The Influence Mechanisms of Policy Guidance on the Innovation Performance of Enterprises: A Case Study on High-Technology Shipbuilding Enterprises

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Abstract. Overnment policy guidance plays a pivotal role in promoting supply, driving demand, shaping the environment, and other aspects of enterprise development. Research on the impacts of policy guidance helps governments to implement precise policies and provide policy bases for the innovation and development of enterprises. By combining the innovation characteristics of high-tech shipbuilding enterprises in China, we constructed a model of the influence factors of government policy guidance on the innovation performance of enterprises from the perspectives of innovation planning, research and development (R&D), and industrialization. We used the original innovation capability of enterprises as the mediating variable and empirically studied the influence mechanisms of policy guidance on the innovation performance of high-tech shipbuilding enterprises by collecting data from domestic high-tech shipbuilding enterprises. Finally, from these research findings, we systematically propose policy suggestions for improving the innovation performance of high-tech shipbuilding enterprises in China in terms of innovation planning, R&D and industrialization.

Keywords: Policy guidance · Innovation performance · High-tech shipbuilding enterprises · Influence mechanisms

1 Introduction

With the development of trade globalization, innovation capability has started receiving more and more attention at all levels. The core of innovation is the comprehensive competitiveness of an enterprise based on the effective integration of its own resources, which reflects the comprehensive quality of the enterprise. Companies with innovation cores often have high levels of R&D, resources, management, and a good innovation atmosphere. As a result, enterprises can have sufficient opportunities for trial and error under superior financial and environmental conditions, thus enhancing their autonomy, ensuring their survival and development. Innovative companies have clearly defined phases and project goals in the R&D process, and precise management rules that enable

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efficient communication among R&D personnel and effective collaboration between different functions. In addition, innovative companies have a culture that encourages innovation, which effectively promotes communication and accelerates the innovation of organizational structure and incentives. On this basis, innovative companies can seek new breakthroughs in their fields, thus diversifying their products, improving quality, reducing production costs, and supplying the market with products that offer advantages in terms of price, quality, and performance.

However, technological innovations do not only rely on traditional internal R&D, but many enterprises also choose to seek help from external resources to break through technological barriers through R&D innovation methods, such as technology introduction. In China, government policy guidance plays a pivotal role in promoting supply, driving demand, and shaping the environment. Government departments at all levels vigorously promote the innovation development of enterprises through various policy "combinations" [1]. From a global perspective, research on R&D policy has focused on both macro and micro aspects. On the one hand, scholars discuss the excitation and crowding-out effects of public R&D on private R&D at the micro level and conduct empirical investigations on the efficiency of private sector R&D subsidies [2]. On the other hand, researchers discuss the impact of R&D policy on economic growth from the macro level [3].

Although a certain research base has been developed, most of it has focused on the impacts of R&D innovations as a whole on innovation performance or the differential impacts on innovation performance. Very little attention has been paid to the complete policy transmission of R&D innovations and the impacts of specific R&D innovation pathways on innovation performance. It is worth paying attention to the fact that High-tech ships play crucial roles in the development of marine economies and have been the development focus of the upgrading and transformation of China's shipbuilding industry. "High-tech ship" is a general term for various types of ships that were designed and manufactured to house various high-tech, special and cutting-edge technologies, mainly including liquefied natural gas (LNG) vessels, liquefied petroleum gas (LPG) vessels, ro-ro vessels, multipurpose vessels, and luxury cruise ships, among others. However, there is a lack of empirical research on the current situation of R&D innovation in high-tech shipbuilding enterprises in China. Based on this, we conducted an empirical study on the policy guidance processes that influence enterprise innovation performance by constructing a model of government policy guidance–enterprise original innovation capability–enterprise innovation performance, analyzing the key influencing factors of policy guidance on the original innovation capabilities of high-tech shipbuilding enterprises and enterprise innovation performance and exploring the influence mechanisms of policy guidance on the innovation performance of high-tech shipbuilding enterprises.

