



Policy Brief

Impact of “Made in China 2025” Industrial Strategy on Firms Green Innovation

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Introduction

Fostering green corporate innovation has become essential for achieving carbon neutrality goals in emerging countries, especially in countries like China, which has a large industrial base. In this context, enterprises are instrumental in generating social and economic wealth and play a central role in the nation's innovation efforts. By accelerating green innovation, companies can enhance their green competitiveness and infuse new energy into their development. Thus, promoting green innovation within enterprises necessitates the establishment of a supportive external environment that encourages innovation activities. Given this, industrial policies are crucial for guiding industrial development and have increasingly gained importance in facilitating green innovation among enterprises.

“Made in China 2025 (MIC 2025)” is one of the Chinese government's most emblematic industrial policies, launched in 2015 with the goal of driving innovation, transformation, and upgrading within the country's manufacturing sector. The policy aimed to elevate China to a higher position in the global value chain by promoting advanced manufacturing, fostering high-tech industries, and enhancing smart manufacturing capabilities. A key aspect of the policy was to achieve technological independence by reducing reliance on foreign suppliers, particularly in core materials, with the target of decreasing foreign dependence by 70%. The overarching aim was to transition China from being the world's factory to becoming a global technology powerhouse.

MIC 2025 was a highly institutionalized techno-industrial policy that targeted key technologies and sectors¹. It aligns with China's broader goal of fostering "indigenous innovation" and supporting green industrial transformation and energy transition, two fundamental objectives of the 13th and 14th Five-Year Plans. Although the term "Made in China 2025" became less prominent after 2018, largely due to tensions between China and the U.S. over technology and intellectual property rights. The phrase “MIC” has become less frequently used, especially after the "14th Five-Year Plan for Intelligent Manufacturing" was introduced in 2021. This new phase reflects a shift toward a more advanced focus on intelligent manufacturing, marking a move from traditional manufacturing upgrades to an even more technology-driven, smart manufacturing approach. The new strategy highlights the integration of digital technologies to optimize production, which is seen as a natural evolution of the original plan.

These goals continued to shape policy under different names and phases, including their embodiment in successive Five-Year Plans. Thus, effectively evaluating the impact of this industrial policy on enhancing green innovation within enterprises is crucial. The specific objectives of the study are as follows:

- 1) To assess the impact of the “MIC 2025” strategy on firms’ green innovation using a natural quasi-experiment.
- 2) To analyze the mechanism/factors through which MIC 2025 influences green innovation.
- 3) To examine regional/industrial disparities in the influence of industrial policies on green innovation.

¹ It is a strategic initiative aimed at enhancing China's manufacturing capabilities by focusing on ten key sectors: advanced information technology, high-end numerical control machinery and robotics, aerospace equipment, marine engineering, railway and high-speed rail equipment, energy-saving and new energy vehicles, power equipment, new materials, biomedicine and medical devices, and agricultural machinery.

