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A Study on the Correlation Between Equity Incentives, R&D Investment, and Corporate Performance

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Abstract: The existing competitive market environment emphasizes the important role of innovation capability, and listed companies basically consider research and development (R&D) activities as the central route for value creation. The R&D process exhibits the dual characteristics of long cycles and high risks; at the same time, the professional managers who highly regarded R&D emphasize short-term performance criteria. The equity incentive system chains the motivations of managers to the long-term interests of the company through property rights ties. In theory, this mechanism could reduce principal-agent conflicts and foster an organization culture centered on entrepreneurship and innovation. Whether this institutional arrangement produces R&D investment to translate to actual improvement in performance is a real issue worthy of study.

Keywords: Corporate performance; Equity incentives; Listed companies; R&D investment

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1. Introduction

To adopt innovation strategies, enterprises need to support incentive mechanisms as a precondition. The equity incentive system, in its essence, reconstructs the enterprise value distribution pattern. The management holding shares in the company changes their view of making decisions from short-term reports to long-term value. This change in perspective will directly affect the scale and sustainability of R&D resource allocation. As the material basis of innovation activities, R&D investment is influenced by corporate governance and the effectiveness of incentive mechanisms at the same time. It is valuable to investigate the intrinsic relationship among the three to understand the mechanism of enterprise innovation [1].

2. The theoretical basis of equity incentives and corporate performance

2.1. Principal-agent theory

The principal-agent theory arises from a modern enterprise structure that separates ownership from management

rights. Owners of the enterprise are expecting to see the value of their firm grow over time, whereas the management, which possesses the management rights, are more concerned about what they can measure during their period in management. The necessary misalignment in goals can lead management to avoid R&D as a way to allocate resources as R&D consumes a lot of current funds and has deferred benefits. When management is experiencing the pressure of performance evaluation, it is common for management to cut R&D budgets in order to get through the short-term profit level performance requirements. By doing so, management has optimized the current statements of financial performance, but this behavior may degrade enterprise core innovation capability.

The equity incentive system seeks to create a reconciliation of this tension by providing management with some residual claims. When management's identity role changes from agency to one of ownership they will naturally extend their decision-making role to the cycle of development that is longer. Managers who hold shares in the company are more willing to bear the uncertainty risks in the R&D process [2]. They deeply understand that today's R&D investment determines tomorrow's market position of the enterprise. This cognitive shift promotes the formation of a sustainable and stable R&D investment mechanism in the enterprise.

2.2. Motivation theory

Incentive theory focuses on the psychological motivations of human behavior, positing that individual actions are driven by both intrinsic needs and external incentives. Under traditional compensation systems, managers often settle for achieving predetermined performance metrics, lacking the courage to innovate beyond the norm. Equity incentive schemes creatively link personal gains to the long-term value growth of the enterprise, transforming managers from passive executors into a community of interests that shares risks. When managers hold company stock, their decision-making considerations naturally align with the perspective of the owners. This shift in identity fosters a more proactive innovation mindset. R&D activities inherently involve uncertainty in outcomes, and conventional evaluation systems can easily inhibit innovative attempts. The long-term nature of equity returns perfectly matches the characteristics of R&D cycles. Practice has shown that management teams that receive equity incentives are more inclined to maintain a high level of R&D investment. They are willing to bear the cost of trial and error during the innovation process, as future equity appreciation can compensate for current risk investment. This incentive mechanism reshapes managers' decision-making patterns, providing sustained internal motivation for corporate innovation activities [3].

2.3. Innovation theory

Innovation theory emphasizes that the fundamental driving force for sustained enterprise development stems from knowledge accumulation and technological breakthroughs, a process that requires stable resource investment as the fundamental guarantee. R&D activities constitute the core of enterprise innovation, and the transformation of their outcomes often spans multiple accounting periods. Traditional assessment mechanisms emphasize short-term financial indicators, and enterprise management may reduce R&D expenditure to maintain current profit performance. Equity incentive plans grant managers the right to share future earnings, and this institutional arrangement realigns decision-makers' time preferences. Managers with equity holdings are more willing to support R&D projects with strategic value, recognizing that technological innovation can build market advantages that are difficult to imitate. Enterprise innovation activities exhibit path dependence characteristics, and continuous R&D investment forms a stock of knowledge accumulation, providing fundamental support for product iteration and process upgrading. Equity incentives closely link managers' personal gains with the long-term growth of the

enterprise, prompting decision-makers to value the coherence and sustainability of the R&D system. This incentive mechanism helps enterprises overcome short-termism tendencies in the innovation process and aligns resource allocation more closely with long-term development needs.