2 Method

2.1 Study Hypotheses

Chinese and foreign scholars have conducted various studies on government policies and proved that each of them can affect the innovation capabilities and innovation performance of enterprises to a greater or lesser extent. The innovation activities of enterprises

span the complete chain of conceptual design, technological development, results in transformation, and production and sales, which correspond to four key innovation links, namely, technological innovation planning, research and development, industrialization activity, and innovation output [4]. On this basis, government policies are categorized as innovation planning policies, research and development policies, and industrialization policies, which correspond to the innovation processes of enterprises from technological innovation planning to industrialization activities. To explore the possible effects of each type of policy on the innovation performance of firms, we proposed the following hypotheses:

(H1) Government innovation planning policies can significantly contribute to the innovation performance of firms;

(H2) Government R&D policies can significantly contribute to the innovation performance of firms;

(H3) Government industrialization policies can significantly contribute to the innovation performance of firms.

Technological innovation does not only rely on traditional internal R&D. With the development of world science and technology and the exchange of economic and trade activities on a global scale, the product development cycle has been shortened and updated at a faster pace, while the cost of R&D has also been increasing. The traditional manufacturing model can hardly adapt to the rapid changes in the global market. Many multinational enterprises have also set up R&D institutions in developing countries, changing from the original labor-intensive production and processing to capital and technology-intensive R&D production, and R&D innovation is constantly developing in the direction of globalization.

However, the difference between original innovations and general technological innovations lies in the external effects that are specific to the innovation processes. The results of original innovations are discoveries or inventions that have not been seen before, so original innovation often implies the qualitative development of science and technology [5]. Because of the externality of original innovations, there are differences between the benefits for the innovation subjects and those for society and it is difficult to generate direct economic benefits from many original innovations, so they need the guidance and support of government policies [6]. The existing literature has also demonstrated that policies have significant effects on the innovation capacities of firms. Based on this, we proposed the following hypotheses:

(H4) Government innovation planning policies are positively correlated with the original innovation capabilities of firms;

(H5) Government research and development policies are positively correlated with the original innovation capabilities of firms;

(H6) Government industrialization policies are positively correlated with the original innovation capabilities of firms.

The original innovation capability of a company is the core of its technological innovation. An increase in original innovation capability means the use of new processes and technologies that reduce the costs of production. In addition, innovation capability enables firms to produce better and more marketable products that bring higher profits [7].

At this level, the innovation performance of firms can be enhanced. Thus, we formulated Hypothesis 7 and the corresponding sub-hypotheses:

(H7) The original innovation capabilities of firms contribute significantly to their innovation performance;

(H7a) The original innovation capabilities of firms have mediating effects on the relationships between innovation planning policies and the innovation performance of firms;

(H7b) The original innovation capabilities of firms have mediating effects on the relationships between research and development policies and the innovation performance of firms;

(H7c) The original innovation capabilities of firms have mediating effects on the relationships between industrialization policies and the innovation performance of firms.

The external research horizons of firms have limitations and due to limited resources, it is unlikely that firms can have sufficient capacities to handle all external opportunities. Based on this status quo, government departments often provide intermediary services to firms within certain geographical areas and can be considered as repositories of information, knowledge, and opportunities within that region, thereby providing entry to various local networks [8]. The formulation of various government regulations through the implementation of policies invisibly affects business and innovation environments for enterprises. Therefore, the higher the degree of government policy implementation, the stronger the regulations, the higher the efficiency of the administration and the more that policy can promote the release of policy effects and stimulate the innovation enthusiasm of enterprises. [9] Based on this, we proposed the following hypotheses:

(H8) Government involvement positively affects the relationships between innovation planning policies and the innovation performance of firms, i.e., the effects of innovation planning policies on the innovation performance of firms increase with greater government involvement;

(H9) Government involvement positively affects the relationships between research and development policies and the innovation performance of firms, i.e., the effects of research and development policies on the innovation performance of firms increase with greater government involvement;

(H10) Government involvement positively affects the relationships between industrialization policies and the innovation performance of firms, i.e., the effects of industrialization policies on the innovation performance of firms increase with greater government involvement.

