

The Impact of Government Support and Technological Innovation on Enterprise Performance: A Case Study of Guangdong Hi-tech Enterprises

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Abstract

In the context of the spread of the global epidemic and economic downturn, promoting enterprises' scientific and technological strength and innovation ability is not only a practical need for building an innovative country but also a way to encourage the development of enterprises to maximize profits. This research focuses on the problems in the process of high-tech enterprises' technological innovation to improve enterprise performance under the conditions of government support. This study analyses the impact of government support on enterprise performance from two aspects: Government subsidies and policy orientation. This research uses the questionnaire method to explore the topic empirically. The research results show that, first, non-selective government subsidies and selective government subsidies are conducive to the improvement of the technological innovation level of enterprises; second, tax preference policies, government procurement policies, and financial support policies help to enhance the technological innovation capabilities of enterprises; third, the non-selective government subsidies and the selective government subsidies can jointly promote the performance of high-tech enterprises; fourth, building support based on diversified policies is the driving force to improve enterprise performance; fifth, technological innovation affects the high-quality development of high-tech enterprises; sixth, technological innovation affects the path of government subsidies to enhance enterprise performance; seventh, give play to the intermediary role of technological innovation in policy orientation to enhance enterprise performance. Given the above conclusions, this study provides specific suggestions for high-tech enterprises to improve their performance from the perspectives of government, industry and enterprises.



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Introduction

In recent years, in order to encourage the technological innovation of high-tech enterprises and promote economic growth, the government has taken a variety of policy measures to increase support for the technological innovation of high-tech enterprises. However, at present, the effect of relevant policy support is not obvious (Yang & Yin 2022). There are still some problems in the formulation and implementation of government policies and the development of China's high-tech enterprises. The perspective of government subsidies. There are still controversies from all walks of life about whether the government should give financial subsidies to enterprises and whether subsidies can really promote the development of high-tech enterprises. Although the early debate on whether government subsidies should be retained mainly focused on subsidies for listed companies and state-owned enterprises, these disputes still had a certain impact on the implementation of the government subsidies policy of high-tech enterprises. In particular, there are a series of common phenomena in reality. For example, not all high-tech enterprises that have obtained government subsidies can achieve good development, and different types of government subsidies play different roles in promoting the development of high-tech enterprises, which makes government agencies and scholars have to re-examine the effectiveness and possible problems of government subsidies of high-tech enterprises at this stage. That is to say, can government subsidiaries certainly promote the development of high-tech enterprises? If yes, should government subsidies be inclusive or competitive? Are there differences in the impact of these two types of government subsidiaries on high-tech enterprises? If so, what are the differences? What types or characteristics of high-tech enterprises subsidies should the government give to give full play to the effectiveness of government subsidies? Whether these problems are solved or not is the basis for answering whether the government subsidiaries of high-tech enterprises should exist and deeply revealing the mechanism of government subsidiaries on the development of high-tech enterprises. The perspective of policy orientation (Wei & Xiao 2021).

On the one hand, due to the fact that the government decision-making layer is far away from the technological frontier, the selection of funded projects is biased, which makes the efficiency of government support low, and the efficiency of technological innovation of government supported enterprises is greatly reduced. The main reasons are that the incentive policy system is not perfect, the supervision mechanism of incentive policy is not perfect, the application of incentive policy is not scientific, and the incentive policy does not match the incentive object. On the other hand, the implementation effect of government policies is uneven, and chaos such as "defrauding housing rent" and "defrauding government subsidies" emerge in endlessly. Some local governments have poor policy implementation and implementation capabilities, resulting in weak positive effects of policies, poor guidance and incentive effects, and little effect in stimulating enterprise innovation. The government policy support has also gradually become hollow, which has not achieved actual results, failed to maximize the enthusiasm of enterprises for R&D and innovation, and the production efficiency of enterprises is low. The perspective of technological innovation. As the main body of technological innovation, high-tech enterprises' innovation activities affect the development of national innovation. However, in the innovation activities of high-tech enterprises, the market mechanism fails from time to time. New products and services are likely to be put on the market by imitators at a lower cost through imitation and replication, which will affect the expected earnings of enterprises and lead to insufficient innovation motivation of high-tech enterprises. In addition, innovation is characterized by high risks, high costs and uncertainty of returns (Mao & Wu 2022). However, the information asymmetry between enterprises and external investors affects the investment decisions of external investors, which makes enterprises fall into financing difficulties, insufficient innovation funds and affects the innovation behavior of high-tech enterprises.

Therefore, the government needs to support the innovation of high-tech enterprises through a series of policy measures (Yan & Pang 2022).

Problem Statement

Based on the above background analysis and problem statement, we can see that high-tech enterprises are an important practice subject of technological innovation and national innovation driven development strategy, and good policy and market environment can provide power source for the development of high-tech enterprises (Yang & Yin 2022). The government's attention and support to high-tech enterprises play a key role in attracting investment and high-tech talents, and can promote the development of regional high-tech enterprises (Mao & Wu 2022). Therefore, the research object of this study is mainly aimed at high-tech enterprises. From the current management practice, the domestic high-tech enterprises have deeply recognized the important role of government subsidies and policy orientation in the development of enterprises, but enterprises usually do not pay enough attention to the impact process of government subsidies and policy orientation. In contrast, although there are theoretical views on government subsidies and policy orientation in the theoretical circle, there is a lack of enterprise performance research under the dual background of government support and technological innovation (Yan & Pang 2022; Wei & Xiao 2021). In practice, how to use theory to guide China's high-tech enterprises to carry out business activities and technological innovation under different government policy support has become the focus of China's high-tech enterprises to achieve high-quality development and improve enterprise performance. This research focuses on how China's high-tech enterprises, with the support of the government, carry out technological innovation activities and promote the transformation of innovation achievements to improve enterprise performance in the context of global industrial restructuring and domestic development transformation. This core problem needs to be solved through the following four research questions:

- R. Q.1: What is the relationship between government subsidies, policy orientation and enterprise performance?
- R. Q.2: What is the relationship between government subsidies, policy orientation and technological innovation?
- R. Q.3: Under the influence of technological innovation, what is the mechanism of government subsidies on enterprise performance?
- R. Q.4: Under the influence of technological innovation, what is the mechanism of policy orientation on enterprise performance?

Literature review

Dependent Variable: Enterprise Performance

How to improve the performance level of enterprises has been the core issue of strategic management research. In today's complex and unpredictable global economy, achieving good Enterprise Performance has gradually become the key to improve the competitiveness and overall performance of high-tech enterprises. Because of this, Enterprise Performance has become a hot spot in management research. Among them, the influencing factors of high-tech enterprises' performance, namely how to improve the performance of high-tech enterprises, are the focus of existing research (Huang & Chen, 2010). As shown in Table 1-5:

Table 1 Concept of Enterprise Performance

Year	Scholar	Relevant views
1979	Schendel & Hofer	Considering that performance is the time validation of any strategy, strategic management theory must attach importance to its embodiment.
1989	Geringer	It is pointed out that the definition and measurement of performance mainly focus on the local

		profitability and cost effectiveness of the parent company, satisfaction with local customer service and the performance of the parent company in the capital market.
1995	Hebert	Performance is the combination of performance and effectiveness. It is the overall output effect of an organization or individual's work in a certain period of time.
2007	Chen	Performance refers to the effective output of various behaviors carried out by organizations or individuals to achieve their set goals.
2012	Chen	Based on the domestic and foreign research on enterprise performance evaluation and the current situation of enterprise performance evaluation in China, a more reasonable indicator system is constructed.
2019	Li	Enterprise Performance is defined as the economic result that an enterprise obtains sales profit in the process of operating activities.

