The Impact of Innovative Subsidy Policies on Enterprises

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Abstract. As global innovation competition intensifies, countries around the world have begun to implement innovation subsidy policies to promote national innovation development. While these policies have brought many benefits overall, the current subsidy policies still have many areas that need improvement and shortcomings. Against this backdrop, this paper conducts an in-depth study of the impact of innovation subsidy policies on enterprises within China, identifies the main issues currently facing these policies, and proposes a series of optimization methods. This paper employs literature analysis and data analysis methods to review existing literature on innovation subsidy policies, provides examples of how enterprises in different sectors and types utilize government subsidies, and derives several policy improvement recommendations. This study provides a more in-depth explanation of the mechanisms through which innovation subsidy policies influence businesses, as well as their heterogeneous effects on different industries and types of businesses. It offers guidance on addressing the challenges faced by the government in implementing subsidy policies, supplements and refines existing theories and perspectives on innovation subsidy policies, and enriches the literature in the field of innovation subsidies.

Keywords: Innovation Subsidies, Government Subsidies, Corporate Innovation, Policy Evaluation, Innovation.

1 Introduction

In today's increasingly competitive innovation landscape, governments worldwide have introduced a range of innovation subsidy policies to incentivize business growth. China, in particular, has placed a strong emphasis on innovation-driven development, first proposing an innovation-driven development strategy and later explicitly positioning innovation as the primary driving force behind national development. The government's strategic focus has shifted from traditional “factor-driven” and “investment-driven” models to an “innovation-driven” model. The aim of these strategies is to accelerate the construction of an innovative nation, with scientific and technological innovation serving as the core engine for promoting high-quality economic development [1]. Businesses play a significant role in scientific and technological innovation, and government subsidies play an important role in promoting the performance of large enterprises [2]. Against this backdrop, this paper primarily focuses on the impact of innovation subsidy

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policies on businesses within China. Through literature analysis and indicator comparison methods, this paper delves into the mechanisms through which innovation subsidy policies influence businesses, compares and evaluates the policy effects across different industries, and finally identifies the challenges faced by innovation subsidy policies and offers optimization recommendations.

Current government innovation subsidies are primarily implemented through the following methods. First, direct financial support is provided. Second, government subsidies may interfere with corporate decision-making, causing companies to prioritize compliance with subsidy criteria over market demands. Third, subsidies indirectly enhance corporate confidence in their core businesses by reducing the costs of innovation-related trial and error, thereby encouraging companies to take greater risks in their core operations. Finally, a common approach is to assist companies in securing external financing, either by improving their credit ratings to facilitate bank loans or by enhancing the appeal of their projects to attract venture capital and industrial investment [3].

Some scholars have pointed out that there is a game-like relationship between government subsidies and corporate innovation strategies, which not only affects the effectiveness of government subsidies but also the effectiveness of corporate innovation [4]. In the current academic community, there are three main views on the relationship between government subsidies and corporate technological innovation: positive impact, negative impact, and no significant impact. Scholars who believe that government subsidies have a positive impact on corporate technological innovation argue that subsidies not only alleviate internal financial pressures and reduce risks in innovation activities, enabling companies to allocate more resources to technological innovation and thereby enhance innovation performance, but also incentivize companies to actively engage in R&D and innovation activities. This conveys the government's recognition of a company's growth potential and sends positive signals to investors [1,5]. Scholars who believe that government subsidies have a negative impact argue that innovation subsidies may lead to businesses becoming overly reliant on the government, reducing their own R&D investments, and potentially triggering “subsidy-seeking” behavior or misappropriation of funds due to information asymmetry between the government and businesses, thereby suppressing business innovation levels [1]. Additionally, some scholars believe that government subsidies have no significant impact on corporate technological innovation.

In summary, existing academic research holds diverse views, but there remains a lack of research on the mechanisms through which innovation subsidy policies affect enterprises, as well as in-depth discussions on the evaluation of policy effects across different industries and optimization schemes for innovation subsidy policies. This paper will analyze the impact of innovation subsidy policies on enterprises based on a specific analysis of previous literature and in conjunction with the subsidy policy situations of various types of enterprises in China.

The remaining sections of the article are structured as follows. Section Two explores the mechanisms through which innovation subsidy policies influence enterprises, Section Three examines the heterogeneity of policy effects, Section Four addresses the challenges faced by policies and offers optimization suggestions, and Section Five presents conclusions and implications.

