

The SWOT-PEST Analysis of the Construction of Incentive System for State-owned Enterprises' Scientific Researchers[§]

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Abstract. Analyse the internal micro-environment and external macro-environment factors which the construction of the scientific research personnel incentive system faces by the way of SWOT-PEST analysis method. Construct a SWOT-PEST analysis matrix to systematically analyze the strengths and weaknesses of the scientific research personnel incentive system in terms of politics, economy, society, and technology. Find the opportunities and risks which the scientific person faced, and solve the incentive system for scientific research person.

1. Instruction

With the continuous deepening of the concept of innovation and the promotion of a large number of incentives to promote the release of innovation policies, the status and importance of technological innovation has become increasingly prominent. Companies in all countries attach great importance to scientific and technological innovation, but among them, scientific researchers who are the main driving force for scientific and technological innovation have not yet been effectively motivated. This study combines SWOT analysis with PEST analysis, from the political, economic, social and technological perspectives. On the other hand, it comprehensively analyzes the situation and environment facing the construction of the incentive system for state-owned enterprise scientific research personnel and provides reference and basis for establishing and improving the incentive system.

Table 1. SWOT-PEST Analysis Matrix for the Construction of Incentive System for State-owned Enterprises' Researchers

	Politics	Economy	Society	Technology
Strengths	In line with the situation	Improve efficiency	Improve social responsibility	With basic conditions
Weaknesses	lack of concern	Earnings are hard to measure	Affect the overall atmosphere	Incentives are too single
Opportunities	Policy Support	Good economic foundation	State-owned enterprise reform	Can learn from experience
Threats	Incomplete policy system	Lack of results transformation	Responsibility for pay issues	Incentives cannot be implemented



2. Strengths

From a political perspective, the development of scientific research personnel incentives is the trend of the times, in line with the development direction of the country to implement innovation-driven development strategy and the overall situation. Scientific research personnel are the main body of technological innovation and the key to the construction of an innovative country. The overall quality of scientific research teams fundamentally determines the level of technological development. The direction of development and speed of scientific and technological innovation As an important support for state development, state-owned enterprises play an important role in scientific and technological innovation, and their contributions cannot be underestimated. In recent years, the national government and various ministries and commissions have also introduced a large number of incentives for scientific research personnel, and through the use of incentives in state-owned enterprises to implement trials and other means to seek effective ways of encouraging researchers. Promoting scientific research personnel and establishing incentive systems and mechanisms for scientific research personnel in state-owned enterprises are in line with the government's policy orientation and development trends.

From the perspective of economy, the soundness and perfection of scientific research personnel's incentive mechanism plays an important role in stimulating the vitality of researchers and improving the economic efficiency of enterprises. The core competitiveness of an enterprise lies in the value, scarcity, irreplaceability, and imitation of its comprehensive capabilities. The acquisition and maintenance of these characteristics must be based on the company's continuous innovation. Through an effective incentive mechanism to enhance the overall vitality of the scientific research team, it can more fully release the creativity of researchers, provide new products that are closer to the market demand, reduce production costs and other hardware, as well as optimize the management process, achieve lean management and other software aspects create greater value for the company.

From the perspective of society, the utilization of the social responsibility of state-owned enterprises depends on the overall level of innovation work and is closely related to the construction of incentive systems for scientific research personnel. As an important force for strengthening the overall national strength, promoting economic and social development, and ensuring the improvement of people's livelihood, state-owned enterprises must also pay attention to satisfying the common interests of the society and undertaking certain political responsibilities and social responsibilities while pursuing their own economic interests. Through appropriate incentives to arouse the innovative vitality of researchers, they can play a greater role in creating new ways to reform corporate production methods, improve people's lifestyles, and extend the coverage of results, creating more value for society and the people's livelihood. The products provide more development ideas that are beneficial to the development of the country and society, and provide important support for the promotion of sustainable economic and social development and development results that benefit people's livelihood.

From the technical perspective, most state-owned enterprises have formed a relatively complete human resources management system and institutional system, and have the basic conditions for establishing an incentive system for researchers. Incentives, as an important part of human resource management, are closely related to job creation, performance management, and compensation management. Economic incentives, which are used as basic incentives, are generally based on job or performance standards, and are often paid in the form of remuneration. At present, the modern enterprise management system promoted by the government is well implemented in state-owned enterprises. Most of the enterprise's system systems are relatively complete, which satisfies the needs for scientific researchers to provide standard basis for incentives and ensure the realization of rights. On the other hand, the scientific research personnel incentive system is an important part of the human resources management system. Its development not only reversely promotes the soundness and standardization of the human resources module, but also provides a sample for the establishment and improvement of other employee group incentive mechanisms. Promote the overall level of human resources management work.