Table 2 Measures of Enterprise Performance

Year	Scholar	Relevant views
1971	Vernon	The evaluation of enterprise performance is based on the return on sales and the net profit rate of assets.
2004	Chen	The evaluation of performance should be measured by the degree of completion of the set goals.
2007	Xie	It is pointed out that financial performance, capability performance and market performance indicators should be comprehensively used when measuring business performance.
2009	Yang & Zhang	The questionnaire survey is used to measure the enterprise performance based on the interviewees' subjective evaluation of the enterprise performance.
2015	Jiang & Li	Enterprise performance is divided into four dimensions: financial performance, customer performance, learning and growth, and internal operation. Balanced scorecards are used to measure the performance of manufacturing enterprises.
2016	Jiang & Shen	Return on assets, return on total assets, gross profit rate of sales and net profit rate of sales are used to reflect the operating performance of manufacturing enterprises.

Table 2 Research on Financial Performance of Enterprises

Year	Scholar	Relevant views
2010	Fan	Research shows that technological innovation, such as national and regional property rights protection, legal environment and the development degree of factor market, has an important impact on enterprise behavior, and the financial performance of enterprises is closely related to the external soft environment.
2013	Carrasco & Buendia	It is found that enterprises will form new innovation mechanisms in the process of actively undertaking social responsibilities, which will promote enterprises to increase R&D investment and improve innovation capability. These behaviors also have a certain impact on financial performance of enterprises.
2014	Wang	Through empirical analysis of the relationship between corporate social responsibility and financial performance in China and the United States under completely different market systems and technological innovation, it is found that the relationship between the two has a lot to do with a country's degree of marketization, so the relationship between the two is stronger in the sample of American enterprises.
2015	Hao	Taking the listed companies in China's pharmaceutical industry as a sample, it is found that the control of enterprise internal systems has a positive impact on financial performance.
2019	Li	It is believed that various technological innovations affect corporate behavior, leading to differences in corporate social responsibility behavior under different technological innovations. Corporate social responsibility can help improve corporate reputation, improve relations with stakeholders, and ultimately improve corporate financial performance.

Table3 Research on Market Performance of Enterprises

Year	Scholar	Relevant views
2012	Zou & Ni	The study explored the impact of technological innovation on enterprise market performance from six perspectives: government intervention, financial constraints, public services, infrastructure, government regulation, and corruption. The empirical results show that the higher the system quality, the better the enterprise market performance.
2013	Zhang	It is believed that the marketing policy orientation reflects the marketing ability of the enterprise, and the reasonable allocation of marketing resources can improve product influence, expand market share, and establish competitive advantage. At the same time, the improvement of marketing policy orientation also reduces waste. Therefore, improving the marketing policy orientation will positively affect the market performance of enterprises.
2014	Yang & Li	Based on incomplete contract theory, the research empirically analyzes the relationship between technological innovation and enterprise market performance. The results show that a perfect

		technological innovation will provide a better development environment for enterprises and help enterprises improve their market performance.
2015	Zhou	It is believed that the technological innovation of listed companies has a significant positive moderating effect on the strategic orientation of enterprises and the market performance of enterprises.

Table4 Research on the Impact of Technological Innovation on Enterprise Performance

Year	Scholar	Relevant views
2017	Hu & Yu	It is pointed out that in the early stage of technology catching up, the capability evolutionary restructuring has improved the performance of technological innovation by expanding and restructuring internal and external resources, adjusting operational practices and organizational routines.
	Xiong L. et al.	It is found that dynamic innovation capability has a positive impact on innovation performance, but successful experience traps will inhibit the impact of dynamic innovation capability on innovation performance.
	Xiong S. et al.	The research shows that the three dimensions of technological innovation dynamic capability, namely, technology opportunity perception capability, innovation resource integration capability, and environmental change capability, positively affect R&D performance, while innovation resource integration capability and environmental change capability positively affect industrialization performance.
2018	Yang et al.	The empirical research on 253 high-tech enterprises shows that breakthrough innovation can enable enterprises to have core competitiveness and effectively improve their financial performance.
	Xu	Empirical research shows that patent quality will affect business performance by influencing the market power of enterprises, and its impact on the performance of high-tech enterprises is significantly greater than that of traditional industries.
2019	Nie	The research found that R&D investment is helpful to improve enterprise performance, but in high-tech enterprises and enterprises in non eastern regions, the role of R&D investment in improving enterprise performance is not very obvious.
	Yue & Yu	It is found that the dynamic capability of technological innovation can significantly improve the performance of technology commercialization.
	Xiong & Li	The research shows that the above three dimensions of technological innovation dynamic capability have a significant impact on R&D performance and new technology industrialization performance.
2020	Qie et al.	It is found that the reasonable R&D intensity of enterprises can improve the performance of enterprises by reducing the negative impact of asset liability ratio.

Independent Variable: Government Subsidies

There is no uniform standard for the discussion of the concept of government subsidies in the academic circle. There are many terms for "government subsidies" in the existing literature: "financial subsidies" and "government subsidies", and they are used alternately in the same literature (Faccio, 2006). Although the appellation is slightly different, due to its consistent functional positioning and data sources, it is often considered that there is no essential difference. However, as a policy tool, the development of government subsidies in theoretical research is different from that in policy practice. In foreign studies, government subsidies originated from Pigou (1943), which corrected the market failure caused by the positive externalities of innovative products. In order to make up for private benefits of enterprises and achieve Pareto optimality of social benefits, government support was used to encourage enterprises to engage in innovative research. Wang and Hassler (1985), based on the study of commodity price system, regarded it as a "price subsidies". Musgrave (1989), based on the study of commodity supply, believed that government subsidies were used to cover the production costs of public goods and quasi public goods, and the amount of subsidies should increase with the publicity of the products. The research of domestic scholars is represented by the research of Kong et al. (2013), who believe that it is the gratuitous transfer payment provided by the government to the micro entities to achieve a variety of political, economic and social goals in a specific period. Kong transferred funds to microeconomic entities free of charge mainly through direct financial allocation, financial discount, free allocation of non monetary assets, equity investment, patent application funding, financial subsidies applied for

scientific research projects, scientific and technological innovation support funds, special funds for technological transformation and other forms of subsidies. Government subsidies help achieve multiple goals such as enterprise development, industrial upgrading, and economic growth, and are "incentives" to support enterprise innovation (Han, 2016; Lu, 2014). Some scholars also studied the concept of government subsidiaries, as shown in Table 6-10.

Table 5 Concept of Government Subsidies

Year	Scholar	Relevant views
2007	Tang & Luo	The specific forms of government subsidies for enterprises can be divided into four categories: financial allocation, tax preference, financial discount and non monetary assets transferred without compensation.
2014	Wang et al.	Government subsidies are not only a part of the government's financial expenditure, but also an important means of direct intervention in the market. Objectively, they have become an important measure to promote China's industrial adjustment.
2019	Chen et al.	Government subsidies include government special funds, special plans, R&D subsidies and other direct financial support obtained by enterprises.