2 The Mechanism of Innovation Subsidy Policies' Impact on Enterprises

2.1 Direct Impact Pathways

This section will discuss the mechanism of government innovation subsidy policies' impact on enterprises. First, government implementation of innovation subsidy policies has a direct impact on enterprises. Innovation subsidy policies incentivize R&D investments, increasing R&D expenditures for small and medium-sized enterprises (SMEs) and enhancing the resources available for innovative activities. Additionally, by supporting the development of digital platforms, governments can significantly reduce business costs and the risks associated with innovative activities, thereby encouraging businesses to increase their R&D budget allocations and boost innovative investments. This, in turn, enhances the expected returns from engaging in innovative activities, a phenomenon also referred to as the "crowding-in effect" [6,7]. Additionally, according to the signaling theory, government subsidies serve as a channel for signaling. The government only disburses subsidies when businesses meet specific conditions [4]. Such subsidies act as favorable investment signals for potential investors, indicating that the R&D project has been recognized by government departments. This facilitates innovative businesses in securing more external financing, alleviating financing constraints, and enhancing innovation output, patent numbers, and the speed of new product development, ultimately helping businesses improve their innovation performance [6]. Furthermore, government subsidies can promote the accumulation of innovative talent and technology, as subsidy funds support the recruitment of high-end R&D talent and collaboration in innovative technologies.

2.2 Indirect Impact Pathways

Government implementation of innovative subsidy policies also has indirect impacts on enterprises. Government subsidies give enterprises a competitive edge in the market, as improvements in the quantity and quality of innovation outcomes translate into products with differentiated competitiveness, enabling enterprises to stand out in the market. Innovation subsidy policies also improve the internal financing environment of enterprises, leading to increased innovation funding, higher R&D investments, significant R&D outcomes, enhanced overall R&D capabilities, and strengthened appeal to capital markets, thereby improving the innovation performance of enterprises.

2.3 Potential Negative Effects

Government innovation subsidy policies may also bring potential negative effects. Businesses may develop an overreliance on subsidy policies, neglecting the development of their own innovative capabilities. Since governments only provide subsidies when they deem businesses to be engaged in effective innovative activities, businesses often exploit rent-seeking behavior to obtain subsidies. This involves leveraging information asymmetries between policymakers and businesses to present favorable innovative information to the government, using low-quality innovations to embellish their

innovative outcomes, and thereby achieving certain profit objectives. Government innovation incentive policies and market pressures may trigger such strategic innovation behavior [6]. Additionally, due to insufficient screening capabilities and gaps in regulatory mechanisms or systems, government subsidies may be diverted to non-R&D purposes, leading to resource misallocation. This misallocation not only diverts subsidies away from core R&D areas to inefficient enterprises but may also result in redundant corporate resources, thereby crowding out the company's own R&D investments, i.e., creating a “crowding-out effect” [7]. In pursuing the quantity and speed of innovation outcomes, to meet government standards, high-quality technologies gradually decrease, with more strategic innovation behavior emerging. Such behavior not only distorts policy effects but is also highly covert, making it extremely challenging for regulatory authorities to detect [6].

3 Heterogeneity of Policy Effects

3.1 Impact of Firm Heterogeneity

This section will discuss the heterogeneous effects of government subsidy policies on the innovative performance of firms of different sizes. By examining Guangdong Topstar Technology Co., Ltd. and EFORT Intelligent Robot Co., Ltd. in China, this study will conduct an in-depth analysis and comparison of the changes in government subsidies, R&D expenditures, net profits, and total number of employees for these two SMEs from 2021 to 2024, thereby assessing the impact of government subsidy policies on SMEs.

