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Strategic Emerging Industries and the Rise of Great Powers: Postprint

Authors: Huo Guoqing, Sun Hao

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Abstract

[Purpose/Significance] This study aims to explore the organic nexus between strategic emerging industries and national competitiveness, thereby furnishing strategic recommendations for the development of China' s strategic emerging industries. [Method/Process] Through a systematic retrospective examination of literature on technological revolutions, strategic emerging industries, and the rise of great powers since the modern industrial revolution, and taking the rise and succession of great powers as the principal thread, this study dissects the intrinsic interconnections among institutional innovation, technological innovation, and industrial innovation, with particular emphasis on investigating the catalytic role of strategic emerging industries in the ascent of great powers. [Results/Conclusion] A coupling relationship exists between strategic emerging industries and the rise of global great powers. The general pattern manifests as follows: a country first stimulates innovation vitality and fosters technological innovation through institutional innovation; the large-scale application of technological innovation achievements subsequently propels the development of strategic emerging industries; and the rapid growth of these industries effectively elevates the nation' s international competitiveness, thereby establishing the foundation for great power emergence. Accordingly, it is recommended that China prioritize the construction of a basic research system for strategic emerging industries, continuously refine the collaborative development mechanism integrating institutional, technological, and industrial innovation, and effectively promote the sound development of strategic emerging industries.

Full Text

Strategic Emerging Industries and the Rise of Great Powers

Huo Guoqing, Sun Hao

School of Public Policy and Management, University of Chinese Academy of Sciences, Beijing 100049

Abstract

[Purpose/Significance] This study aims to explore the organic relationship between strategic emerging industries and national competitiveness, providing strategic recommendations for the development of strategic emerging industries in China.

[Method/Process] Through a systematic review of literature on technological revolutions, strategic emerging industries, and the rise of great powers since the modern Industrial Revolution, this paper examines the rise and succession of great powers as its central theme. It analyzes the intrinsic connections among institutional innovation, technological innovation, and industrial innovation, with particular focus on the facilitating role of strategic emerging industries in the rise of great powers.

[Results/Conclusion] The findings reveal a coupling relationship between strategic emerging industries and the rise of global powers. The general pattern is that a nation first stimulates innovation vitality and promotes technological innovation through institutional innovation. The large-scale application of technological achievements then drives the development of strategic emerging industries, whose rapid growth effectively enhances the country's international competitiveness and lays the foundation for its emergence as a great power. Based on this analysis, China should prioritize the construction of a basic research system for strategic emerging industries, continuously improve the collaborative development mechanism among institutional innovation, technological innovation, and industrial innovation, and effectively promote the healthy development of strategic emerging industries.

Keywords: Strategic emerging industries; Technological innovation; Rise of great powers; Coupling mechanism; Policy recommendations

The concept of “strategic emerging industries” was first proposed by China in 2009, though such industries have existed long before this modern formulation. Tracing the evolution of human industry, strategic emerging industries emerged alongside the Industrial Revolution. According to research by the National Social Science Fund Major Project Team at the University of Chinese Academy of Sciences (hereinafter referred to as “our research team”), the rise of global powers in modern times has often been closely related to their correct selection and development of strategic emerging industries. Our research team defines strategic emerging industries as future strategic industries at the global level—strategic industries catalyzed by breakthrough technological innovations that can establish national industrial competitive advantages. Our research reveals that each major industrial revolution in modern history has been accompanied by the rise of one or several great powers. The coupling mechanism among great power emergence, strategic emerging industries, and technological revolutions generally follows this pattern: technological revolutions drive industrial revo-

lutions, industrial revolutions give birth to strategic emerging industries, the development of strategic emerging industries establishes or strengthens a particular nation's international competitive advantages, and a new great power consequently rises.

1. Historical Rise of Great Powers Benefiting from Strategic Emerging Industries and Technological Revolutions

In a sense, world history is a history of continuous emergence and succession of great powers. A “great power” refers to a country that can exert significant influence on the world in political, economic, and cultural dimensions. Since the advent of modern society, Portugal, Spain, and the Netherlands dominated the seas; Britain built the “Empire on which the sun never sets”; Germany shook the entire European continent; the United States achieved superpower hegemony; the Soviet Union promoted the formation of a bipolar world; Japan led the “East Asian Miracle” ; and the “BRICS” countries led by China are reshaping the 21st-century world order. The rise and succession of great powers have been accompanied by growing pains while also bringing progress and innovation, following thought-provoking logics and patterns.