Table 6 Classification of Government Subsidies

Object	Type of subsidies	Researcher
Government subsidies for specific behaviors	Investment subsidies	Colombo et al, 2013; Cerqua & Pellegrini, 2014
	R&D subsidies	Dimos & Pugh, 2016; Mao & Xu, 2015; Chen & Yang, 2016; Yuan & Zhu, 2020
Government subsidies for specific industries or industries	Agricultural subsidies	Fan et al., 2012; Zhang, 2020
	Forestry subsidies	Wu & Zeng, 2013; Wang et al., 2020
	Subsidies for new energy vehicle industry	Zhou & Pan, 2019; He et al., 2022; Peng & He, 2022; Liu et al., 2022
	Subsidies for photovoltaic industry	Li et al., 2017; Gu, 2019; Nie & Xu, 2019; Wang et al., 2022
	Subsidies for enterprises in strategic emerging industries	Fu & Li, 2015; Wu et al., 2018; Yang & Wang, 2019; Yan et al., 2020; Huang & Li, 2022
	Subsidies for high-end equipment manufacturing industry	Ren & Lu, 2014; Zhao et al., 2020
Government subsidies for specific businesses	Subsidies for listed companies	Tang & Luo, 2007; Zhao & Ju, 2013; Wang et al., 2014
	IPO company subsidies	Wang et al., 2015
	Subsidies for start-up enterprises	Amezcuca et al., 2013; Soderblom et al., 2015; Yue et al., 2022

Table 7 Research on the Relationship between Government Subsidies and Enterprise Performance

Result	Year	Scholar	Related research
Positive correlation	2013	Amezcuca et al.	The study believes that government subsidies can bring various benefits to companies, especially for those start-up companies with financing constraints. It is further found that obtaining government subsidies can serve as a positive signal to attract more human and financial resources.
	2015	Soderblom et al.	
	2017	Zhang	The study found that government subsidiaries will increase investment in product upgrading, which will have a positive impact on product quality of Chinese enterprises.
	2019	Yu et al.	The analysis points out that the government subsidies in China are still at a low level, and there is still much room for improvement in promoting the innovation performance of enterprises. Moreover, the promotion effect of government subsidies on the innovation performance of larger enterprises is significantly higher than that of smaller enterprises.
		Nie	It is found that government subsidiaries can help improve the performance of enterprises, but in state-owned enterprises and non high-tech enterprises, their role is not obvious.
Not relevant	1998	Teoh et al.	The study found that investors may have high expectations of the company due to government subsidies, but with the increasing disclosure of analyst reports, company financial statements, media news and other information, investors will revalue the company's value, resulting in a decline in the company's market performance.

	2011	Czarnitzki et al. Guo et al.	Through in-depth research on strategic emerging industries, it is found that local government subsidiaries have a significant tendency to support the weak, which fails to directly promote enterprise performance.
	2014	Han	
	2012	Shao & Bao	
	2007	Tang & Luo	The study found that government subsidiaries did not enhance the economic benefits of listed companies and had no significant impact on the performance of new energy concept companies.
	2013	Zhao & Ju	
	2015	Wang et al.	The study found that government subsidies may distort the company's normal production activities, thereby reducing the company's ability to continue operating.
Negative correlation	1996	Beason & Weinstein	The problems existing in the allocation of government subsidized resources lead to resource mismatch, thus inhibiting the improvement of enterprise profitability.
	2007	Lee	
	2012	Tian & Xiao	It is pointed out that many enterprises will meet the requirements of the government by means of rent-seeking to obtain government subsidies, which leads to inefficient utilization of government subsidies.
	2016	Hu & Huang	
	2019	Ma	
	2019	Chen & Liu	It is believed that, due to the motivation of turning losses around or protecting the shell, enterprises with earnings manipulation to the loss state obtain more government subsidies, which leads to the decline of marginal value, and government subsidies will inhibit the improvement of enterprise development quality.

Table 8 Research on the Impact of Government Subsidies on R&D Investment of Enterprises

Year	Scholar	Related research
1984	Scott	The government subsidies are divided into direct subsidies and tax incentives. It is found that both of them can stimulate enterprises' R&D investment.
1986	Mansfield	
2008	González	The research on Spanish manufacturing industry and Korean manufacturing industry respectively shows that government subsidies have a stronger incentive effect on the R&D investment of small and medium-sized manufacturing enterprises.
2010	Lee	
2011	Bai	It is believed that government subsidies can stimulate enterprises to increase R&D expenditure, and the effect of R&D funding is positively correlated with the knowledge stock of enterprises.
2020	Liu	The study found that government subsidies significantly improved the R&D input and innovation output of enterprises. Government subsidies have significant effects on enterprises at different growth stages, but the influencing factors and results are different.

Table 9 Research on the Impact of Government Subsidies on the Technological Innovation Output of Enterprises

Year	Scholar	Related research
2009	Bérubé & Mohnen	The study found that the enterprises that received both government tax relief and R&D subsidies produced more new products than the competitors that only received tax relief.
2011	Fornahl et al.	The study found that government subsidies can significantly promote the innovation output of joint R&D projects
2015	Liu et al.	Research shows that government subsidies create more profits for enterprises, provide guarantee for enterprises' R&D funds, and enhance enterprises' R&D enthusiasm.
2016	Bronzini & Piselli	It is found that R&D subsidies has a significant impact on the number of patents.
2020	Liu	The study found that government subsidies significantly improved the R&D input and innovation output of enterprises. Government subsidies have significant effects on enterprises at different growth stages, but the influencing factors and results are different.

Independent Variable: Policy Orientation

On the definition of tax preference. The tax preference enhances the confidence of enterprises in innovation input and innovation output, provides an effective way to reduce the cost of enterprise operation and management, and helps reduce the tax burden of enterprises in the process of R&D, production, sales, etc. At present, tax incentives include tax relief, tax extension and other policies (Huang & Wu, 2019). Definition of the concept of government procurement.

In 1987, the World Trade Organization pointed out in the Agreement on Government Procurement that government procurement refers to government procurement, engineering, leasing, services, goods and the purchase of public facilities. In the Government Procurement Law of the People's Republic of China, China has also defined government procurement, that is, the use of financial funds by state organs, institutions and organizations at all levels to purchase goods, projects and services in a centralized manner according to law. Government procurement can stabilize demand and reduce market risk (Edler & Boon, 2018; Uyarra et al., 2020; Miller & Lehoux, 2020), which is the "driving factor" supporting enterprise innovation. Scholars usually use different names to describe the role of government procurement in promoting technological innovation of enterprises, such as public procurement for innovation (Edler & Georgiou, 2007), public procurement of innovation (Georgiou et al., 2014), strategic public procurement (Edler, 2010), illuminated public procurement (Williams & Smellie, 1985), etc. As shown in Table 11-12:

Table 10 Research on the Impact of Tax Preferences on Technological Innovation

Year	Scholar	Related research
2008	Kuang & Xiao	The research empirically analyzes the significant impact of tax incentives on enterprises' independent innovation capability, and specifically analyzes the differences in the impact of different taxes.
2015	Ma	The study found that tax incentives can stimulate technological innovation from three aspects: reducing the cost of technological innovation, reducing the risk of technological innovation, and increasing the income of enterprises.
2016	Liu et al.	The study found that tax incentives on the whole help to stimulate enterprises to invest in innovation. Compared with state-owned enterprises, tax incentives have more leverage effect on R&D and innovation investment of private enterprises.
2019	Zhang & Du	The research finds that financial subsidies and tax incentives significantly improve the innovation efficiency of high-tech enterprises, and the role of financial subsidies on innovation efficiency of high-tech enterprises is greater than tax incentives.
2021	Yang & Li	The study found that government subsidies and R&D expenses plus tax deduction significantly promoted technological innovation in high-tech industries.
2021	Sun et al.	The incentive effect of tax and fee reduction on technological innovation of enterprises is studied by using the multi time point double difference method. It is found that tax and fee reduction not only improves the R&D input of enterprises, but also improves the innovation output of enterprises. However, the incentive effect of tax and fee reduction policies on technological innovation of enterprises is lagging behind.

Table 11 Research on the Impact of Government Procurement on Enterprise Technological Innovation

Year	Scholar	Related research
2011	Sun	It is believed that the high-tech industry, as a new industry, can be encouraged to increase technological innovation through government procurement.
2018	Deng	The study found that government procurement can effectively expand the demand for enterprise innovation, reduce the risk of enterprise innovation, and stimulate enterprise innovation.
2019	Wang	The study found that the combination of national high-tech zones and government procurement policies has a significant impact on the quantity and quality of technological innovation, and the positive incentive effect of the combination of national high-tech zones and government procurement policies in the "mature period" is more obvious.
2020	Jing et al.	It is pointed out that government procurement policies, as one of the main tools of government macro-control, play a very important role in promoting technological innovation of enterprises by stimulating market demand.
2020	Xu & Li	It is found that China's government procurement has a significant positive impact on technological innovation of enterprises in low technology industries through market catalysis and improving enterprise financing constraints and other mechanisms.
2021	Chen & Wu	The empirical study found that government procurement can significantly promote technological innovation by effectively easing credit constraints, and proposed the need to strengthen the policy orientation of government procurement to promote innovation.