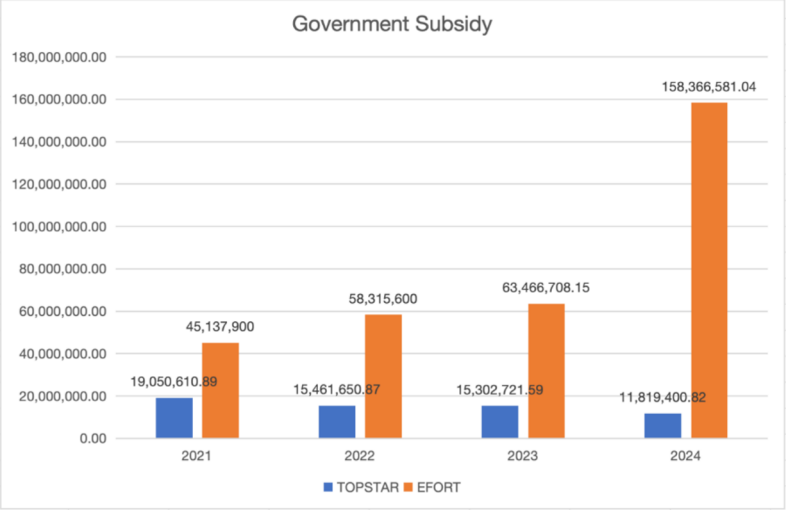

Fig. 1. Changes in the amount of government subsidies received by TOPSTAR and EFORT in 2021–2024.

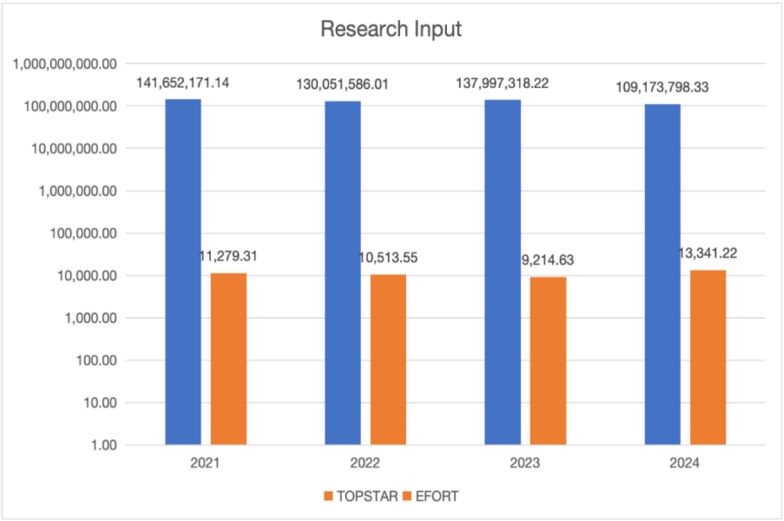

Fig. 2. Changes in the amount of government subsidies received by TOPSTAR and EFORT in 2021–2024.

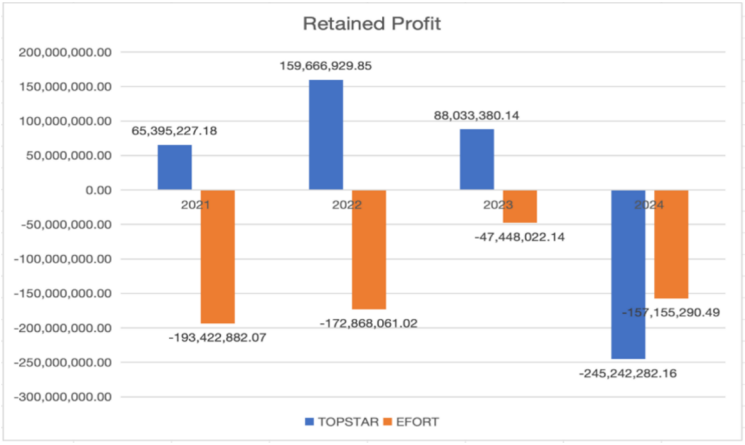

Fig. 3. Changes in net profit of TOPSTAR and EFORT from 2021 to 2024.

Based on Figures 1, 2, and 3, the first phenomenon can be analyzed: EFORT Company incurred a loss of -19.342 million in 2021, with R&D expenditures of 11.28 million. The government subsidy of 45.14 million fully covered the R&D expenditure, resulting in a coverage rate of approximately 400%, confirming that without government subsidies, R&D would have been virtually nonexistent. Over the next three years, government subsidies will also fully cover R&D expenditure. TOPSTAR Company incurred a loss of -245.24 million in 2024, with R&D expenditures of 109.17 million. Government subsidies of 52.81 million nearly covered 48.3% of R&D costs, indicating that government subsidies effectively prevented the company's R&D from being halved