The rise of great powers has benefited from historical opportunities to develop strategic emerging industries. Spain and the Netherlands seized opportunities in shipbuilding, navigation, and overseas trade to become maritime hegemons. Britain capitalized on steam engine, metallurgy, textile, and financial industries to build its “Empire on which the sun never sets.” France and Germany grasped opportunities in electric power, chemical, and mechanical manufacturing industries to become continental powers. The United States captured development opportunities in steel, automotive, electric power, aviation, creative industries, nuclear energy, computer, and internet industries to form the foundation for its current global dominance. The Soviet Union seized opportunities in aerospace industry development to emerge as a global technological power. Japan capitalized on automotive, electronics, and animation creative industries to become a global economic power. China aims to seize the commanding heights of a new round of economic and technological development through seven major industries: new energy, energy conservation and environmental protection, electric vehicles, new materials, new medicine, biological breeding, and information industry. While many key factors contribute to the rise of great powers, selecting and developing the correct strategic emerging industries at the right time has undoubtedly been a decisive factor since modern times.

The rise of great powers has also benefited from historical opportunities to initiate or dominate technological revolutions. Technological revolutions encompass both scientific revolutions and technical revolutions. Throughout the development of human civilization, five technological revolutions have occurred: the first scientific revolution in the 16th-17th centuries centered on Newtonian mechanics; the first technical revolution beginning in the mid-18th century marked by steam engine technology; the second technical revolution in the mid-to-late

19th century marked by electric power and telecommunications technology; the second scientific revolution in the mid-20th century centered on relativity and quantum theory; and the third technical revolution in the mid-to-late 20th century marked by computer, internet, and aerospace technology. Britain led both the first scientific revolution and the first technical revolution. France, Germany, and the United States led the second technical revolution, while the United States also led the second scientific revolution and the third technical revolution. The Soviet Union and Japan primarily seized opportunities from the third technical revolution. Entering the 21st century, numerous scientific authorities have predicted that the sixth technological revolution may emerge in the 2020s-2030s. For China, it is essential to be fully prepared and strive to lead this sixth technological revolution, seize the strategic emerging industries it will spawn, and build national competitive advantages for the era of the sixth technological revolution, thereby laying a solid scientific and industrial foundation for realizing the “Chinese Dream.” Generally, technological revolutions determine the transfer of global scientific centers and influence the historical pathways of great power emergence and succession.

2. Synergistic Evolution Patterns Among Great Power Rise, Strategic Emerging Industries, and Technological Innovation

There exists a coupling relationship among world power emergence, strategic emerging industry succession, and technological revolution development. Our research team finds that historical great powers share common characteristics: they often seized opportunities to develop the most promising strategic emerging industries of their time, fully utilized their dominant positions in contemporary technological revolutions, and wholeheartedly supported and developed strategic emerging industries. With technological innovation as their guide and through coordinated government regulation and market mechanisms, they promoted industrial structure upgrading and consequently formed new-era national competitive advantages. Further analysis reveals the following logical relationships: a specific country emphasizes scientific and technological development, conducts strategic layout in the most important technological fields of its era, and achieves leading breakthrough scientific achievements. Based on analysis of global industrial transformation, the country selects important industries that can influence global processes for cultivation. Through institutional and policy innovations, it encourages the application of scientific and technological achievements, promotes the healthy development of strategic emerging industries, and facilitates their smooth transformation into national strategic industries, thereby substantially enhancing national competitive advantages and establishing the country’ s global power status.

Technological innovation spawns strategic emerging industries. Technological revolutions are the prerequisite and precursor to industrial revolutions. When the achievements of technological revolutions are applied and promoted on a

large scale in production, causing changes in industrial economic system elements, technological revolutions transform into industrial revolutions. Innovative outcomes from major technological breakthroughs, through commercial application and large-scale production, ultimately give birth to emerging industries. Strategic emerging industries represent those emerging industries with the potential to develop into future strategic industries. They particularly require guidance and support from technological innovation, among which those with broad market prospects, breakthrough technological innovation capabilities, and international competitive potential will emerge and enter the development stage of strategic emerging industries. As technology transfers and markets mature, the historical mission of strategic emerging industries will conclude, and they will transform into national strategic industries. Looking at development trends, the speed of transforming scientific and technological achievements into real productive forces is accelerating, and their contribution to the selection and cultivation of strategic emerging industries will become increasingly significant.