Mediator: Technological Innovation

In economics, the concept of innovation proposed by the American economist Schumpeter (1912) in Economic Development Theory is generally regarded as the origin of the concept of innovation (Witt, 2016). Schumpeter believes that innovation is to introduce a "new combination" of production factors and conditions into production and establish a new production function. On this basis, subsequent scholars have developed innovation into two branches: technological innovation, which targets technological change and technology promotion, and institutional innovation, which targets institutional change and institutional formation. Freeman (1987) further extended the economic significance of technological innovation to the first commercialization of technology, including new products, new processes, new systems and new equipment. In "Successful Industrial Innovation", Myers and Marquis (1969), the advocates and main participants of NSF (National Science Foundation of USA), defined innovation as a collection of technological changes. Technological innovation is a complex activity process, starting with new ideas and concepts, and finally making a new project with economic and social value practical and successful by continuously solving various problems. At that time, the definition of technological innovation was still relatively narrow. Until the second half of the 1970s, NSF further expanded the definition of technological innovation to introduce new or improved products, processes or services to the market. "Imitation" and "improvement without introducing new technological knowledge" are included in the concept scope of technological innovation as two types of innovation at the final level. Some scholars have defined the concept of technological innovation, as shown in Table 13-14 :

Table 12 Definition of Technological Innovation

Year	Scholar	Related research
1969	Arow	Technological innovation refers to the process of recombining and testing production factors.
1993	Meyer & Utterback	It is believed that technological innovation is not only product innovation, but also includes not only the investment of enterprises in technology research and development, but also the absorption capacity of advanced technology, as well as the production and sales capacity after successful research and development.
	Liu	Recognized the connection process of technological innovation, and divided the technological innovation process into product innovation, process innovation and innovation diffusion process.
1998	Fu	Technological innovation is a process in which entrepreneurs identify potential profit opportunities, optimize the allocation of production factor resources, establish an efficient production system, and produce new products for sales in order to obtain profits.
2000	Wu	Technological innovation refers to the whole process of commercialization of the new concept of technological innovation, through research and development and technology combination, to obtain practical application and produce economic and social benefits.
2003	Rogers	It is believed that technological innovation refers to the generation of new ideas, new methods and new goods by enterprises.
2009	Damanpour & Schneider	It is believed that technological innovation refers to output in a new form.
2012	He	It is believed that technological innovation is not only the embodiment of innovation capability, but also includes the strategic objectives formulated by enterprises to achieve technological innovation in the process of technological innovation, as well as the innovation atmosphere of enterprises in the process of technological innovation and the degree of investment in the implementation process.
2013	Nie	It further deepens the definition of technological innovation and believes that enterprises not only produce new technologies, apply new processes, develop new products and provide new services, but also realize their market value through technology development, experiment and achievement transformation in the process of technological innovation.
2020	Li	It is believed that technological innovation is a multi-stage decision-making process, which needs to go through the process from resource input to economic benefits, that is, from R&D resource input to the realization of technological achievements, and from technological achievements to the ability to realize social and economic values.
2021	Zhang et al.	It is believed that technological innovation is a process in which enterprises use new knowledge, new production methods and new processes to produce new products, provide

		new services, improve product quality, and then meet market demand and realize market value.
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Table 13 Measurement Indicators of Enterprise Technological Innovation

Type	Representative scholars	Indicators	
Single indicator	Nelson, 1982; Crépon & Duguet, 1994; Xiao & Wang, 2013; Zhang & Li, 2015; Hai et al., 2021	Enterprise R&D investment	
	Hausman et al., 1984	Number of patents granted	
	Liu et al., 2012; Li & Chen, 2018; Che et al., 2020	Number of patent applications	
	Cao, 2012	Sales rate of new products	
	Wang, 2013	Ratio of new product output value to total output value	
	Zeng et al., 2019	Enterprise value	
Multiple indicators	Balanced scorecard	Smith et al., 2014	Balanced scorecard
	Economic and social benefits	Qian et al., 2010	New technology/process, new product R&D success rate, market reaction, new product/service
		Xie et al., 2013	Sales revenue ratio of new products, product innovation ratio and process innovation ratio
		Bellstam et al., 2021	Operational performance, growth opportunities, sales growth, patent value
		Rogers, 2004	Develop new products, increase market share, reduce production costs, improve product quality and reduce environmental pollution
	Process innovation and product innovation	Chen et al., 2007; Zhang et al., 2015	Product innovation and process innovation
	Relative efficiency of innovation	Bai & Li, 2011	Stochastic frontier measurement of innovation input-output efficiency
		Wang et al, 2007; Dai et al., 2019	DEA measures innovation input-output efficiency
	Different links of innovation	Lacová & Huňady, 2018; Tamara et al, 2019	R&D input and patent output
		Yang et al., 2019	R&D efficiency and transformation efficiency of technological achievements
		Feng et al., 2019	R&D input, R&D output and economic benefits (distinguish between scale and intensity)
		Han et al., 2020	Technological innovation, profit and growth

Hypotheses

Based on the above theoretical analysis, this section proposes five hypotheses about high-tech enterprises. They are the relationship between government subsidies and enterprise performance, the relationship between policy orientation and enterprise performance, the relationship between government subsidies and technological innovation, the relationship between policy orientation and technological innovation, and the mediation role of technological innovation. Table 15 summarizes the hypotheses.

Table 14 Summary of Hypotheses

No.	Contents
H1	Government subsidies is positively correlated with enterprise performance.
H1a	Non-selective government subsidies is positively correlated with enterprise performance.
	Selective government subsidies is positively correlated with enterprise performance.
H2	Policy orientation is positively correlated with enterprise performance.
H2a	Tax preference policies is positively correlated with enterprise performance.
H2b	Government procurement policies is positively correlated with enterprise performance.

H2c	Financial support policies is positively correlated with enterprise performance.
H3	Government subsidies is positively correlated with technological innovation.
H3a	Non-selective government subsidies is positively correlated with technological innovation.
H3b	Selective government subsidies is positively correlated with technological innovation.
H4	Policy orientation is positively correlated with technological innovation.
H4a	Tax preference policies is positively correlated with technological innovation.
H4b	Government procurement policies is positively correlated with technological innovation.
H4c	Financial support policies is positively correlated with technological innovation.
H5	Technological innovation is positively correlated with Enterprise Performance.
H5a	R&D investment capacity is positively correlated with Enterprise Performance.
H5b	Innovation output capacity is positively correlated with Enterprise Performance
H6	Technological innovation mediates the relationship between government subsidies and enterprise performance.
H7	Technological innovation mediates the relationship between policy orientation and enterprise performance.

Research Framework

On the basis of literature review and theoretical analysis, the author puts forward assumptions about government subsidies and enterprise performance, policy orientation and enterprise performance, government subsidies and technological innovation, policy orientation and technological innovation, technological innovation and enterprise performance of high-tech enterprises. In this chapter, the author explains the concept, measure and correlation of each variable. In this study, technological innovation is set as Mediator, and government subsidies, policy orientation and enterprise performance are included in the model of this study. According to the logic idea of government subsidies and policy orientation - technological innovation - enterprise performance, the author builds a research logic model of "government subsidies and policy orientation (independent variable) - technological innovation (mediator) - enterprise performance (dependent variable)", as shown in Figure 2-1.