3. Analysis of the current status of equity incentives and R&D investment in listed companies

3.1. The basic characteristics of equity incentive implementation

At present, the equity incentives of listed companies are undergoing a gradual expansion of incentives for their employees based on a trend that is more prevalent in industries that engage in higher levels of innovation, such as information technology and biomedicine, and have stronger implementation frequency. In constructing incentive frameworks, companies prioritize the concurrent involvement of the core technical staff, in addition to middle and senior managers. This personnel structure arrangement reflects how organizations value innovative human resources. The majority of incentive plans generally have a performance assessment period is between three and five years, and which remain a certain matching relationship with the product development cycle. There are different levels of intensity in their incentives between those companies. Some companies select to utilize a method that uses a combination of restricted stock and stock options to move back and forth between balancing the incentive effect at stake, and the cash flow pressure need.

High-technology firms favor allocating quotas preferentially to members of the R&D teams, while traditional manufacturing industries focus on covering key business personnel. Oftentimes in incentive conditions, financial indicators are often utilized, such as the compound growth rate of operating income and net profit [4]. There has been some companies beginning to reference innovative performance indicators such as the obtaining a patent, and developing new products. State-owned listed companies face more institutional constraints in terms of incentive proportion and pricing mechanism, and their scheme design exhibits a robust characteristic. The degree of market competition and the stage of the enterprise's life cycle jointly influence the choice of equity incentive models, with growth-stage enterprises generally adopting more attractive incentives.

3.2. Analysis of R&D investment level and structure

The R&D investment of listed companies exhibits significant industry differentiation characteristics, with enterprises in the electronic communication and biopharmaceutical fields demonstrating sustained enthusiasm for R&D. R&D funds form a dynamic allocation pattern among basic research, applied research, and experimental development, reflecting different innovation strategic orientations of enterprises. Some enterprises on the Science and Technology Innovation Board concentrate a large number of resources on basic research, with the scale and quality of their R&D teams constituting core competitive advantages. Traditional manufacturing enterprises tend to focus their R&D funds on process improvement and product optimization, reflecting their stable innovation strategy. Listed companies in the Yangtze River Delta and Pearl River Delta regions have formed a significant R&D agglomeration effect, with the well-established industrial chains in these regions providing strong support for the transformation of R&D achievements.

The proportion of R&D personnel and educational structure indicate the talent reserve status of enterprises, with high-tech enterprises generally having a higher proportion of R&D personnel with master's degrees or above. Continuous and stable R&D investment helps enterprises build technological barriers, and this long-term investment mechanism keeps enterprises vibrant in market competition. Enterprises of different ownership types

exhibit differences in their R&D investment structures, with private enterprises placing more emphasis on short-term effective applied R&D projects. There is a positive correlation between the scale of R&D investment and the number of patent applications, reflecting the inherent logic between innovation input and output [5].

3.3. The current characteristics of corporate performance

At present, corporate performance shows multi-dimensional differentiation, and some enterprises have been able to maintain a steady growth trend in return on net assets. While innovation-oriented enterprises are under pressure from short-term financial indicators related to profits, their market valuations will often see a more meaningful improvement. The composition of the major business income of a publicly listed enterprise demonstrates aspects of market competitively with regard to its main business, and, furthermore, enterprises with a diversified product structure often demonstrate stronger capacity to withstand risk. The states of cash flow, as well as the turnover of assets by enterprises provides indications of levels of management skill, where for companies who have high turnover in their operations are obtaining more robust cash flow in the same market environment. The scale of research and development investment in addition to a number of patents produced are positively correlated with the long-term corporate performance, and this correlation is especially strong in technology-oriented industries.

The performance recovery of some traditional enterprises was related to business changes, and investment in technology ultimately lead to an upwards trend in product margins. The sustained characteristics of corporate performance are most evident in industry leaders, which typically have established stable customer groups and supply chain systems. Enterprises within regional industrial clusters often experience synergistic development effects, which promote an overall improvement in corporate performance. There is a time lag between corporate performance and the cycle of innovation investment, and this time-lag characteristic requires investors to have a longer-term perspective.