Based on the above hypotheses, a conceptual relationship model was constructed (Fig. 1).

2.2 Variable Design and Measurement

(1) Dependent variable: firm innovation performance. Enterprise innovation performance was mainly measured in terms of the number of patents and new product sales. On the one hand, innovative companies are always the first to launch new products in the industry, and the market share of their new products will continue to increase, and the sales revenue of new products will account for a higher and higher proportion of total sales. On the other hand, the number of patents also reflects the

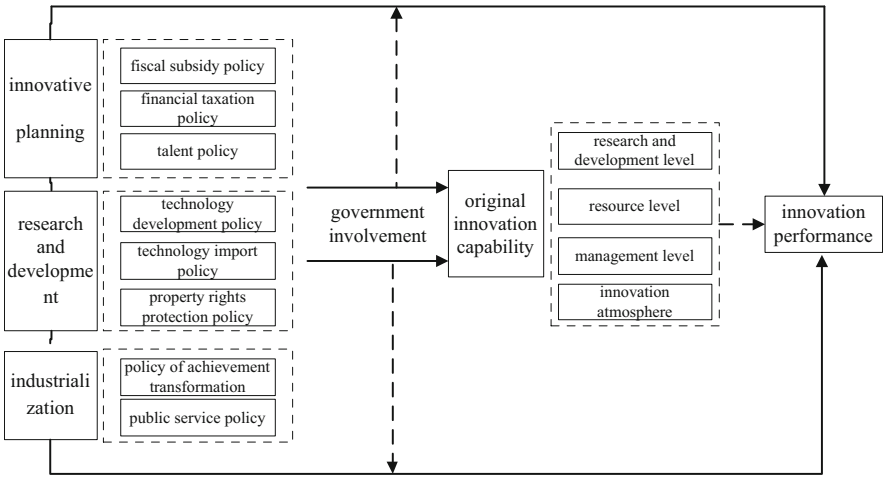

Fig. 1. Our government policy guidance–firm original innovation capability–firm innovation output model. [self-drawn]

innovation performance to a certain extent. Innovative companies will continue to produce new patents in the process of R&D and innovation, and thus the number of patent applications and scientific papers published by the company will increase, and even receive scientific and technological awards.

(2) Independent variables: government policies. Based on the theories of Liu, government policies were divided into innovation planning policies, research and development policies and, industrialization policies [4]. Among them, innovation planning policies are mainly involved in the initial planning stages of R&D and innovation activities. Research and development policies mainly assist in the research and development stages of R&D innovation. The role of industrialization policies is mainly to promote the transformation of R&D results into productivity.

(3) Mediating variable: firm original innovation capability. The original innovating ability was divided into R&D level, resource level, management level and innovation atmosphere. The R&D level is the core and foundation of original innovations and it is only through R&D that enterprises can transform new technologies into new products. The resource level represents all of the resources that enterprises can use for original innovations. The management level is mainly reflected by innovation strategies, innovation encouragement mechanisms, and project implementation capabilities. A good innovation atmosphere can provide effective environmental support for enterprises to ensure that the original innovation activities can be carried out in an orderly environment.

(4) Moderating variable: government involvement. The implementation of government policies and the level of management services were used to consider the degree of government involvement, where the implementation of policies was measured by the implementation of various government subsidies and the ease of application procedures and the level of government management services was measured by

the government-led construction of comprehensive service platforms for the shipbuilding industry and the government's ability to effectively maintain the market environment of the industry.

(5) Control variables: The established literature has usually used the basic information of enterprises and the characteristics of enterprise leaders as the control variables. On this basis, enterprise category, enterprise size, enterprise age, R&D personnel ratio, and the education level of the enterprise leader were selected as the control variables to be studied.