Strategic emerging industries drive the rise of great powers. From the perspective of industrial economics, national competitive advantage refers to the comparative advantage a country creates and maintains in specific industrial fields relative to other major developed countries. Strategic emerging industries determine a nation's future development prospects and competitive advantages. Their development paths are closely related to national industrialization models or national modernization development patterns, while also being influenced by factors such as national systems, economic policies, factor endowments, and infrastructure environments. Therefore, the foresight and scientific nature of a country's strategic layout for strategic emerging industries are crucial. China's strategic emerging industries were proposed in response to the global financial crisis to establish China's competitive advantages in the post-crisis era. Although the designated seven strategic emerging industries underwent repeated discussions, the rapid spread of the financial crisis from the United States left limited time for deliberation. Whether these strategic emerging industries can develop into China's strategic industries remains to be observed and tested in practice. It should be noted that this selection of strategic emerging industries is crucial for China's development in the 21st century and must be elevated to the highest national strategic level for multi-round game-based decision-making. It must also closely connect with the sixth technological revolution to analyze, discuss, and layout strategic emerging industries. Moreover, since strategic emerging industries are merely strategic industries in their growth or pre-growth stages, as industries continue to develop and mature, some originally designated strategic emerging industries will be transferred to the catalog of strategic or conventional industries, while new emerging industries with development potential will be added to the strategic emerging industries catalog. This requires China to establish a specialized strategic emerging industry research alliance to conduct long-term relevant research and provide strategic decision-making support.

3. Policy Recommendations for Developing Strategic Emerging Industries in China

Establish a basic research system for strategic emerging industries.

First, research the general laws of strategic emerging industries. The essential characteristics of strategic emerging industries mainly include globality, innovativeness, and growth potential. Studying the general laws of strategic emerging industry development based on these three characteristics has important theoretical significance, yet current domestic and international research findings remain relatively limited. Second, research the mutual promotion relationship between technological innovation and strategic emerging industries. Strategic emerging industries themselves are products of breakthrough technological innovation achievements, while their development often triggers or promotes rapid progress in technological innovation. Effective in-depth research is needed on how to strengthen this promoting relationship through institutional, mechanism, and model innovations. Third, research the transformation laws from strategic emerging industries to strategic industries. Generally speaking, strategic emerging industries are merely one stage in the development of strategic industries. Truly strategic emerging industries are destined to evolve into national strategic industries. However, in industrial development history, not all strategic emerging industries can smoothly transform into strategic industries. Therefore, research on the evolution and laws of strategic emerging industries is needed to ensure their orderly and healthy development.

Improve the collaborative development mechanism among institutional innovation, technological innovation, and industrial innovation.

From the historical process of strategic emerging industry development, the rise of a great power begins with institutional innovation, which promotes technological innovation, which in turn guides the development of strategic emerging industries. Therefore, it is necessary to explore, construct, and continuously improve a technological innovation system with enterprises as the main body, market as the guide, and integration of industry, academia, and research. Specifically, efforts should focus on three aspects: First, fully leverage the regulatory role of market mechanisms to continuously stimulate and enhance China's independent innovation capabilities in strategic emerging industries through competition. Encourage enterprises to digest, absorb, and innovate imported technologies, and promote the transformation of scientific and technological achievements into real productive forces. Second, construct a collaborative innovation platform for sharing scientific and technological resources among industry, academia, and research, guide substantive integration between research institutes and industrial R&D organizations, promote the reorganization and reconstruction of the technological innovation value chain, and optimize the allocation of scientific and technological resources to fundamentally solve the difficulty of transforming scientific and technological achievements. Third, build efficient innovation and industrial service platforms, and fully utilize the internet's role in serving strategic emerging industries. On one hand, promote cross-boundary

innovation cooperation among different regions, industries, and organizations; on the other hand, continuously reduce the organizational and social costs of strategic emerging industry development.

Effectively promote the healthy development of strategic emerging industries. Strategic emerging industries constitute a typical dynamic industrial system. Since strategic emerging industries are merely a stage-specific designation within strategic industry development—the intersection of strategic and emerging industries—they represent an emergent, rapidly developing, and sequentially replacing process. Therefore, promoting the healthy development of strategic emerging industries requires several key initiatives: First, establish a national-level strategic emerging industry research institute or research alliance to continuously track global breakthrough technological innovations, predict future global strategic industry development trends, and propose decision-making recommendations for strategic emerging industry development in different periods. Second, guide national, enterprise, and social capital to increase investment in technological innovation through multiple channels, construct internet-based technology finance platforms, broaden financing channels for industrializing scientific and technological achievements, and fully leverage the role of existing venture capital institutions and various venture capital organizations. Third, promote independent innovation from multiple perspectives including values, policies, incentive measures, and entrepreneurship environment construction, and provide favorable policy environments in areas such as finance and taxation, industry-academia-research collaboration, transformation of scientific and technological achievements, intellectual property rights, introduction-digestion-absorption-re-innovation, scientific and technological infrastructure, and government procurement. Fourth, create an environment conducive to the development and entrepreneurship of innovation-leading talents, construct a training system for innovation-leading talents, improve the incentive system for innovation-leading talents, and cultivate a group of truly capable leaders who can guide the development of strategic emerging industries. Fifth, encourage Chinese enterprises to continuously explore international technology markets, strengthen international cooperation, integrate international resources, and continuously enhance the international competitiveness of China's strategic emerging industries.

Note: Figure translations are in progress. See original paper for figures.

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