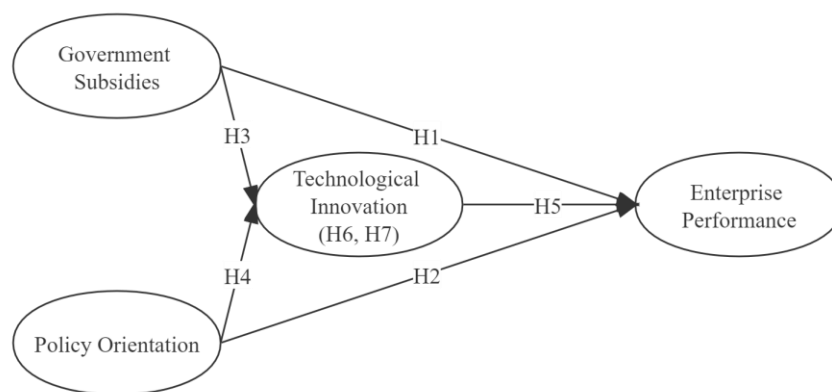


Figure 2-1 Research framework

Methodology

Research Methods

This research adopts three methods: literature research, questionnaire survey and empirical analysis to explore the impact mechanism of government support and technological innovation on enterprise performance. Firstly, this study systematically combs the existing theories and relevant literature to provide theoretical guidance for the construction of the research framework; Secondly, the questionnaire method is used to collect relevant data on four variables: government subsidies, policy orientation, technological innovation and enterprise performance; Finally, the research hypopaper designed in the theoretical framework is empirically tested. Therefore, this study provides multiple guarantees for the scientificity and preciseness of the research content through literature review, questionnaire survey and empirical test.

Population/Sampling/Unit of Analysis

In this study, we obtained the required sample data through a questionnaire survey, and selected Guangdong high-tech enterprises as the research object, mainly for three reasons. First, the convenience of geographical location. The author is now working in the capital city of Guangdong province, and chooses Guangdong province as the research object, which is conducive to field research and the distribution and recovery of questionnaires. Second, in recent years, Guangdong province has frequently introduced preferential policies to support the development of high-tech enterprises. Third, I have been engaged in the work and research of high-tech enterprises in innovation and entrepreneurship, incubation and cultivation, science and technology finance and enterprise management for a long time. The object of my work is high-tech enterprises. I have a relatively deep understanding of high-tech enterprises in obtaining government support for their technological innovation and enterprise performance. Personal interests and experience are conducive to the development of this study, making the questionnaire survey and empirical research objects more targeted and accurate. Through in-depth interviews and research on high-tech enterprises, we can obtain first-hand data to provide data support for the study of the relationship between government support and enterprise performance. The questionnaire of this study is mainly distributed and collected through online questionnaire, which is divided into two parts. The first part of the questionnaire is about the characteristics of the enterprises interviewed. The measurement content includes the nature of the enterprise, whether it is a high-tech enterprise, the industry to which the enterprise belongs, the operating years of the enterprise, the number of employees, the total assets of the enterprise and other information. The second part of the questionnaire is to measure the relevant variables of the research model, including government subsidies, policy orientation, enterprise performance, technological innovation and other variables. A total of 350 original data samples were collected in this survey. After removing invalid questionnaires, 329 were valid, with an effective rate of 94%.

Profile of Respondents

This questionnaire was distributed to mid-level or senior managers of Guangdong high-tech enterprises. 350 questionnaires were distributed, 329 of which were valid, with an effective recovery rate of 94%. The researchers mainly sent the website for questionnaire survey with the consent of the respondents. The questionnaire includes information such as the nature of the enterprise, the industry to which the enterprise belongs, the number of employees, and the total assets of the enterprise.

(1) Nature of the enterprise

Among the investigated samples, 36 people belonged to state-owned enterprises, accounting for 10.94%; There are 25 foreign-funded enterprises, accounting for 7.59%; 181 people belong to private enterprises, accounting for 55.02%; There are 57 Chinese foreign joint ventures, accounting for 17.33%; There are 24 employees belonging to Hong Kong, Macao and Taiwan enterprises, accounting for 7.29%; There are 6 enterprises belonging to other types, accounting for 1.83%. The questionnaire basically covers some representative high-tech enterprises in Guangdong province, as shown in Table 16.

Table 16 Distribution of Enterprise Nature

Enterprise nature	Subtotal	Proportion
State-owned enterprise	36	10.94%
Foreign enterprise	25	7.59%
Private enterprise	181	55.02%
Sino foreign joint venture	57	17.33%
Hong kong, Macao and Taiwan enterprises	24	7.29%
Other	6	1.83%
Total	329	100%

(2) Industry

The survey covers 93 representative high-tech enterprises in Guangdong province, accounting for 28.27%; 47 belong to the biomedical industry, accounting for 14.29%; There are 32 new material industries, accounting for 9.73%; There are 27 companies in the opto mechanical and electrical industry, accounting for 8.21%; 53 belong to the new energy industry, accounting for 16.11%; There are 48 environmental protection industries, accounting for 14.59%; 21 companies belong to modern equipment industry, accounting for 6.38%; There are 8 enterprises belonging to other industries, accounting for 2.43%. It can be seen from this that the industry distribution of the surveyed enterprises is relatively uniform. As shown in Figure 2.

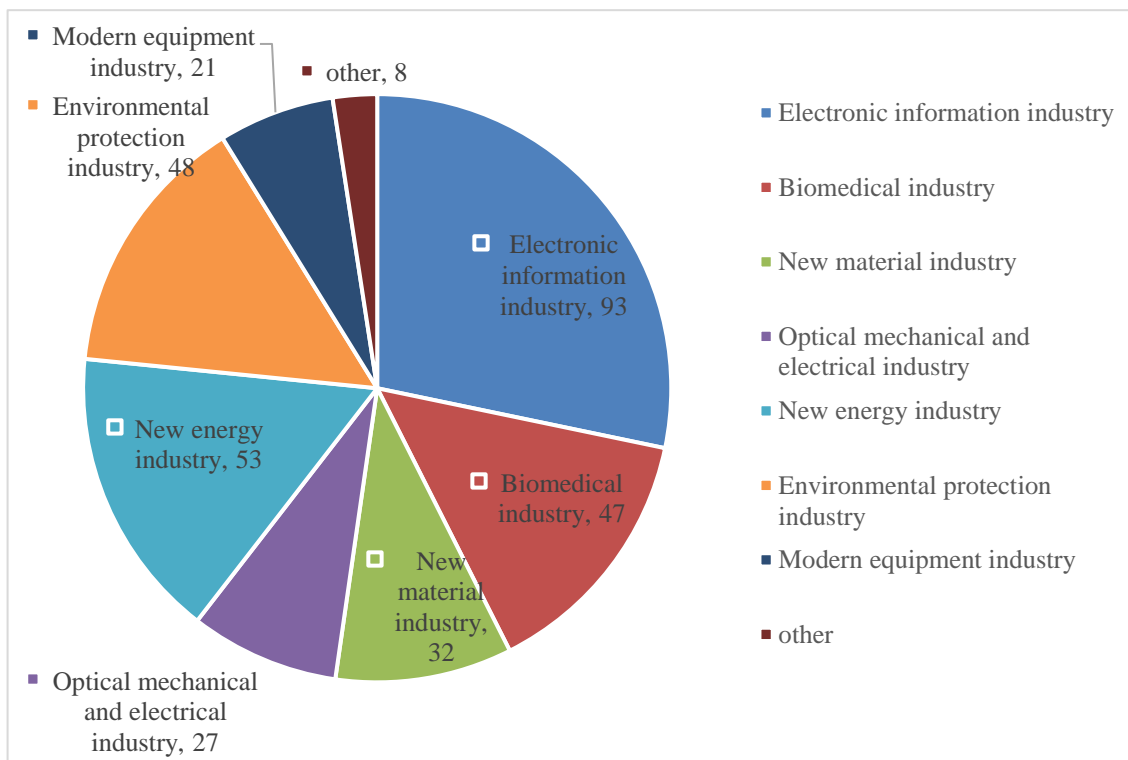


Figure 2 Industry Distribution of Respondents' Enterprises

(3) Number of employees

In the survey sample, 13.98% of respondents belong to enterprises with less than 50 employees; 23.71% of the respondents belong to enterprises with 50-99 employees; 28.57% of respondents belong to enterprises with 100~499 employees; 33.74% of the respondents' enterprises have/more than 500 employees. As shown in Table 17.

