptual connotation**

The uniqueness of innovation consortia in terms of goal orientation, formation conditions, organizational models, and operational mechanisms is primarily reflected in the following four aspects.

### **3.2.1. Goal orientation: Driven by national strategies and industrial demands**

The core objective of innovation consortia is to ‘serve national strategies and resolve industrial pain points’, exhibiting a distinct dual-orientation. From the perspective of serving national strategies, these consortia focus on critical bottleneck technologies and major scientific missions, addressing market failures in long-term, high-risk basic research and the lack of core technologies in key fields. For example, the Aviation Engine Innovation Consortium tackles challenges around ‘domestic large aircraft engines’, directly supporting the national ‘large aircraft strategy’. To cope with the industrial demand perspective, innovation consortia dedicate themselves to resolving common technological bottlenecks and process challenges that constrain industrial development. For instance, the Biopharmaceutical Innovation Consortium overcomes ‘large-scale production technology for antibody drugs’, reducing drug costs and driving industrial upgrading. This dual orientation distinguishes innovation consortia from both academic communities, which prioritize knowledge creation and scholarly prestige, and industry-education integration entities, which focus primarily on skill transfer and human resource

development. It achieves an intrinsic unity of public value and market efficiency at the organizational goal level.

### **3.2.2. Formation prerequisites: Guidance by innovation leading enterprises**

A defining characteristic of innovation consortia is their ‘leadership by innovation flagship enterprises’. This role extends beyond mere participation, granting core decision-making authority and resource integration leadership in consortium development and operations. First, leadership in member selection: Flagship enterprises can choose suitable universities, research institutes, and companies based on specific R&D tasks. For example, when establishing the HarmonyOS Ecosystem Innovation Consortium, Huawei prioritized entities with strengths in operating systems and IoT. Second, they control organizational structure by designing governance frameworks like councils and technical committees, typically serving as chair units. Third, they lead task allocation by dividing R&D into modules based on comparative advantages, assigning challenges that leverage each member’s strengths. This enterprise-led model represents a paradigm shift from traditional government or academic-research-led approaches, ensuring innovation activities remain anchored in value creation and industrial application.

### **3.2.3. Organizational model: Task-oriented organizations under the new system**

Innovation consortia represent the ‘concrete organizational form of the new system for mobilizing resources nationwide in achieving breakthroughs in core technologies in key fields’, characterized by being ‘task-oriented and systematic’. On one hand, they embody task-driven dynamism, where organizational boundaries and lifecycles are not fixed but tightly bound to specific, well-defined R&D objectives. Upon task completion, the organization may transform or dissolve, exhibiting high modularity and reconfigurability, distinguishing it from permanent, institutionalized traditional research institutions or industrial alliances. On the other hand, it demonstrates integrated systemic coordination by establishing a strategically cohesive R&D system through project entities. This achieves the convergence of innovation, industrial, capital, and talent chains, effectively overcoming ‘systemic failures’ caused by scattered, duplicative, and inefficient innovation resources.

### **3.2.4. Operational mechanism: A better combination of efficient markets and competent government**

The operation of innovation consortia transcends the single-mode approaches of ‘government monopolization’ or ‘market laissez-faire’, forming a ‘dual-drive’ mechanism. The ‘efficient market’ unleashes the vitality of market entities: it allocates innovation resources through market mechanisms, such as ‘challenge-based competitions’ and ‘competitive selection’, enabling capable entities to undertake key research tasks. Incentive-sharing mechanisms like equity dividends and patent licensing stimulate the enthusiasm of these entities. An ‘active government’ guides development direction: Policy frameworks like R&D subsidies, tax incentives, intellectual property sharing, and risk-sharing mechanisms reduce coordination costs and address market failure. This dual-drive mechanism leverages the market’s decisive role in resource allocation while compensating for market shortcomings in critical strategic domains.

## **4. Advantages of innovation consortiums**

As a new form of innovation organization, innovation consortia possess five key advantages over traditional industry-academia-research models: the new system for mobilizing resources nationwide, strategic scientific capabilities, integrated innovation resources, efficient collaborative organization, and market-oriented resource allocation. These advantages collectively underpin their pivotal role in achieving breakthroughs in core technologies in key fields.