2.3 Sample and Data Collection

Our questionnaire mainly consisted of sections on basic enterprise information, enterprise technological innovation, government policy support, and enterprise innovation performance. Executives from high-technology shipbuilding enterprises and government supervisors were consulted during the questionnaire design process to further improve the content of the questionnaire and ensure its applicability to the management behavior of the government and enterprises in the current Chinese context and ensure that the questions were set by the actual situation of enterprises.

A combination of random and non-random sampling was used to distribute the questionnaires to high-technology shipbuilding enterprises and relevant research institutions across China, mainly including enterprises that use leading high-tech shipbuilding technologies. The research institutions mainly included the China Shipbuilding Engineering Society, the Jiangsu University Collaborative Innovation Center of High-tech Ships, and more. Middle and senior managers and R&D personnel from the enterprises were mainly used as the survey subjects to ensure the reliability and validity of the completed questionnaires. The data were collected in two ways: firstly, executives and technical personnel from the high-tech shipbuilding enterprises were invited to fill in the questionnaire in person; secondly, emails were randomly sent to high-tech shipbuilding enterprises to explain the research needs and invite them to fill in the questionnaire online. The survey lasted for 2 months and 350 questionnaires were distributed, 220 of which were collected. In total, 215 questionnaires were valid after excluding those that were not completed correctly or fully, with an effective response rate of 61.4%.

3 Results

3.1 Reliability and Validity Tests

Reliability analysis was conducted using Cronbach's α (Cronbach's alpha) to test the reliability and stability of the questionnaire. The Cronbach's α for the latent variables was greater than 0.7, indicating that the scale had a good internal consistency and a high degree of reliability. A validity analysis was conducted using combined reliability (CR), and average variance extracted (AVE) to test the effects of the study variables. The effects were accepted when the combined reliability (CR) was greater than 0.8 and the average variance extracted (AVE) was greater than 0.5.

Table 1. Reliability and validity tests. [self-drawn]

Latent variables	Cronbach's α	CR	AVE
Financial subsidy policy	0.847	0.816	0.526
Financial taxation policy	0.820	0.820	0.532
Talent policy	0.842	0.837	0.563
Technology development policy	0.849	0.838	0.565
Technology import Policy	0.857	0.861	0.608
Property rights protection policy	0.860	0.832	0.553
Policy of achievement transformation	0.874	0.841	0.570
Public service policy	0.864	0.835	0.560
R&D level R&D level	0.885	0.859	0.505
Resource level	0.904	0.893	0.545
Management level	0.872	0.857	0.500
Innovation atmosphere	0.875	0.863	0.560
Government involvement	0.857	0.853	0.594
Innovation performance	0.899	0.889	0.535

The Cronbach's α, combined reliability (CR) and average variance extracted (AVE) for each factor were tested for reliability using SPSS 28.0 software, as shown in Table 1. It can be seen that Cronbach's α and the combined reliability (CR) of the scale were greater than 0.8, which indicated that the scale had good internal consistency and convergence. The validation factor analysis was conducted using SPSS 28.0 and AMOS 24.0 software. The results showed that the minimum value of the factor loadings in the latent variables was 0.649 and the maximum value was 0.828 (all factor loadings were significant at the 0.001 level) and that the AVE values of all latent variables were greater than 0.5, indicating that the scale had good construct validity. The KMO testing of the valid samples was conducted using the SPSS 28.0 software and showed that the overall KMO value of the formal scale was 0.891, which passed Bartlett's test ($p < 0.001$) and indicated that the scale has high construct validity.

3.2 Hypothesis Testing

As shown in Table 2, the regression analysis results for each variable were divided into 14 models. Models 1 to 4 analyzed the influence of independent variables on original innovation ability after adding the control variables and three types of policies, respectively. Models 4 to 14 analyzed the influence of policy guidance and original innovation ability on innovation performance, as well as testing the mediating and moderating effects.