Table 17 Staff Size of Respondents' Enterprises

Staff size	Subtotal	Proportion
Less than 50 people	46	13.98%
50~99 persons	78	23.71%
100-499 persons	94	28.57%
More than 500 people	111	33.74%
Total	329	100%

(4) Duration of enterprise

In the sample, there are 54 enterprises that have been operating for 0-2 years, accounting for 16.41%; 105 enterprises have been operating for 3-5 years, accounting for 31.91%; There are 97 enterprises with business life of 6-10 years, accounting for 29.48%; There are 73 enterprises that have operated for more than 10 years, accounting for 22.19%, as shown in Figure 3.

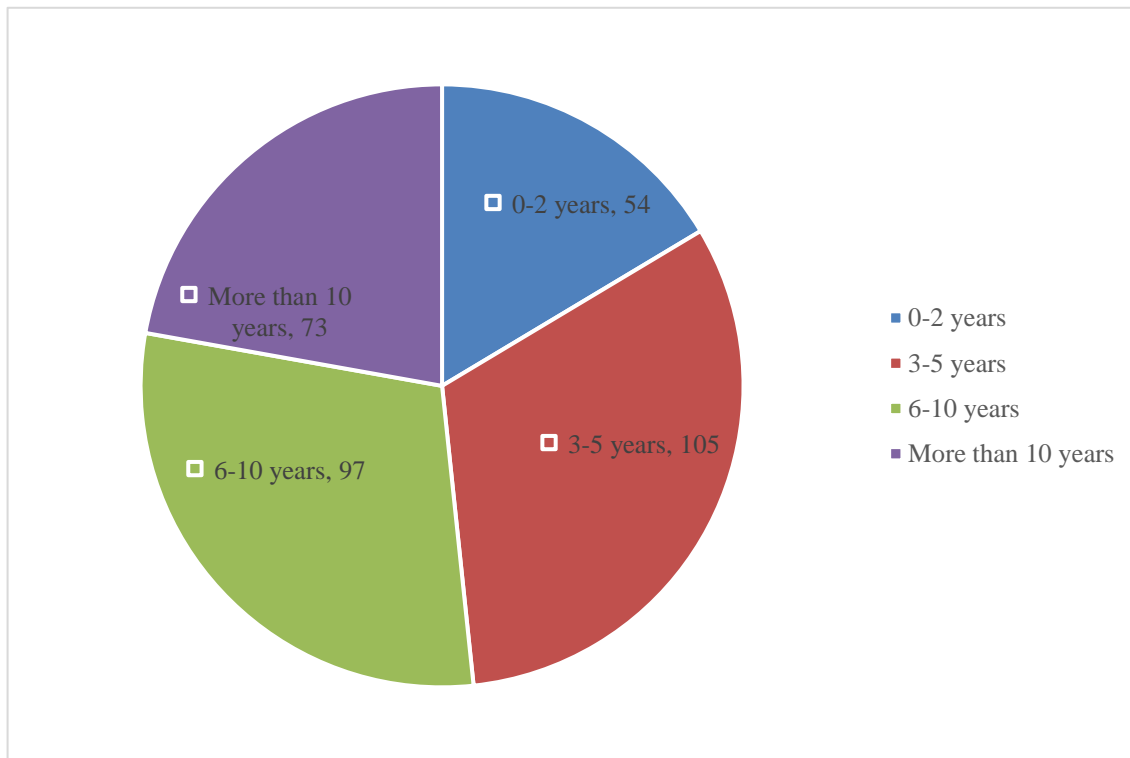


Figure 3 Duration of Respondents' Enterprises

(5) Total assets of the enterprise

In the sample, there are 56 enterprises with total assets of less than 10 million, accounting for 17.02%; 89 enterprises with total assets between 10 million and 50 million, accounting for 27.05%; 103 enterprises with total assets between 50 million yuan and 100 million yuan, accounting for 31.31%; There are 81 enterprises with total assets of more than 100 million yuan, accounting for 24.62%. As shown in Table 18.

Table 18 Total Assets of Respondent's Enterprises

Total assets	Subtotal	Proportion
Below 10 million yuan	56	17.02%
10-50 million yuan (inclusive)	89	27.05%
50 million to 100 million yuan (inclusive)	103	31.31%
More than 100 million yuan	81	24.62%
Total	329	100%

Relationship between Government Subsidies and Technological Innovation

In this study, the government subsidies (GS) are divided into two parts: non-selective government subsidies (NS) and selective government subsidies (SG). In this study, technological innovation (TE) is subdivided into two dimensions: R&D investment capacity (RD) and innovation output capacity (IO). In this study, 329 valid questionnaires were used to conduct an empirical study based on the sample data obtained to analyze the relationship between the two dimensions of government subsidies (GS) and technological innovation. First, the relationship between government subsidies and technological innovation is analyzed, as shown in Table 19.

Table 19 Correlation Analysis Results of Government Subsidies and Technological Innovation

	GS	TP	GP	TE	RD	IO
GS	1					
NS	0.891**	1				
SG	0.906**	0.616**	1			
TE	0.808**	0.832**	0.629**	1		
RD	0.762**	0.853**	0.529**	0.909**	1	
IO	0.708**	0.660**	0.614**	0.909**	0.654**	1

Note: *** means $P < 0.001$; ** means $P < 0.01$; * means $P < 0.05$.

According to the relevant analysis results of government subsidies and technological innovation in Table 19: Government subsidies (GS) are significantly correlated with technological innovation (TE), R&D investment capacity (RD), and innovation output capacity (IO). Non-selective government substance (NS) is significantly correlated with technological innovation (TE), R&D investment capacity (RD), and innovation output capacity (IO); Selective government subsidies (SG) is significantly related to technological innovation (TE), R&D investment capacity (RD), and innovation output capacity (IO). For the relationship size and causality between government subsidies and technological innovation, further multiple regression analysis is required, as shown in Table 20.

Table 20 Multiple Regression Analysis Results of Government Subsidies and Technological Innovation

	Un-std. Coeff.		Std. Coeff.	t	Sig.
	β	Std. Error			
(constant)	0.756	0.120		6.280	0.000
NS	0.652	0.034	0.717	19.083	0.000
SG	0.158	0.032	0.187	4.969	0.000

Note: the dependent variable is TE.

Table 21 Goodness of fit of Government Subsidies to Technological Innovation Model

R	R ²	Adj. R ²
0.845	0.714	0.713

Note: Predictors are (constant), NS, SG.

According to Table 20 and Table 21, the model $R^2=0.714$, after adjustment $R^2=0.713$, $F=407.459$, and the significance level $P < 0.001$. The non-selective government subsidies (NS) has a significant regression with technological innovation (TE) ($P<0.01$), the regression coefficient is 0.652, and H3a is established. The regression of selective government subsidies (SG) to technological innovation (TE) is significant, $P < 0.01$, and the regression coefficient is 0.158. H3b is supported. The following empirical results can be obtained through the correlation analysis and multiple regression analysis between government subsidies and technological innovation: The non-selective government subsidies (NS) and selective government subsidies (SG) of government subsidies (GS) are significantly positively correlated with technological innovation (TE). Therefore, the distribution of non-selective government subsidies (NS) and selective government subsidies (SG) of government subsidies (GS) can promote the improvement of technological innovation (TE). On this basis, H3a and H3b are supported.