3. Weaknesses

From the political perspective, some state-owned enterprises have not yet realized the importance of scientific research personnel's incentives. The soundness of the system and the implementation of incentives have not risen to the height of the company. The scientific research work itself is a forward-looking work. The content and results of its research are often not necessarily immediately put into use, or can not be seen in a short time after being put into use. Therefore, the researcher's pay is often overlooked. Or was mistaken for not being able to bring enough benefits to the company. Such misunderstandings have caused the company's operating personnel to believe that there is no need to motivate researchers, and thus lack of initiative in the construction of incentive systems and related incentive systems, and delaying exploration of related work. Due to the lack of support from upper-level personnel, most state-owned enterprises have not been able to form independent incentive systems for scientific researchers. In addition to the same incentives for performance as most of the personnel in the enterprise, as well as a small amount of scientific research awards and other spiritual incentives, Almost no other incentive can be enjoyed.

From an economic perspective, the value evaluation of scientific research results still lacks appropriate standards, and the benefits cannot be accurately measured, making the incentive for scientific researchers lack standards and evidence. The transformation mechanism for hard scientific research achievements is not perfect, and there are no results conversion channels. The results of soft scientific research cannot be transformed into achievements, lack of substantive transformation results, etc., and the results of scientific research personnel can hardly be measured in the same way as other jobs with the operating benefits of enterprises. The incentive standards naturally have no definition. Especially when carrying out mid-to-long-term incentives such as equity dividends, the problem of lack of standards is particularly acute. For instance, when equity incentives are implemented, it is impossible to determine the amount of their shareholdings based on the contributions of scientific researchers, nor can they be valued in accordance with the value of scientific research; When the project is divided into dividends, the dividend amount cannot be calculated proportionally because the project has no revenue or income to estimate. Scientific research results have not actually translated into economic returns of enterprises, or have been transformed into hidden profits of enterprises that are difficult to measure. As a result, researchers are only able to obtain benefits based on traditional pay systems, and they lack scientific research projects with long time spans and slow conversion of results. Research enthusiasm is not conducive to the long-term development of scientific research.

From the perspective of society, due to the restrictions on total salary and the internal system of the company, individually strengthening the incentives of scientific researchers may affect the overall atmosphere within the company. Internally, because the total salary of state-owned enterprises is strictly controlled, the increase in incentives for scientific researchers will inevitably increase the proportion of total wages, which will affect the income of other employees. In addition, the contribution of researchers is mostly implicit earnings are not easy to quantify, so increasing the motivation of scientific researchers may weaken the sense of internal employees, not only affects the corporate image of the enterprise, but also may cause morale problems in the enterprise. Not conducive to the overall development of the company. . In addition, there is a certain risk of failure in scientific research work, and some scientific research projects have a long cycle and the results are not easy to translate. If there is no lack of a sound mechanism for determining incentive levels, researchers may concentrate on projects with high returns and short periods. Some basic R&D projects have no one's interest. And competition for the project will instead disperse the energy of researchers and affect the internal research atmosphere of the company.

From the perspective of technology, the current incentive methods of researchers are still mainly economic incentives, and the means are relatively simple. There are certain difficulties in the implementation of incentive measures. Researchers belong to knowledge workers. Most of them have high academic qualifications and good cultural background. Apart from basic material needs, they also have high demands on the working environment, career development, decision-making participation, and self-realization. The demand level presents a diversity of features. However, under the influence of the traditional management system and corporate culture of state-owned enterprises, many incentive

methods will be hindered by the inherent institutional mechanisms in the process of implementation, and implementation will not be in place. It is difficult to produce the expected incentive effect; some incentive methods are due to the existing system. The system and work methods are too different and cannot be implemented in a short time. Therefore, under the existing system of state-owned enterprises, the available incentives for scientific researchers are relatively limited, and it is difficult to meet the different needs of different levels and types of researchers, and the incentive effect is not good.