(1) Hypotheses 1, 2 and 3 were verified and there were significant positive relationships between innovation planning policies, research and development policies,

industrialization policies and enterprise innovation performance. From the regression results of Model 5, the correlation coefficient between innovation planning policies and enterprise innovation performance was 0.512 ($P < 0.01$), indicating a significant positive relationship. Models 7 and 9 showed that there were significant positive relationships between research and development policies and innovative performance and industrialization policies and innovation performance, with correlation coefficients of 0.429 ($P < 0.01$) and 0.397 ($P < 0.01$), respectively. In comparison, government innovation planning policies offered larger contributions to the innovation performance of firms.

(2) Hypotheses 4, 5 and 6 were verified and showed significant positive correlations between innovation planning policies, research and development policies, industrialization policies and the original innovation capabilities of enterprises. From the analysis results of Model 2, there was a significant positive correlation between innovation planning policies and the original innovation capabilities of firms after adding the control variables, with a correlation coefficient of 0.667 ($p < 0.01$). Similarly, Models 3 and 4 showed the significant positive effects of research and development policies and industrialization policies on the original innovation capabilities of firms, with correlation coefficients of 0.681 ($P < 0.01$) and 0.670 ($P < 0.01$), respectively. However, research and development policies played more prominent roles in improving the original innovation capabilities of firms.

(3) Hypothesis 7 was verified and showed a significant positive correlation between the original innovation capabilities of enterprises and their innovation performance. Model 11 was used to analyze the impact of original innovation capability on innovation performance and produced a correlation coefficient of 0.49 ($p < 0.01$), which proved that the original innovation capabilities of enterprises could contribute to improving their innovation performance.

(4) Hypotheses 7a, 7b and 7c were tested and showed that the original innovation capabilities of firms, as the mediating variable, positively affected the relationships between policies and firm innovation performance. Model 12 showed that the effects of innovation planning policies on innovation performance decreased significantly after the inclusion of original innovation capability. The correlation coefficient decreased from 0.512 ($p < 0.01$) to 0.333 ($p < 0.01$) using Model 5, which proved that the original innovation capabilities of firms had mediating effects on innovation planning policies and the dependent variable. Similarly, Models 13 and 14 also showed that after adding original innovation capability, the correlation coefficients between R&D policies, industrialization policies and innovation performance decreased from 0.429 ($P < 0.01$) and 397 ($P < 0.01$) to 0.181 ($P < 0.05$) and 0.126 using Model 7 and Model 9, respectively. This indicated that the original innovation capabilities of firms also had mediating effects on R&D policies, industrialization policies and the dependent variable.

(5) Hypotheses 9 and 10 were tested and showed that government involvement, as a moderating variable, positively affected the relationships between policies and firm innovation performance. Models 6, 8 and 10 were used to show the interaction effects of innovation planning policies, research and development policies and industrialization policies through government involvement in firm innovation performance. Model 6 indicated that the correlation coefficient between innovation

planning policies via government involvement and firm innovation performance was 0.177 ($p < 0.01$), which was significantly positively correlated. Additionally, the R^2 value of Model 6 significantly increased by 0.026, which indicated that the greater the government involvement, the more significant the positive relationship between innovation planning policies and firm innovation performance. Hypothesis 8 also passed this test. Similarly, the analysis results of Models 8 and 10 also indicated that research and development policies and industrialization policies had significantly positive effects on firm innovation performance via government involvement, with correlation coefficients of 0.329 ($p < 0.01$) and 0.431 ($p < 0.01$), respectively. Additionally, the R^2 values of Models 8 and 10 increased by 0.039 and 0.056, respectively, which indicated that the greater the government involvement, the more significant the correlations between R&D policies, industrialization policies and the innovation performance of enterprises.