Relationship between Policy Orientation and Technological Innovation

In this study, policy orientation is divided into three aspects: tax preference policies, government procurement policies and financial support policies; Technological innovation is subdivided into R&D investment capacity and innovation output capacity for analysis. In this study, 329 valid questionnaires were used to conduct empirical research based on the sample data obtained, and analyze the relationship between the three dimensions of policy orientation and technological innovation. First, the relationship between policy orientation and technological innovation is analyzed, as shown in Table 21.

Table 21 Correlation Analysis Results of Policy Orientation and Technological Innovation

	PO	TP	GP	FS	TE	RD	IO
PO	1						
TP	0.801**	1					
GP	0.613**	0.279**	1				
FS	0.655**	0.406**	-0.043	1			
TE	0.796**	0.750**	0.467**	0.438**	1		
RD	0.699**	0.769**	0.273**	0.421**	0.909**	1	
IO	0.750**	0.595**	0.578**	0.375**	0.909**	0.654**	1

Note: *** means $P<0.001$; ** means $P<0.01$; * means $P<0.05$.

According to the results of the relevant analysis of policy orientation and technological innovation in Table 21: The policy orientation is significantly related to technological innovation, R&D investment capacity and innovation output capacity. Tax preference policies are significantly related to technological innovation, R&D investment capacity, and innovation output capacity. Government procurement policies are significantly related to technological innovation, R&D investment capacity, and innovation output capacity. Financial support policies are significantly related to technological innovation, R&D investment capacity, and innovation output capacity. For the relationship size and causality between policy orientation and technological innovation, further multiple regression analysis is required, as shown in Table 22.

Table 22 Multiple Regression Analysis Results of Policy Orientation and Technological Innovation

	Un-std. Coeff.		Std. Coeff.	t	Sig.
	β	Std. Error			
(constant)	-0.010	0.168		-0.058	0.953

TP	0.546	0.035	0.573	15.618	0.000
GP	0.276	0.029	0.317	9.448	0.000
FS	0.197	0.032	0.219	6.217	0.000

Note: the dependent variable is TE.

Table 23 Goodness of fit of Policy Orientation to Technological Innovation Model

R	R2	Adj. R2
0.821	0.674	0.671

Note: Predictors are (constant), TP, GP, FS.

From the multiple regression analysis of Table 22 policy orientation and technological innovation and the goodness of fit of Table 23 policy orientation on the impact model of technological innovation, it can be concluded that model R2 and adjusted R2 are 0.674 and 0.671 respectively, $F=223.529$, and the significance level is $P<0.001$. The regression of tax preference policies to technological innovation is significant, $P < 0.01$, and the regression coefficient is 0.546. H4a is supported. The regression of government procurement policies to technological innovation is significant, $P < 0.01$, and the regression coefficient is 0.276. H4b is supported. The regression between financial support policies and technological innovation is significant, $P < 0.01$, and the regression coefficient is 0.197. H4c is supported.

Relationship between Government Subsidies and Enterprise Performance

In this study, government subsidies are divided into two dimensions, namely non-selective government subsidies and selective government subsidies. This study divides enterprise performance into two sub dimensions: financial performance and market performance. This study also empirically studies the relationship between government subsidiaries and enterprise performance by using 329 valid sample data of questionnaires, and explores the relationship between government subsidiaries and enterprise performance, as shown in Table 24.

Table 24 Correlation Analysis Results of Government Subsidies and Enterprise Performance

	GS	NS	SG	EP	FP	MP
GS	1					
NS	0.891**	1				
SG	0.906**	0.616**	1			
EP	0.799**	0.820**	0.625**	1		
FP	0.719**	0.680**	0.616**	0.927**	1	
MP	0.763**	0.840**	0.542**	0.927**	0.719**	1

Note: *** means $P<0.001$; ** means $P<0.01$; * means $P<0.05$.

The following conclusions can be drawn from the correlation data in the above table: Government subsidiaries are significantly related to enterprise performance, financial performance and market performance. The non-selective government subsidies is significantly related to enterprise performance, financial performance and market performance. There is a significant correlation between the selected government subsidies and enterprise performance, financial performance and market performance. For the relationship size and causality between government subsidiaries and enterprise performance, further multiple regression analysis is required, as shown in Table 25.

Table 25 Multiple Regression Analysis Results of Government Subsidies and Enterprise Performance

	Un-std. Coeff.		Std. Coeff.	t	Sig.
	β	Std. Error			
(constant)	0.568	0.133		4.256	0.000
NS	0.684	0.038	0.701	18.047	0.000
SG	0.175	0.035	0.193	4.971	0.000

Note: the dependent variable is EP.

Table 26 Goodness of fit of Government Subsidies to Enterprise Performance Model

R	R2	Adj. R2
0.834	0.695	0.693

Note: Predictors are (constant), NS, SG.

From the multiple regression analysis of government subsidiaries and enterprise performance, it can be seen that the relationship model between government subsidiaries and enterprise performance has a good effect, in which $R^2=0.695$, $R^2=0.693$, $F=371.439$, and the significance level is $P<0.001$. The non-selective government subsidies has a significant regression on enterprise performance, $P < 0.001$, and the regression coefficient is 0.684. H1a is supported. The regression between selected government subsidies and enterprise performance is significant, $P < 0.001$, and the regression coefficient is 0.175. H1b is supported.

Relationship between Policy Orientation and Enterprise Performance

Based on the analysis of the second chapter and the above related theories, it can be concluded that there is a certain relationship between policy orientation and enterprise performance. In this study, policy orientation is divided into three dimensions: tax preference policies, government procurement policies, and financial support policies. This study divides enterprise performance into two dimensions: financial performance and market performance. This study also uses 329 valid sample data from questionnaires to empirically study the correlation between policy orientation and enterprise performance. Relevant analysis results are shown in Table 27.

Table 27 Correlation Analysis Results of Policy Orientation and Enterprise Performance

	PO	TP	GP	FS	EP	FP	MP
PO	1						
TP	0.801**	1					
GP	0.613**	0.279**	1				
FS	0.655**	0.406**	-0.043	1			
EP	0.721**	0.766**	0.294**	0.446**	1		
FP	0.649**	0.635**	0.271**	0.447**	0.927**	1	
MP	0.687**	0.785**	0.275**	0.379**	0.927**	0.719**	1

Note: *** means $P<0.001$; ** means $P<0.01$; * means $P<0.05$.

The following conclusions can be drawn from the correlation data in the above table: The policy orientation is significantly related to enterprise performance, financial performance and market performance. Tax preference policies are significantly related to enterprise performance, financial performance and market performance. Government procurement policies are significantly related to enterprise performance, financial performance and market performance. Financial support policies are significantly related to enterprise performance,

financial performance and market performance. For the relationship size and causality between policy orientation and enterprise performance, further multiple regression analysis is required, as shown in Table 28.

Table 28 Multiple Regression Analysis Results of Policy Orientation and Enterprise Performance

	Un-std. Coeff.		Std. Coeff.	t	Sig.
	β	Std. Error			
(constant)	0.185	0.194		0.955	0.340
TP	0.673	0.040	0.659	16.681	0.000
GP	0.111	0.034	0.118	3.279	0.001
FS	0.177	0.037	0.184	4.843	0.000

Note: the dependent variable is EP.

Table 29 Goodness of fit of Policy Orientation to Enterprise Performance Model

R	R2	Adj. R2
0.788	0.621	0.618

Note: Predictors are (constant), TP, GP, FS.

From the multiple regression analysis of policy orientation and enterprise performance, it can be concluded that the relationship model between policy orientation and enterprise performance has a good effect, in which $R^2=0.621$, adjusted $R^2=0.618$, $F=177.864$, and the significance level $P<0.001$. The regression between tax preference policies and enterprise performance is significant, $P < 0.001$, and the regression coefficient is 0.673. H2a is supported. The regression between government procurement policies and enterprise performance is significant, $P < 0.05$, and the regression coefficient is 0.111. H2b is supported. The regression between financial support policies and enterprise performance is significant, $P < 0.001$, and the regression coefficient is 0.177. H2c is supported.