Theoretical and Analytical Framework

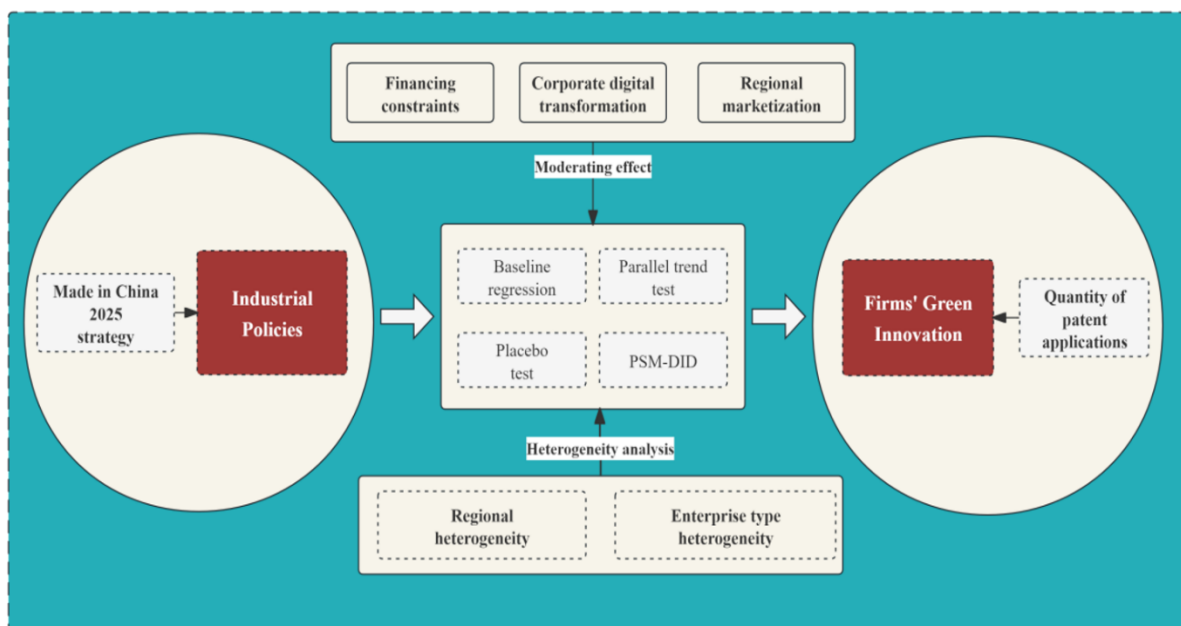
Direct Effect

The impact mechanism of industrial policy on enterprise green innovation can be delineated through three primary facets: the “cost effect,” the “competition effect,” and the “signal effect.” The “cost effect” relates to changes in production costs induced by policy support, influencing enterprises’ behavior towards green innovation. The “competition effect” denotes the capacity of government support to cultivate a competitive milieu conducive to advancing the supported industry, thus endowing firms with a competitive edge and impacting their green innovation endeavors. The “signaling effect” pertains to the ability of industrial policy to transmit favorable signals to the market, mitigating information asymmetry and influencing enterprises’ green innovation endeavors. Based on the above costs, competition, and signaling effects of industrial policy, MIC policy could be tested to confirm whether it is conducive to improving enterprises’ green innovation levels.

Indirect Effect

One of its core mechanisms is addressing financing constraints and promoting green innovation. Firstly, “MIC 2025” seeks to stimulate investment in innovation by providing financial support through dedicated funds, subsidies, and tax incentives. Second, enhancing enterprises’ digital transformation can positively regulate the impact of this industrial policy on promoting green innovation. Digital transformation facilitates the flow of information and communication internally and externally, enhancing innovation efficiency. Third, increased regional marketization boosts market forces in resource allocation and intensifies market competition. It encourages firms to engage actively in green innovation activities. It fosters a conducive environment for green innovation within firms, providing greater opportunities and incentives for adopting and developing green technologies. Figure 1 portrays the direct and indirect mechanisms and complete analytical framework of this study.

Figure 1: Analytical Framework



Source: Author

Materials and Methods

Variables Description

The dependent variable, corporate green innovation (CGI), is measured using the number of green development-related patent applications filed by enterprises. This study adopts a group dummy variable, Treat, in ten specific sectors, denoted by a value of 1, while a 0 value shows the companies excluded from industries. The staged dummy variable, denoted as Post, estimates the impact of the “MIC 2025” policy implemented in 2015. It is assigned a value of 1 for the Post; however, it indicates 0 for the preceding years. In control variables, firm size, number of employees in the firm, total profits of the firm, turnover of total assets, net profit margin of total assets, return on net assets, Tobin’s Q, and percentage of shares held by the first shareholder. For mechanism variables, financial constraints, corporate digital transformation, and regional marketization are used in the analysis. The detailed description and analysis of the variables can be viewed in the published working paper².

Empirical Model

This research employs a double-difference-in-difference model to elucidate the potential impact of “MIC 2025” on green innovation within enterprises. The data used in this study were sourced from the Cathay Pacific (CSMAR) database from 2000 to 2021. After excluding samples with outliers and missing data, a sample of 1,594 Chinese A-listed firms was selected for analysis, 815 of which were considered treated and 779 as part of the control group.

Key Findings

- 1) The empirical findings exhibit that the “MIC 2025” industrial policy significantly and positively impacts enterprises’ green innovation. However, location differences and enterprises’ degree of pollution exhibit asymmetric impacts on green innovation performance.
- 2) Specifically, enterprises located in the eastern part of the country and those with lower pollution levels are more significantly influenced by the positive impact of the MIC 2025
- 3) The mechanism analysis reveals that eradicating corporate financing constraints, improving corporate digital transformation, and enhancing regional marketization can positively regulate the promotion of green innovation facilitated by the MIC 2025.