for the year. The second phenomenon is that from 2022 to 2024, TOPSTAR's profits plummeted from +160 million to -245 million, a decline of nearly 254%. Under normal circumstances, R&D expenditures should have been significantly reduced, but in reality, R&D expenditure only decreased from 130 million to 109 million, a decline of approximately 16%. The reason can be seen from government subsidies: During the same period, government subsidies surged from 0.15 billion to 0.53 billion, an increase of approximately 241%, with these subsidies filling the company's loss gap. Similarly, EFORT Company has incurred losses of nearly 571 million yuan over four consecutive years, yet its R&D expenditure increased from 11.28 million yuan to 13.34 million yuan, representing an increase of 18.26%. Looking at government subsidies: from 45.13 million yuan to 158 million yuan, an increase of approximately 250%. Especially in 2024, when the company incurred a loss of 157 million yuan, the 158-million-yuan subsidy provided an 11.85-fold coverage. This demonstrates that government subsidies can counteract adverse conditions during periods of survival pressure, providing enterprises with a safety net for R&D and preventing innovation from being interrupted midway.

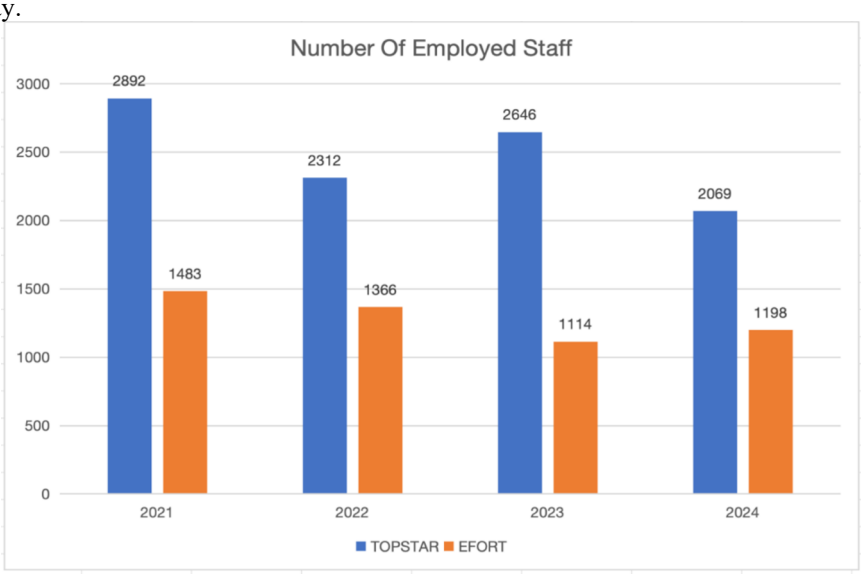

Fig. 4. Total change in the number of employees at TOPSTAR and EFORT from 2021 to 2024.

As shown in Figure 4, Eft Company accumulated losses of 571 million yuan from 2021 to 2024. In this situation, the total number of employees first decreased and then increased, with a 24.9% reduction in 2022-2023 and a 7.5% increase in 2024. Meanwhile, Tuosida incurred losses of 310 million yuan from 2021 to 2024, with the number of employees continuing to decline. The company laid off 20.1% of its workforce in 2022, expanded by 14.4% in 2023, and then laid off another 21.8% in 2024. The most significant difference between the two companies lies in the fact that Effort's unusual increase in staff and the surge in subsidies occurred simultaneously in 2024, revealing the impact of government intervention on market dynamics.

The above analysis concludes that, among small and medium-sized enterprises, government subsidies have a more significant impact on R&D investments under survival pressure. At the same time, government subsidies also influence market dynamics.