Relationship between Technological Innovation and Enterprise Performance

In this study, technological innovation is subdivided into two dimensions: R&D investment capacity and innovation output capacity. This study subdivides enterprise performance into two dimensions: financial performance and market performance. In this study, 329 valid questionnaires were used for empirical research. First, the relationship between technological innovation and enterprise performance is analyzed, as shown in Table 30.

Table 30 Correlation Analysis Results of Technological Innovation and Enterprise Performance

	TE	RD	IO	EP	FP	MP
TE	1					
RD	0.909**	1				
IO	0.909**	0.654**	1			
EP	0.783**	0.758**	0.666**	1		
FP	0.708**	0.636**	0.652**	0.927**	1	
MP	0.744**	0.770**	0.582**	0.927**	0.719**	1

Note: *** means $P<0.001$; ** means $P<0.01$; * means $P<0.05$.

According to the correlation analysis results in Table 30, the relationship between technological innovation and enterprise performance is significantly related. For the relationship size and causality between technological innovation and enterprise performance, further multiple regression analysis is required, as shown in Table 31 and Table 32.

Table 31 Multiple Regression Analysis Results of Technological Innovation and Enterprise Performance

	Un-std. Coeff.		Std. Coeff.	t	Sig.
	β	Std. Error			
(constant)	0.669	0.151		4.426	0.000
RD	0.550	0.044	0.564	12.596	0.000
IO	0.289	0.044	0.297	6.625	0.000

Note: the dependent variable is EP.

Table 32 Goodness of fit of Technological Innovation to Enterprise Performance Model

R	R2	Adj. R2
0.791	0.625	0.623

Note: Predictors are (constant), RD, IO.

According to the results of multiple regression analysis, the regression model $R^2=0.625$, the adjusted $R^2=0.623$, $F=272.122$, and the significance level P value <0.001 . The above results show that the goodness of fit of the regression model is good. The regression between R&D investment capacity and enterprise performance is significant, $P<0.001$, and the regression coefficient is 0.55. H5a is supported. The regression between innovation output capacity and enterprise performance is significant, $P<0.001$, and the regression coefficient is 0.289. H5b is supported.

Mediation of Technological Innovation between Government Subsidies and Enterprise Performance

Description of research model:

Model 1: regression test between technological innovation and government subsidies.

Model 2: regression test between enterprise performance and government subsidiaries.

Model 3: government subsidies, technological innovation, and enterprise performance are simultaneously subject to regression tests.

Multivariate regression analysis was conducted for the above three models, as shown in Table 33.

Table 33 Multiple Regression Analysis of Government Subsidies, Technological Innovation and Enterprise Performance

	Model 1 (TE)	Model 2 (EP)	Model 3 (EP)
Government Subsidies	0.789***	0.836***	0.503***
Technological Innovation			0.423***
F	616.582***	579.002***	368.002***
R2	0.653	0.639	0.693
ΔR^2	0.652	0.638	0.691

Note: *** means $P<0.001$; ** means $P<0.01$; * means $P<0.05$.

It can be seen from Table 33 that, first of all, in Model 1, government subsidies have significant regression effects on technological innovation, R2 of the regression model is 0.653, R2 after adjustment is 0.652, F=616.582, indicating that the regression model is well fitted, and the regression coefficient $\beta=0.789$ ($P<0.001$), and H3 is verified. Secondly, in model 2, government subsidies have significant regression on enterprise performance, with R2=0.639, adjusted R2=0.638, and F=579.002, indicating that the regression model is well fitted, and the regression coefficient $\beta=0.836$ ($P<0.001$). H1 has been verified. Lastly, in model 3, when technological innovation is added as a mediator, the regression model R2=0.693, the adjusted R2=0.691, and F=368.002, indicating that the regression model fits well. However, the influence coefficient of government subsidies on enterprise performance decreases from model 2's coefficient $\beta=0.836$ ($P<0.001$) to model 3's coefficient $\beta=0.503$ ($P<0.001$), which indicates that technological innovation plays a partial intermediary role in the relationship between government subsidies and enterprise performance. The ratio of mediating effect to total effect is $0.789 * 0.503 / 0.836 * 100\% = 47.5\%$, so H6 is verified.

Mediation of Technological Innovation between Policy Orientation and Enterprise Performance

Description of research model:

Model 1: regression test between technological innovation and policy orientation.

Model 2: regression test between enterprise performance and policy orientation.

Model 3: policy orientation, technological innovation, and enterprise performance are used together for regression testing.

Multivariate regression analysis was conducted for the above three models, as shown in Table 34.

Table 34 Multiple Regression Analysis of Policy Orientation, Technological Innovation and Enterprise Performance

	Model 1 (TE)	Model 2 (EP)	Model 3 (EP)
Policy Orientation	1.051***	1.019***	0.375***
Technological Innovation			0.613***
F	567.373***	353.199***	288.226***
R2	0.634	0.519	0.639
ΔR2	0.633	0.518	0.637

Note: *** means $P<0.001$; ** means $P<0.01$; * means $P<0.05$.

It can be seen from Table 34 that, first of all, in Model 1, policy orientation has significant effect on technological innovation regression, R2 of the regression model=0.634, adjusted R2=0.633, F=567.373, indicating that the regression model is well fitted, and the regression coefficient $\beta=1.051$ ($P<0.001$), H4 is verified. Secondly, in model 2, the policy orientation has significant regression on enterprise performance. The regression model R2=0.519, the adjusted R2=0.518, and F=353.199 indicate that the regression model is well fitted, and the regression coefficient $\beta=1.019$ ($P<0.001$). H2 has been verified. Therefore, in the mediation test, the relationship between independent variable and mediator and dependent variable is significant. Finally, in model 3, when technological innovation is added as a mediator, the regression model R2=0.639, the adjusted R2=0.637, and F=288.226, indicating that the regression model fits well. However, the influence coefficient of policy orientation on enterprise performance decreased from model 2's coefficient $\beta=1.019$ ($P<0.001$) to model 3's coefficient $\beta=0.375$ ($P<0.001$), indicating that technological innovation played a part of intermediary role in the

relationship between policy orientation and enterprise performance. The ratio of mediating effect to total effect is $1.051 * 0.375 / 1.019 * 100\% = 38.7\%$, so H7 is verified.

Conclusion

The impact of government support on enterprise performance is a popular direction in the current research, and the research has made many achievements. However, in general, the relevant research theories are not very mature, especially the relevant empirical research in the Chinese context has a lot of research space (Ba et al. 2022). Moreover, few studies have explored the impact mechanism of high-tech enterprises' government support on enterprise performance, lacking relevant empirical analysis and providing useful reference for enterprise development and government policy formulation (Brown et al. 2020; Bei et al. 2022). Therefore, this study takes high-tech enterprises in Guangdong province as the research object, and constructs a model framework of "government subsidies and policy orientation - technological innovation - enterprise performance" through literature review and theoretical research, which not only collates previous studies, but also makes new research breakthroughs. Therefore, based on the summary of empirical results, this study can draw the following conclusions: First, non-selective government subsidies and selective government subsidies are conducive to the improvement of technological innovation level of enterprises. Second, tax preference policies, government procurement policies, and financial support policies help enhance the enterprise's technological innovation capabilities. Third, non-selective government subsidies and selective government subsidies can jointly promote the performance of high-tech enterprises. Fourth, building support based on diversified policies is the power to improve enterprise performance. Fifth, technological innovation affects the high-quality development of high-tech enterprises. Sixth, technological innovation affects the path of government subsidiaries to improve enterprise performance. Seventh, play the intermediary role of technological innovation in policy orientation to improve enterprise performance (Akam et al.).

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