Table 2. Multiple regression analysis among study variables. [self-drawn]

variable		Innovation performance						
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Control variables	Business category	0.074	0.002	0.086	0.068	0.015	0.008	0.051
	The enterprise scale	0.064	0.052	0.095	0.000	0.068	0.071	0.040
	Length of establishment	0.013	0.072	0.011	0.103	0.037	0.035	0.024
	Leader's degree	0.074	0.054	0.042	0.074	0.000	0.002	0.005
	Percentage of R&D staff	0.071	0.021	0.017	0.081	0.073	0.081	0.077
The independent variables	Innovation planning policy		0.667^{***}			0.512^{***}	0.304^{***}	
	Research and development policy			0.681^{***}				0.429^{***}
	Industrialization policy				0.67^{***}			
	Original innovation capability							
Product item	Innovation planning policy × government participation						0.261^{***}	
	Research and development policy × government participation							

(*continued*)

Table 2. (*continued*)

variable		Innovation performance						
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	Industrialization policy × government participation							
	F	0.958	29.098***	32.276***	30.175***	12.827***	12.421***	8.51***
	R squared	0.022	0.456	0.482	0.465	0.270	0.296	0.197
	Adjusted R squared		0.441	0.467	0.450	0.249	0.272	0.174
variable		Innovation performance						
		Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
Control variables	Business category	0.059	0.040	0.057	0.007	0.015	0.020	0.012
	The enterprise scale	0.046	0.097	0.095	0.090	0.082	0.074	0.097
	Length of establishment	0.018	0.045	0.034	0.015	0.018	0.020	0.003
	Leader's degree	0.009	0.015	0.004	0.021	0.015	0.020	0.015
	Percentage of R&D staff	0.090	0.117*	0.125*	0.076	0.067	0.071	0.084
The independent variables	Innovation planning policy					0.333***		
	Research and development policy	0.167*					0.181**	
	Industrialization policy		0.397***	0.036				0.126
	Original innovation capability				0.490***	0.268***	0.365***	0.405***
Product item	Innovation planning policy × government participation							
	Research and development policy × government participation	0.329***						
	Industrialization policy × government participation			0.431***				
	F	9.156***	7.099***	8.612***	11.49***	13.231***	10.72***	10.254***
	R squared	0.236	0.170	0.226	0.249	0.309	0.266	0.257
	Adjusted R squared	0.211	0.146	0.199	0.227	0.286	0.241	0.232

Note: *** $P < 0.01$; ** $P < 0.05$; * $P < 0.1$.

Table 3. The results of the policy-guided decomposition effect regression analysis. [self-drawn]

variable		Model								
		1	2	3	4	5	6	7	8	9
Control variables	Business category	0.043	0.001	0.027	0.015	0.071	0.031	0.040	0.033	0.049
	The enterprise scale	0.059	0.077	0.080	0.046	0.039	0.042	0.065	0.047	0.124
	Length of establishment	0.009	0.019	0.025	0.006	0.001	0.017	0.032	0.018	0.038
	Leader's degree	0.015	0.012	0.038	0.001	0.000	0.020	0.034	0.039	0.011
	Percentage of R&D staff	0.111	0.097	0.103	0.081	0.085	0.078	0.116*	0.115*	0.115*
The government's policy	Financial subsidy policy		0.441***							
	Financial taxation policy			0.416***						
	Talent policy				0.264***					
	Technology development policy					0.302***				
	Technology import policy						0.317***			
	Property rights protection policy							0.326***		
	Policy of achievement transformation								0.327***	
	Public service policy									0.333***
	F	0.615	8.982***	7.917***	3.098***	4.020***	4.398***	4.712***	4.717***	4.832***
	R squared	0.015	0.206	0.186	0.082	0.104	0.113	0.120	0.120	0.122
	Adjusted R squared		0.183	0.162	0.056	0.078	0.087	0.094	0.094	0.097

Note: *** $P < 0.01$; ** $P < 0.05$; * $P < 0.1$.

The results of Models 1 to 9, as shown in Table 3, indicate the effects of each policy measure on the innovation performance of enterprises. Overall, eight different types of policies showed positive correlations with the innovation performance of high-tech shipbuilding enterprises and the magnitude of the β coefficient showed that there were some differences in the effects of each policy. The effects of financial subsidy policies ($\beta = 0.441$; $P < 0.01$) and financial taxation policies ($\beta = 0.416$; $P < 0.01$) on the innovation performance of high-tech shipbuilding enterprises were the most significant, followed by public service policies ($\beta = 0.333$; $P < 0.01$), talent policies ($\beta = 0.264$; $P < 0.01$) and technological development policies ($\beta = 0.302$; $P < 0.01$), which had the weakest relative effect on innovation performance.