Policy Implications

Given the observed disparities in the policy’s effectiveness based on geographic location, pollution levels, and corporate capabilities, a more nuanced and targeted policy approach is necessary to ensure broader and more equitable outcomes.

- **Tailored Regional Strategies for Green Innovation:** While the MIC 2025 policy has been more effective in driving green innovation in enterprises located in the eastern part of China, the same cannot be said for enterprises in central and western regions. This regional disparity underscores the need for differentiated policy frameworks that take into account local economic conditions,

² This brief is extracted from a recently published working paper, which can be freely downloaded from www.adb.org/sites/default/files/publication/992921/adbi-wp1477.pdf.

industrial bases, and environmental challenges. The central and western regions, often characterized by lower levels of industrialization and marketization, require greater government support, capacity building, and investment to close the gap in green innovation. Policies such as regional subsidies, tax incentives, and targeted R&D investments could help level the playing field, ensuring that the positive effects of industrial policies are felt nationwide.

- **Targeted Support for High-Polluting Enterprises:** The limited impact of the MIC policy on promoting green innovation in high-polluting listed industries (i.e energy, chemicals, heavy industry, and mining) can be explained by several key reasons. Firstly, these industries encounter substantial technological and financial hurdles, as adopting green practices often demands significant investments in advanced technologies and cleaner production methods. Secondly, the policy design may lack sufficient focus on these industries, with inadequate incentives and weak enforcement mechanisms failing to drive meaningful progress. Lastly, high-polluting industries may have limited capacity for innovation, given their historical priority on maximizing production efficiency rather than sustainability.

To drive green innovation in high-polluting industries, industrial policy should focus on specific actions. First, green financing tools like low-interest loans and bonds should be introduced to fund clean technologies. Second, sector-specific carbon pricing, such as tailored carbon taxes or emissions trading, should be implemented to incentivize sustainable practices. Although the energy sector is regulated under carbon markets, the carbon price still does not truly reflect the full cost of emissions. Third, innovation hubs should be established that fund R&D collaborations for industry-specific green technologies. These targeted measures, alongside strict enforcement of green standards, can effectively accelerate sustainability transitions.

- **Eradication of Corporate Financing Constraints:** The mechanism analysis reveals that reducing corporate financing constraints plays a pivotal role in enabling enterprises to engage in green innovation. Policymakers should work to improve access to green financing by creating more robust green bond markets, green credit facilities, and public-private partnerships. Special attention should be given to SMEs, which often face the most significant hurdles in accessing the capital needed for green investments. Expanding green finance instruments to be more accessible and affordable will be critical in scaling up green innovation efforts across the private sector.
- **Accelerating Corporate Digital Transformation:** The positive influence of digital transformation on green innovation underscores the importance of integrating digitalization into green development strategies. Policymakers should further incentivize enterprises to adopt smart manufacturing technologies, automation, and AI-driven solutions that can enhance resource efficiency and reduce emissions. Government initiatives should focus on providing digital infrastructure, facilitating skill development in digital technologies, and supporting research collaborations between tech firms and traditional industries to drive green transformation.
- **Enhancing Regional Marketization:** The study highlights that regional marketization positively regulates green innovation. Thus, policies that encourage market-driven innovation and competition should be promoted. Efforts to streamline business regulations, protect intellectual property rights, and reduce bureaucratic red tape can help create a more dynamic environment for green innovation. At the same time, local governments in less developed regions should be encouraged to adopt market-oriented reforms that foster innovation and sustainability in industries.
- **Economic Diversification and Green Innovation:** Drawing lessons from China's MIC 2025

policy, CAREC countries may incorporate green innovation into their industrial strategies. This can be done by promoting eco-friendly technologies across key sectors such as mining, agriculture, transport and manufacturing. The region has traditionally relied on resource extraction, particularly agriculture, mining and quarrying, which have high environmental costs. Governments should take steps to reduce their reliance on resource extraction and low-end manufacturing by integrating green innovation into their industrial strategies.

- **Fostering Regional Cooperation and Knowledge Transfer:** Given that many CAREC countries are at an early stage of industrial development, they could benefit greatly from regional cooperation and knowledge transfer on green innovation. Policymakers should explore regional initiatives that pool resources and share best practices for green industrialization. For example, partnerships with more industrialized CAREC members, countries like China, can facilitate the diffusion of advanced technologies and sustainable practices. Programs that encourage cross-border investments in green industries and technology transfer will allow CAREC countries to leapfrog to cleaner, more efficient manufacturing processes.