4. Opportunities

Judging from the political perspective, governments at all levels have given full support to the incentive work of scientific researchers and provided strong guarantees in policy formulation and other aspects. In the two years of 2016 and 2017 alone, the State Council and various ministries and commissions introduced more than a dozen policies and regulations related to the incentives of scientific researchers. The contents covered the aspects of material incentives, spiritual incentives, growth incentives, and environmental incentives. The focus of incentives is also a gradual transition from simple material and spiritual incentives to growth and environmental incentives. General Secretary Xi Jinping and Premier Li Keqiang also stressed the importance of mobilizing scientific researchers to create spirits on various occasions, and they need to further release the creativity of researchers. In addition, the government has further accelerated the deployment of state-owned science and technology enterprise incentive pilots, and piloted research personnel incentives in aerospace, energy, communications, and manufacturing industries to explore effective ways and incentives for implementation. It can thus be seen that the government's strong support has brought good opportunities for the construction of incentive systems for researchers.

From the economic perspective, the global economy as a whole is showing a good momentum, providing a good economic foundation for the construction of incentive systems for researchers. On the one hand, the overall warming of the economic situation will inevitably bring about a new round of rapid development for enterprises, and the operational efficiency of enterprises will increase. At the same time, this means that enterprises will have more resources to invest in scientific research work. The revenue generated by the transformation of scientific research achievements into enterprises will also increase, which will provide solid economic security and steady gains for the incentives of scientific researchers. On the other hand, the intensified market competition will prompt companies to pay more attention to scientific research. Work to enhance the company's own core strengths, resulting in the adjustment of the company's business strategy will enable companies to pay more attention to the mobilization of scientific researchers, and have a positive effect on the construction of incentive systems for researchers. Moreover, the national finance support policy for high-tech industries also provides support for the strengthening of scientific research personnel's incentives.

From the perspective of society, the implementation of the reform of state-owned enterprises has effectively promoted the process of marketization of state-owned enterprises and injected new vitality into the construction of incentive systems for researchers. The changes in the business model, organizational structure, and profitability caused by corporate governance structure adjustments, changes in the operating management system, and the introduction of market-based mechanisms will inevitably bring about the reform of the human resources system. If you want to maintain your company's dominant position in the competitive market competition, you must continue to increase your focus on the core resource of talents, and increase the focus on the core resources through the establishment of incentive and restraint mechanisms that are compatible with economic benefits and labor market prices. The high-end scientific research personnel attract and retain their efforts to maintain the company's core competitiveness. At the same time, the mixed ownership structure established after the reform of state-owned enterprises, so that state-owned capital no longer must be the sole shareholder of state-owned enterprises, employees can also become the company's shareholders, which creates favorable conditions for state-owned enterprises to implement medium and long-term incentives such as equity dividends.

From the perspective of technology, some state-owned enterprises have provided experience that can be used for reference to improve the incentive system for scientific research personnel through the successful exploration of pilot models and relevant experience. As early as 2002, the Ministry of Finance and the Ministry of Science and Technology took the lead in launching trials for equity incentives in state-owned high-tech companies, and conducted equity incentives for those researchers who made outstanding contributions to the development of pilot enterprises. Subsequently, the Ministry of Finance and the State-owned Assets Supervision and Administration Commission successively implemented equity incentives and dividend incentives in the Zhongguancun National Independent Innovation Demonstration Zone enterprises and some pilots of central enterprises. A large number of pilot projects have achieved good results and triggered widespread public attention. While providing the necessary basis for policy formulation and promulgation, they have also provided valuable practical experience for the promotion and improvement of scientific research personnel's incentive mechanism. When other companies formulate their own scientific research personnel incentive system, they can use it to purify and destroy their dross.

5. Threats

From a political perspective, although the government has issued a series of documents concerning the incentives for scientific researchers, the incompatibility of policies, lack of policies, and lack of coherence have affected the implementation. Through combing the policies, it is not difficult to find that the issuing agencies for various policies are diversified. The NDRC, SASAC, Ministry of Finance, and Ministry of Science and Technology have issued relevant documents either alone or in conjunction with other ministries, but due to the lack of an integrated and coordinated agency. With the mechanism, some of the science and technology policies are overlapping and contradictory. For example, the "Regulations on Promoting the Transformation of Scientific and Technological Achievements" promulgated in 1999 rewards the use of scientific and technological achievements as a shareholder more than the "Implementation Measures for the Equity and Dividend Incentives for Enterprises in the Self-innovation Demonstration Zone in Zhongguancun National Demonstration Zone." After the introduction of some policies, due to lack of necessary supporting policies to ensure protection, resulting in empty policies, it can not be implemented, which is particularly prominent in the industrialization of scientific and technological achievements. There are also some policies that have been issued in response to specific problems in specific historical periods, have historical limitations and geographical applicability, and have experienced policy failures during their implementation.