3.4. Preliminary analysis of the relationship between motivation and engagement

The implementation intensity of equity incentive schemes exhibits a significant positive correlation with the scale of corporate R&D investment. Listed companies implementing equity incentives generally demonstrate a higher willingness to invest in R&D, and enterprises with a higher proportion of core technical personnel holding shares exhibit more continuous R&D activities. There are significant differences in the incentive effects across different industries, with high-tech enterprises being particularly sensitive to equity incentives. **Table 1** shows that as the intensity of incentives increases, the intensity of corporate R&D investment exhibits a step-like growth characteristic.

The stability of the R&D team has been significantly improved after the implementation of equity incentive plans, and the turnover rate of scientific research personnel has shown a downward trend. The setting of the incentive period directly affects the cycle planning of R&D projects, and long-term-oriented equity incentive plans are more conducive to supporting major R&D projects. Private enterprises respond more positively to equity incentives than state-owned enterprises, and this difference stems from the different characteristics of the governance structure and evaluation system of the two types of enterprises. The wider the coverage of equity incentives, the smaller the fluctuation in corporate R&D investment, indicating that a broad incentive scope helps smooth the cyclical fluctuations of R&D activities [6].

Table 1. Correlation characteristics between equity incentives and R&D expenditures across different industries

Industry categories	Preferred incentive tools	R&D personnel coverage rate	Growth phase
Information technology	Stock options as primary	High	3–5 years
Biopharmaceuticals	Combination of options and restricted stock	High	Over 5 years
Advanced equipment	Restricted stock as primary	Moderate	Approximately 3 years
Traditional manufacturing	Combination of appreciation rights and stock	Low	1–3 years

4. Correlation analysis between equity incentives, R&D investment, and corporate performance

4.1. Analysis of the direct impact of equity incentives on R&D investment

The implementation intensity of equity incentive schemes has a substantial impact on the allocation of corporate R&D resources. Managers who hold shares in the company are more inclined to approve R&D projects with longer cycles, as they stand to share in the benefits brought by the long-term value growth of the enterprise. After receiving equity incentives, R&D teams significantly enhance their innovation enthusiasm, and this shift is reflected in the simultaneous improvement in both the quantity and quality of patent applications. The incentive effects vary significantly across different industries, with R&D personnel in high-tech enterprises showing higher sensitivity to equity incentive plans. The setting of incentive periods directly affects the sustainability of R&D investment, and a lock-up period of more than three years can effectively support the advancement of major R&D projects. There is a positive relationship between the proportion of management shareholding and the stability of R&D investment, and this relationship is particularly prominent in highly competitive industry environments. The expansion of equity incentive coverage will have a broader organizational mobilization effect, with more technical personnel actively participating in corporate innovation decision-making processes [7].

4.2. The mediating effect of R&D investment on the relationship between equity incentives and corporate performance

To uplift enterprise performance through equity incentive schemes, the critical link of R&D investment must be inserted. R&D investment is an indispensable conductive link between the two, institutional arrangements and substantive R&D activities. Equity incentive schemes first trigger enterprise management to increase the R&D resource allocation, and sustained financial support ensures the material foundation of technological innovation. After some time has elapsed, R&D activities ultimately yield innovative outcomes, and using new technologies and processes can enhance enterprise productivity and product quality.

An improved competitive position in core markets allows enterprises to achieve better performance as manifested in the sustainable increase of return on net assets and main business income. The conduction circles vary considerably from industry to industry, where high-tech enterprises often take three years to finish the transition phase from input to output. When considering the mediating effect of R&D investment on the relationship between equity incentive schemes and enterprise performance, the scale and quality of R&D investment impact strength, where higher-quality R&D activities consistently see greater technological advancements and performance improvements. The extent of enterprise performance improvement depends on the actual transformation efficiency of R&D investment, a process that requires sound corporate governance and efficient R&D management as supporting conditions.

4.3. The moderating effect of enterprise characteristics on incentive outcomes

The scale of a company significantly impacts the actual effectiveness of equity incentive schemes, with a well-established resource support system in large enterprises providing a solid foundation for R&D activities. The role intensity of equity incentives is determined by industry attributes, with high-tech enterprises relying heavily on talent, making the incentive effect more prominent. Corporate governance structure affects the execution efficiency of equity incentive schemes, with a standardized and transparent decision-making mechanism ensuring the rational allocation of R&D resources. The stage of the company's lifecycle regulates the path of the incentive scheme, with flexible mechanisms in growth-stage companies enabling equity incentives to quickly stimulate innovation vitality.