4 Discussion and Conclusions

4.1 Research Conclusions

(1) Various government innovation policies could promote the innovation processes of high-technology shipbuilding enterprises, but there were differences in the implementation effects. The results showed that innovation planning policies, research and development policies, and industrialization policies all had significant promotion effects on the innovation performance of high-tech shipbuilding enterprises and that the promotion effects of innovation planning policies were the most obvious. Focusing on specific policies, public service policies played the most significant roles in enhancing the innovation performance of high-tech shipbuilding enterprises, except for financial subsidies and financial and taxation policies.
(2) The mediating role of enterprise original innovation capability was obvious, and government policy guidance could enhance the original innovation capabilities of high-tech shipbuilding enterprises and, in turn, enterprise innovation performance. All types of policy guidance could promote improvements in enterprise original innovation capability and enterprise original innovation capability played a mediating role between policy guidance and innovation performance. Enterprise original innovation capability had the strongest mediating role between industrialization policies and innovation performance.
(3) The transmission processes of government policy guidance for the innovation performance of enterprises were directly influenced by the degree of government involvement. Improvements in the innovation performance of high-technology shipbuilding enterprises were also regulated by the degree of government involvement. The degree of the government implementation of various innovation policies and the degree of government participation in the processes of policy implementation directly affected the innovation processes of high-tech shipbuilding enterprises.

4.2 Management Inspiration to Improve the Innovation Performance of High-Tech Shipbuilding Enterprises

(1) Focus on the key areas of industrial development, improve innovation investment mechanisms and continue to strengthen financial subsidies and preferential taxation policies.

At present, the innovation of high-technology shipbuilding enterprises in China depends on direct financial support from the government, resulting in a one-way channel of innovation investment. It is necessary to establish innovation investment mechanisms with enterprises as the main bodies and all kinds of social capital sources to broaden the channels of R&D innovation investments, fully mobilize the subjective initiatives of enterprise R&D innovation, and make up for the lack and insufficiency of government financial support

(2) Integrate innovation resources and enhance the core competitiveness within the industry

We need to integrate innovation resources; make up for the lack of investments in human, financial and material resources in R&D processes and innovation via

strong policy support; and guide the reasonable allocation of resources. By focusing on improving innovation talent services, the role and status of outstanding talent in innovation and R&D processes could be improved. At the same time, integrating ship manufacturing with information technology could bring about technological breakthroughs in multiple fields and from angles, realize green and intelligent products and high-end product structures, and aid in the development of high-technology value-added ships, super energy-saving and environmentally friendly ships and intelligent ships, as well as further promoting the transformation and reform of the high-technology shipbuilding industry.

(3) Enrich the modes of technological innovations and improve the efficiency of technological industrialization

The government sets the rules of competition to boost technological industrialization. While taking into account the interests of traditional enterprises, the government appropriately leans toward advanced technology enterprises to speed up technological processes, from the completion of R&D to mass production, so as to guarantee the benign development and metabolism of the whole industry. When enterprises have problems that affect their innovation processes, such as shortages of funds or damaged property rights, the government could provide policy-level assistance. Under the guidance of systematic industrial policies, enterprises could carry out complete R&D and innovation activities, thus improving the production level of the industry.

(4) Optimize the innovation environments of high-tech shipbuilding enterprises

Optimizing the performance of government public service functions could strengthen the construction of innovation platforms in the high-tech shipbuilding industry and promote the efficient combination of industry, universities, and research. As the creator of innovation environments and the guide of innovation rules, the government should pay attention to the planning and implementation of public service policies, better perform public service functions, improve the consciousness of the "service government", build a service-oriented government, strengthen the guidance and incentives for the innovation performance of the high-tech shipbuilding industry and promote the effective cooperation between different social divisions of labor, such as the industry, university and research combination.

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