### **4.1. Institutional advantages of the new system: Concentrating strengths for major undertakings**

Innovative consortia represent the concrete implementation of the new system for mobilizing resources nationwide under socialist market economy conditions. Their strength lies in consolidating dispersed innovation forces into a unified national effort. From the perspective of entity integration, they break down geographical, industrial, and departmental

barriers to unite leading entities nationwide, achieving a coordinated national approach. From the perspective of resource concentration, they pool core resources such as capital, talent, and technology to target major strategic fields. From the perspective of efficiency enhancement, ‘organized research’ shortens development cycles. For instance, the J-20 Innovation Consortium achieved deployment just five years after its maiden flight, a 30 percent reduction compared to traditional models. This advantage enabled China’s leap from ‘catching up’ to ‘leading’ in sectors like large aircraft, high-speed rail, and 5G, validating the national system’s effectiveness.

#### **4.2. Strategic scientific strength advantage: Underpinning national technological security**

Innovation consortia form the core of China’s strategic scientific capabilities, excelling in safeguarding national technological security and enhancing international competitiveness. They bolster independent innovation by integrating fundamental research, applied studies, and industrialization efforts to create a comprehensive innovation ecosystem spanning from source to end-use, thereby countering risks of technological decoupling. Setting their sights on the global frontiers of science and technology, national economic development, the major needs of the country, and the health and safety of the people, they enhance original innovation capabilities, thereby boosting the supply of high-quality original innovations. They improve overall innovation efficiency by optimizing the national innovation system structure through collaborative innovation. In fields where innovation consortia participate, overall innovation efficiency can be significantly enhanced. General Secretary Xi Jinping emphasized that ‘the competition among world-class scientific powers hinges on national strategic scientific strength’ and innovation consortia serve as vital vehicles for such strength.

#### **4.3. Advantages in integrating innovation resources: Addressing the difficulties of resource fragmentation**

Through ‘organized research’, innovation consortia effectively resolve the pain points of inefficient resource allocation, fragmented entities, and weak collaboration inherent in traditional industry-academia-research models. By optimizing resource allocation, promoting resource sharing, and facilitating the free flow of factors, these consortia channel resources toward high-value segments. They drive the cross-entity flow of talents, technologies, and data, transforming innovation resources from ‘dispersed’ to ‘concentrated’ and from ‘idle’ to ‘highly efficient’.

#### **4.4. Efficient collaborative organizational advantage: Forming a community of shared interests**

The core strength of innovation consortia lies in ‘building highly coordinated organizations bonded by shared interests’, avoiding the ‘loose collaboration’ typical of traditional industry-academia-research partnerships. First, a profit-sharing mechanism enables all entities to share innovation benefits through equity partnerships, patent licensing, and revenue distribution. Second, a risk-sharing mechanism establishes risk funds and insurance systems to distribute R&D risks. Third, a communication and coordination mechanism resolves collaboration issues through regular meetings and information-sharing platforms. This organizational strength transforms the consortium from a ‘physical aggregation’ into a ‘chemical fusion’, forming a community of shared interests characterized by ‘share risks, benefits, and responsibilities’.

#### **4.5. Market-oriented allocation advantage: Aligning with industry and market and market demands**

While serving national strategies, innovation consortia remain firmly market-oriented, excelling in ‘aligning national objectives with market demands’. As the driving force, enterprises can accurately gauge industrial and market needs, ensuring research tasks align closely with practical applications. Simultaneously, enterprises possess industrialization capabilities that accelerate the commercialization of technological achievements. From a sustainability perspective, market-driven revenues provide continuous financial support for the consortium, reducing reliance on government subsidies. This advantage enables innovation consortia to serve national strategies while achieving self-sustaining development, avoiding the pitfall of ‘prioritizing R&D over application’.

## 5. Conclusion

Being innovative organizations under the new system for mobilizing resources nationwide, enterprise-led innovation consortia, with integrating diverse innovation resources through enterprises' leadership as their core value, foster a systemic force to achieve breakthroughs in core technologies in key fields. This paper made comprehensive domestic and international research reviews, clarifies the theoretical contributions and limitations of existing studies, and deconstructs the components of innovation consortia along with their characteristics of 'dual orientation, strong leadership, task-oriented, and dual-driven', analyzing the unique advantages across the new system for mobilizing resources nationwide, China's strength in strategic science and technology, integration of resources, collaborative organization, and market-based allocation of resources. Meanwhile, an all-round theoretical framework is constructed to provide targeted theoretical support for the high-quality development of innovation consortia. It will be imperative for enterprise-led innovation consortia to strengthen coordination among all parties, refine operational mechanisms, and boost policy safeguards to play a key part in innovative decision-making, integration of cultural resources, and market application of scientific and technological advances.

## Disclosure statement

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