The concentration of equity has a complex impact on the incentive effect, with a moderately concentrated equity structure maintaining decision-making efficiency while avoiding excessive intervention from major shareholders. The innovation environment in the company's region regulates the efficiency of R&D resource transformation, with a well-developed industrial chain supporting the rapid industrialization of innovation achievements. The existing level of technological accumulation in the company enhances the effectiveness of equity incentives, with profound technical reserves providing a knowledge foundation for continuous innovation [8]. The quality of talent structure directly affects the implementation effectiveness of incentive schemes, with high-quality R&D teams being able to more effectively utilize incentive policies to carry out innovative activities.

4.4. The comprehensive impact path of equity incentives on corporate performance

Equity incentives affect corporate performance through a multi-level transmission mechanism. Management shareholding schemes change decision-makers' time preferences, making them more focused on the long-term value growth of the enterprise. This directional adjustment prompts enterprises to increase their R&D investment scale, providing continuous resource support for technological innovation activities. The knowledge accumulation and technological breakthroughs generated by R&D activities enhance the core competitiveness of enterprises, and new product development and process improvement increase market share. The improvement of corporate governance structure provides institutional support for innovation activities and standardizes decision-making processes to ensure the efficiency of R&D resource allocation.

Talent stability plays a key role in the value creation process, and equity incentives effectively reduce the turnover rate of core technical personnel. **Table 2** shows the correlation characteristics between incentive schemes and corporate performance in different industries, with high-tech enterprises generally exhibiting a stronger performance improvement effect. The market competition environment intensifies the pressure on the transformation of innovation achievements, and enterprises need to quickly convert technological advantages into financial returns. These elements constitute a complete value creation chain, and equity incentives ultimately drive the sustained growth of corporate performance by enhancing innovation efficiency [9].

Table 2. Correlation characteristics between equity incentives and corporate performance in different industries

Industry categories	Incentive intensity range	R&D to commercialization cycle	Outcome realization
Information technology	Above average	2–3 years	3–4 years
Biopharmaceuticals	High	4–5 years	5–6 years
Advanced equipment	Moderate	3–4 years	4–5 years
Traditional manufacturing	Below average	1–2 years	2–3 years

5. Management recommendations for optimizing equity incentives to enhance corporate performance

5.1. Optimizing the design of equity incentive plans

When designing an equity incentive scheme, enterprises should establish a logical chain that runs through the entire process. The scheme designer first needs to precisely define the scope of incentive recipients. Including core technical personnel in the incentive scope can directly stimulate the innovation enthusiasm of the R&D team. The setting of the incentive period should fully consider the complete cycle of the R&D project. A lock-up period of more than three years can effectively support the entire process from technology research and development to the transformation of results. The combination of different incentive tools can produce a synergistic effect.

Restricted stocks retain core talents, while stock options can stimulate the pioneering spirit of R&D personnel. The evaluation index system needs to balance short-term operational pressure and long-term innovation goals. Indicators such as patent applications and new product profitability are introduced to urge managers to consider both current performance and future development. The determination of the incentive level should reflect the principles of fairness and efficiency. Benchmarking against industry salary levels maintains attractiveness while controlling labor costs. The setting of vesting conditions should form a continuous incentive effect. Batch vesting arrangements can maintain the stability and creativity of the R&D team throughout the entire project cycle.

5.2. Establishing a R&D investment safeguard mechanism

Enterprises need to establish a systematic R&D investment guarantee system and incorporate innovation resource investment into their strategic planning. The R&D budget system should maintain a moderate degree of flexibility, with a portion of funds reserved to respond to technological route adjustments and unexpected innovation opportunities. The project management process needs to establish a scientific evaluation mechanism for conducting phased reviews of R&D projects and dynamically allocating resources. Enterprises can establish a research and development reserve fund system, extracting special funds at a fixed proportion of operating income to ensure the continuity of R&D activities. Resource allocation should be tilted towards core technology breakthrough projects, focusing superior resources to overcome technological bottlenecks and form competitive advantages.

R&D infrastructure investment needs to be moderately advanced, with advanced experimental equipment and R&D tools capable of enhancing innovation efficiency. The talent cultivation system should focus on professional ability improvement, and systematic technical training and learning of innovative methods help to enhance the overall level of the R&D team. The cultivation of an innovative culture requires creating an atmosphere that tolerates failure, allowing R&D personnel to accumulate experience and lessons in the exploration process. The design of the compensation system should reflect the value of knowledge, with competitive compensation packages able to attract and retain excellent R&D talent [10].