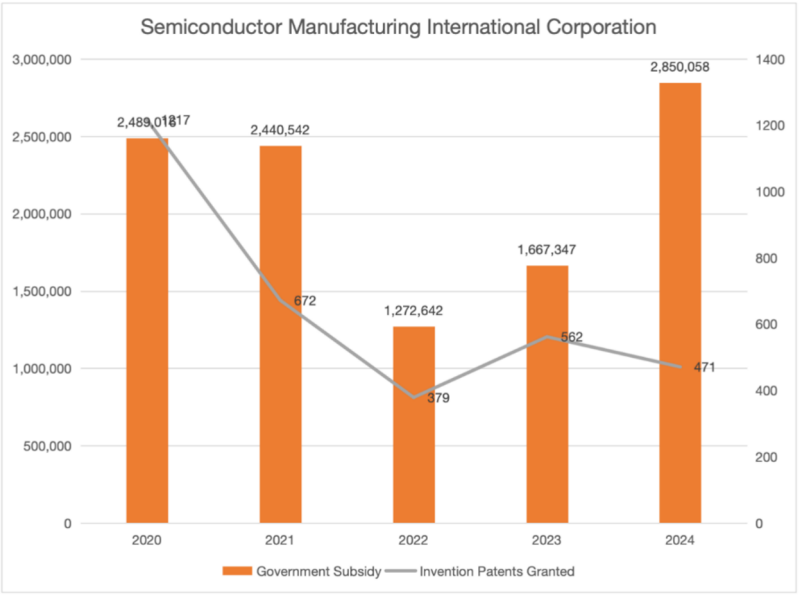

Fig. 5. Changes in the number of government subsidies and patents obtained by SMIC from 2021 to 2024.

As shown in Figure 5, government subsidies for SMIC from 2020 to 2024 increased by approximately 14.51%, but the number of granted invention patents plummeted by 61.29%, resulting in a divergence between policy investment and innovation output growth. The efficiency of subsidy-driven innovation also declined from 48,876 patents per billion yuan to 16,526 patents per billion yuan, a decrease of 66.19%. This inverse effect directly reflects that, for large enterprises, subsidies not only fail to incentivize innovation but also replace the company's own innovation funds, leading to insufficient innovation funding.

3.2 Industry Differences

This section will discuss the heterogeneous impact of government subsidy policies on innovative performance in high-tech industries and traditional industries. By examining the innovation volume, innovation share, patent volume, patent share, and patent output per 10,000 yuan of Gree Electric Appliances, inc, of Zhuhai, Semiconductor Manufacturing International Corporation, and EFORT Intelligent Robot Co., Ltd. in 2024, and comparing their government subsidy utilization efficiency, this study will assess the effects of government subsidy policies on different industries.

Table 1. Comparison of government subsidy utilization efficiency between high-tech industry companies and traditional industry companies.

Company Name	Subsidy Amount (10,000 yuan)	Subsidy Ratio	Number of Patents (units)	Patent Ratio	Patent Output Per 10,000 Yuan	Efficiency Ranking
Gree Electric Applications, inc, of Zhuhai	192,120.91	99.85%	5413	91,31%	0.0281	3
Semiconductor Manufacturing International Corporation	285.01	0,15%	471	7,94%	1.6526	2
EFORT Intelligent Robot Co., Ltd.	1.64	0.00%	44	0.00%	26.8293	1
Total	192,407.56	100%	5928	100%		

As shown in Table 1, among the three companies, SMIC produced 471 patents with only 0.15% of the subsidy, resulting in a patent output of 1.6526 per 10,000 yuan of subsidy, which is 55.81 times that of Gree Electric Appliances. Meanwhile, EFORT produced 44 patents with nearly 0% subsidy, achieving a patent output per 10,000 yuan of subsidy as high as 26.8293, which is 954.78 times that of Gree Electric Appliances. This clearly demonstrates that in the high-tech industry, compared to traditional industries, the marginal effect of subsidies on patent output is higher, meaning they are more effective. As a representative of traditional enterprises, Gree Electric Appliances received 99.85% of the subsidies, nearly the entire amount, but its patent output efficiency was only 0.0281 patents per ten thousand yuan, the lowest among the three companies. This indicates that subsidies detached from technological renovation policies cannot stimulate innovation in traditional enterprises. Therefore, for traditional industries, subsidies must be combined with technological renovation policies to be effective.