From the economic perspective, due to the lack of a reasonable mechanism for the transformation of achievements, most of the scientific and technological achievements do not produce economic benefits, and researchers cannot obtain benefits. On the one hand, due to the imperfect construction of scientific research achievement transformation service platform and lack of scientific research achievements, the lack of authoritative intermediaries between developers and demanders to make up for the lack of information asymmetry between the two parties, the two sides also lacked trust. In addition, the lack of measurement standards for scientific and technological achievements also makes it difficult for both parties to avoid risk considerations, and it is difficult to reach agreement on transaction prices, which ultimately leads to transaction failure. On the other hand, the R&D results of many large state-owned enterprises are only applicable to the Group or the industry. Therefore, the use of results is generally limited to other units within the group. Since the results are internal transfers and there are no relevant regulations, the price of the results is often changed. Cheaper or even free gifts. Scientific research results cannot bring economic benefits, and researchers can't get rewards for the labor they pay for the transformation of results.

From the perspective of society, the relatively sensitive salary issues involving SOEs may lead to public questioning and cause undesirable social repercussions. The salary of employees of state-owned enterprises has always been closely followed by all sectors of society. Further strengthening of incentives based on the original salaries of scientific researchers may be misinterpreted by the outside world and subject to public suspicion, thus triggering public opinion risks. The public generally lacks a

complete understanding of scientific research personnel and scientific research work. It is not clear about their actual value and importance, nor does it understand the income gap between state-owned enterprise research personnel and other types of enterprises. For the public, the research is the work of the scientific research staff. The benefits from the transformation of the results should be owned by the company. The company has also paid for the labor for its research work, so it should not be transferred from the results. Dividends are paid out of the proceeds. In addition, the salary of the employees of state-owned enterprises has been criticized. In this context, the continuous increase of incentives for scientific research personnel may cause adverse public reactions and impair corporate social image.

From the perspective of technology, there are still certain obstacles to the use of mid- and long-term incentives due to policy restrictions, market systems, and regulatory mechanisms. The “Provisional Measures on Equity and Dividend Incentives for State-owned Science and Technology Firms” (Treasury [2016] No. 4) and other policies have strictly restricted the qualifications of the applicable companies, and the incentives that companies can choose to choose are limited, especially equity incentives. For some eligible small and micro enterprises, the scope of incentives is very limited. In addition, the imperfect development of the capital market in China, the imperfect supervision mechanism and restraint mechanisms also constrain the implementation of medium and long-term incentives to some extent. The developed capital market is the premise for the implementation of equity incentives. Only the stock price can accurately reflect the performance and operating conditions of the company, so as to ensure the fairness while playing an incentive role. However, the standardization of the domestic capital market has yet to be strengthened. Stock prices mainly rely on policies and financial support. Equity incentives not only fail to achieve the desired results, but are also prone to the phenomenon of operating stock prices.

6. Conclusion

The motivation of scientific researchers has been practiced and recognized by more and more managers of enterprises, but there are still many new puzzles in the implementation process. Only by proceeding from the external environment and the internal environment of the company, following the procedures of scientific research personnel and mastering the incentives of scientific researchers can we truly make the motivation of scientific researchers an effective weapon for promoting the common development of both companies and employees.

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References

- [1] Cui Herui, Ge Jing, 2013. Research on Development Strategy of Xinjiang Electric Power Company Based on SWOT-PEST Analysis Paradigm, *Journal of Electric Power*. 2013, 28(03): pp. 203-210.
- [2] Luo Wenguang, Wang Ligang, 2018. Research on the Incentive Mechanism of Scientific Researchers in State-owned Research Institutions, *Financial Science*. 2018(02), pp. 50-59+73.
- [3] Wan Xiujuan, Lin Beibei, 2015. Real-time Measurement of Two-way Communication Smart Meter Development, *Chinese Society for Electrical Engineering*. 2011(31), pp. 94-99.
- [4] Zhang Weimin, Zhou Jingkun, 2018. Research on Incentive Mechanism of Scientific Researchers, *Entrepreneur World*. 2005(07), pp. 50-51.
- [5] Lv Yanping, 2018. Discussion on the Construction of Effective Incentive Mechanism for Research Scientists in Institutes, *Human Resource Management*. 2013(08), pp. 44-45.