5.3. Improving the corporate governance structure

The improvement of the corporate governance structure requires the establishment of a decision-making and supervision system with clear levels. The professional committees of the board of directors should play their professional guidance role to the fullest and the strategic development and risk management committee is responsible for conducting assessments of major R&D projects for their feasibility. The independent director system can enhance the supervisory function of the board of directors, and independent directors with an industry background can offer professional advice for research and development decisions. Substantive participation in the shareholders' meeting can safeguard investor rights and interests, and major R&D investment plans should be

submitted for review by the shareholders' meeting.

The supervisory function of the board of supervisors should run through the entire process of research and development activities, and periodic audits of R&D funding should be conducted to ensure proper allocation of company resources. The management compensation committee should scientifically formulate evaluation criteria and incorporate R&D input-output efficiency into the senior management performance evaluation system. Strict implementation of the information disclosure system enhances corporate transparency, and timely disclosure of R&D progress and results transformation to investors is required. The protection mechanism for minority shareholders' rights and interests maintains fairness, and convenient methods such as online voting ensure their right to participate in major decisions. The construction of the senior management team should focus on complementary professional structures, and a leadership team with both technical background and management experience is more conducive to promoting innovative development.

5.4. Establishing a scientific performance evaluation system

To create a scientific performance evaluation system for enterprises, one must consider the balance between long-term development and short-term profit sufficiently. Management should carry out an organic combination of financial and non-financial indicators and apply the Balanced Scorecard method to evaluate the overall operating conditions of the enterprise. The performance evaluation of the R&D department will require time to conduct a reasonable evaluation cycle, as well as expanding the evaluation period for basic research projects. Performance evaluation indicators for the marketing department should measure the market share of new products, as this is a direct representation of the R&D results' commercialization effectiveness.

For the production department, the evaluation will need to consider the results of the contributions of process improvements, measuring the technological innovation savings and quality improvements. The human resource department will require establishing evaluation standards for innovative capacity and measuring the quantity and quality of reasonable employee suggestions in its promotion system. The finance department should design a mechanism for analyzing the benefits of R&D investment, tracking the entire process value creation from R&D project input to output. The information department needs to build a performance data integration platform to achieve real-time collection and analysis of key indicator data from various departments. The application of assessment results should be closely linked to the incentive mechanism, with teams with excellent performance receiving more resource support and development opportunities. The evaluation system itself needs to establish a regular revision mechanism to adjust the weight of indicators according to changes in strategic goals and industry development trends.

5.5. Strengthening information disclosure and supervision

Enterprises should establish a comprehensive information disclosure mechanism and refine the requirements for publicizing key information related to R&D investment and equity incentives. Listed companies need to clearly disclose the specific allocation of R&D investment in their annual reports, distinguishing the distribution of funds among the three major categories: basic research, applied research, and experimental development. The audit committee of the board of directors should strengthen its responsibility for reviewing R&D data to ensure the authenticity and integrity of the disclosed information. Securities regulators can develop special disclosure guidelines for equity incentives, requiring companies to detail the criteria for selecting incentive recipients, the basis for setting vesting conditions, and their relevance to R&D goals. Institutional investors should play

a supervisory role by requesting companies to explain the matching relationship between the benefits of R&D investment and the costs of equity incentives through inquiry letters and other means.

Independent directors should regularly visit R&D bases, conduct on-site inspections of R&D project progress, and express special opinions on this matter at board meetings. Stock exchanges can establish a special identification system for R&D-oriented enterprises to help investors identify listed companies that truly focus on innovation investment. Accounting firms need to pay close attention to the reasonableness of the capitalization timing of R&D expenditure during the audit process to prevent companies from adjusting profits through R&D investment. News media should play a supervisory role in public opinion, keeping a close eye on enterprises that implement high-level equity incentives despite persistently insufficient R&D investment. Small and medium-sized investors can inquire about corporate R&D investment plans and equity incentive schemes through online voting platforms, forming a multi-faceted supervision network.

6. Conclusion

The way that equity incentives promote corporate performance has a non-linear nature with a critical mediating role of R&D investment. Organizations have to think past simply allocating welfare in designing incentive schemes, an effective connection between innovation factors and strategy must be established. Managers must be able to make dynamic adjustments of incentive parameters based on industry characteristics and development stages, combined with a consideration of R&D resource allocation to think about both strategic continuity and market responsiveness. Going forward, corporate competition will increasingly manifest competitively at the level of institutional design, and how to maximize R&D efficiency through governance innovation still requires ongoing exploration.

Disclosure statement

The author declares no conflict of interest.

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