4 Challenges and Optimization Recommendations

4.1 Current Policy Implementation Challenges

In this section, this study will discuss the challenges currently faced by the innovation subsidy policy and propose policy optimization recommendations. First, the implementation of the current policy faces many issues. For example, the utilization rate of inno-

vation subsidies issued by the government is relatively low. As shown in the comparison of the three companies in Section 3 of this paper, despite receiving nearly the full subsidy, Gree Electric Appliances still ranked last among the three companies in terms of innovation output. Additionally, subsidies suffer from delays in fund disbursement due to cumbersome approval processes, which can result in companies not receiving subsidies when they need them, leading to a mismatch with the intended purpose of the subsidies. The distribution of government subsidies also faces fairness concerns, as large enterprises and SMEs have differing capabilities to access subsidies. If the government allocates subsidies to companies that could achieve outcomes without subsidies, it may lead to resource waste. Another significant shortcoming of this policy is the low quality of corporate innovation [8]. Most companies prioritize the quantity of innovation over its quality, and subsidies may even promote low-quality innovation more than high-quality innovation outcomes [7]. This may be because the government finds it challenging to accurately assess innovation quality, leading it to rely more on innovation quantity when designing subsidy policies [6].

4.2 Precision-Oriented Subsidy Design

Given the challenges currently faced in policy implementation, the following optimization recommendations can be proposed to ensure that subsidies are used more precisely. The government can establish a performance-oriented mechanism linking subsidies to the commercialization of innovative outcomes, while optimizing the selection mechanism for subsidy recipients to prioritize companies with high-quality innovative outputs [7]. Relevant scholars have pointed out that more efficient companies should receive greater subsidies [9]. Other scholars have also mentioned the need to create positive spillover effects, suggesting that government agencies should provide funding to companies with outstanding R&D projects but limited financial resources [10]. The government should also adjust subsidy strategies based on the stage of development. As mentioned in the third section of this paper, government subsidies have a more significant impact on R&D investments under survival pressure, so subsidies should be timed appropriately. Secondly, the government should implement differentiated subsidy strategies based on enterprise size and industry. As discussed in the third section, subsidies not only fail to incentivize large enterprises but also displace their own innovation funds, leading to insufficient innovation funding and reduced innovation performance. Therefore, the government should prioritize subsidies for small and medium-sized enterprises. Industry differences are also important; subsidies have a higher marginal effect in high-tech industries, while traditional industries require integration with technological renovation policies to achieve results. Finally, the government must conduct dynamic assessments and adjustments, establish regular effectiveness evaluations and exit mechanisms for subsidy policies. This can enhance the efficiency of subsidy fund utilization, prevent resources from flowing into low-efficiency areas, make subsidies more precise, and help enterprises break free from subsidy dependence to develop through their own capabilities.

5 Conclusion

This paper employs literature and data analysis methods, drawing on a summary of previous literature and a comparative analysis of four representative Chinese enterprises across various industries and types, to conduct an in-depth exploration of the mechanisms through which innovation subsidy policies influence enterprises, the evaluation of policy effectiveness across different industries, and optimization schemes for innovation subsidy policies.

Further research reveals that government subsidies influence enterprises through both direct and indirect channels. Direct effects include subsidies to reduce enterprise costs and risks, alleviate financing constraints, increase available resources for innovation activities, prompt enterprises to increase innovation investments, and enhance innovation performance. Indirect effects include subsidies to improve enterprises' competitive positions in the market and enhance their financing environments; the overall enhancement of enterprises' R&D capabilities further boosts their attractiveness to capital markets. Subsidy policies also have negative impacts on enterprises: excessive reliance on government subsidies can lead to a decline in autonomous innovation capabilities, and enterprises may engage in strategic innovation behaviors to seek government subsidies. Due to deficiencies in government regulation, subsidies may also flow to inefficient enterprises, thereby wasting subsidy resources. Based on an analysis of how four companies utilize government subsidies, the following conclusions were drawn: Subsidies for small and medium-sized enterprises have a more significant impact on R&D investments under survival pressure; for large enterprises, subsidies may lead to insufficient innovation funding, thereby affecting innovation performance. Subsidies for high-tech industries have a better effect on patent output; subsidies for traditional industries need to be combined with technological renovation policies to be effective. This paper also identifies the current challenges faced by subsidy policies and provides optimization proposals. Current challenges include low subsidy efficiency, low innovation quality of enterprises, and disputes over the fairness of subsidy distribution. To address these issues, the following solutions are proposed: link subsidies to innovation outcomes and allocate subsidies to companies that genuinely need them and generate output. The government should also establish a regular evaluation mechanism for subsidy policies to ensure their rational and efficient use.

The limitations of this paper include due to the limited number of literature sources and company analyses, it cannot fully reflect the impact of innovation subsidy policies on companies. Future research should reference more literature and utilize data from a larger number of companies for analysis.

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