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Employee Stock Ownership Plans and Corporate Innovation

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Abstract: Based on the sample of A-share listed companies that implemented ESOPs from 2014 to 2021, this paper empirically studies the impact of ESOPs on corporate innovation output. The results show that ESOPs can promote corporate innovation output. The research in this paper reveals the important role of employees in corporate innovation, which enriches and expands the research on the influencing factors of corporate innovation with employees as the main body. The research conclusions have some implications for the implementation of ESOPs in listed companies.

Keywords: Employee stock ownership plan; Corporate innovation.

1. Introduction

The report to the 19th National Congress of the Communist Party of China clearly pointed out that we should build our country into an innovative country, and strive to train a large number of international strategic talents, scientific and technological talents, young scientific and technological talents and efficient innovation teams. Corporate innovation is very important for the survival and development of enterprises, which can increase the competitiveness of enterprises, promote the improvement of various industrial structures, and play a great role in promoting the transformation of economic development mode. According to the report to the 19th National Congress of the Communist Party of China, China's economy is in a period of transforming its development mode, optimizing its economic structure and transforming its growth drivers. In this important period, it is necessary to enhance the innovation of Chinese enterprises, realize the transformation of economic development from factor-driven to innovation-driven, build a modern economic system and realize high-quality sustainable development. Innovation promotes productivity growth. Enterprises can enhance their competitiveness because of innovation, and the country cannot leave the support of innovation.

Corporate innovation is inseparable from the continuous investment of various resources, and enterprises must invest human resources to make progress in corporate innovation. Innovation cannot leave the support of talent. Innovation occurs only when motivated and innovative people translate their innovative ideas into new products and services. In the previous period, innovation was mainly guided and implemented by scientists, but now innovation activities are not only completed by scientists. Innovation activities are usually group activities, in which each person has his or her own different tasks, and each person needs to work together to complete the innovation activities at this stage. From this perspective, the existing literature mainly takes the management as the research object, and mainly aims at controlling the management to promote corporate innovation (Zhang et al., 2018). However, at the current stage, China's researches rarely mention the other important staff in enterprises, that is, the role played by employees in corporate innovation (Ding et al., 2020). Enterprises are important subjects for the country to implement innovation, and employees are important members to generate and implement innovation. The innovation behavior of employees is a huge advantage for enterprises to continuously compete with other competitors. The motivation and vitality of employees in enterprises to innovate is an important factor to improve the innovation ability of enterprises. The most effective way for enterprises to motivate employees to innovate is not to care about the short-term failures, but to motivate employees for the long-term benefits. Innovation in enterprises needs to mobilize the enthusiasm of all employees, stimulate their creativity and explore their potential, so as to promote the innovation of enterprises. Employees in the enterprises are the top priority of corporate innovation. Therefore, it is necessary to explore and deepen the further research on corporate innovation based on employees.

ESOPs are important methods for the enterprises to give stock or option rewards to talents and employees with contributions, which can encourage them to create more value for the enterprises. This measure is conducive to improving the distribution mechanism, so that the interests of capital owners and ordinary staff are consistent (Huang and Jiao, 2019). The China Securities Regulatory Commission officially issued the Guidance on the Pilot Implementation of Employee Stock Ownership Plan by listed companies in 2014. The promotion of the ESOPs' pilots is conducive to the establishment and improvement of the benefit sharing mechanism among employees, enhancing the level of corporate governance and strengthening the cohesion among employees. The scope of ESOPs is very wide, including not only core members and executives, but also more non-core employees. It is more conducive to aligning the interests of executives and ordinary employees, mobilizing the enthusiasm of employees to actively participate in the daily operation and management of the enterprises and various innovation activities, so as to enhance the innovation ability of the enterprises. Enterprises rarely disclose employees' information to a certain extent in practice, so it is difficult to examine the impact of ESOPs on corporate innovation. However, the implementation of ESOPs in Chinese listed companies has changed this situation, and the further disclosure of employees' information has solved this problem. The "Guidance" issued in 2014 has been well implemented and actively adopted by listed companies in China. By the end

of 2017, 635 A-share listed companies had implemented ESOPs successively. The incentive motivation for employees refers to letting employees hold the company's stock for a long time, so that the conflicts of interest between employees and shareholders can be reduced. Therefore, employees and shareholders in companies have the same interest drive, which can greatly mobilize employees' enthusiasm for work and make the company's performance targets easier to achieve (Chen et al., 2020). In addition to incentive motives, there are also non-incentive motives, which is the consideration of the role of systems and policies, because enterprises will also adopt ESOPs to reduce tax pressure and fight against hostile takeovers. Before the adoption of ESOPs, employees can only receive a certain fixed salary and cannot enjoy the rights of residual earnings of enterprises. As a result, employees are not able to fully devote their efforts to work and only willing to pay part of their efforts to meet the salary standard, which makes them have no sense of belonging to the companies and do not consider the problem of improving the long-term value of the companies.

ESOPs enable employees to own the ownership and residual earnings of enterprises, which can make them more willing to work hard with enthusiasm (Cao and Zhang, 2020), strengthen the team collaboration (Huang and Jiao, 2019) and enhance the ability of supervision (Cao and Zhang, 2020). ESOPs also give employees the motivation to pay attention to the long-term value of enterprises.

The previous literature has examined the relationship between ESOPs and corporate innovation, but most of them are from the perspective of managers. ESOPs are open to the ordinary employees. Employees play an important role in the process of corporate innovation. Therefore, this paper takes A-share listed companies that have implemented ESOPs from 2014 to 2021 as samples to study the impact of ESOPs on corporate innovation. The innovative points of this paper lie in the following aspects: (1) The main literature examines the relevant factors affecting corporate innovation from the perspective of management at this stage. Although some literature mentions the relationship between ESOPs and corporate innovation, it is also studied from the perspective of management (Zhou et al., 2019). Different from the existing literature, this paper studies the impact of ESOPs on the corporate innovation output from the perspective of employees, which extends and deeply studies the literature on the effect of ESOPs on enterprise innovation; (2) There is only a preliminary study on the implementation of ESOPs at this stage. In addition, our country once launched ESOPs, but it caused the negative phenomena such as the insider trading and the losses of assets. Due to the imperfection of relevant laws and regulations, while the inadequate implementation of relevant laws and regulations occurred, there are many defects in the implementation processes, so this system cannot be carried out well. The China Securities Regulatory Commission carried out ESOPs again in our country in 2014. This paper studies how to promote corporate innovation from the perspective of ESOPs. The content of this paper enriches the literature on corporate innovation and ESOPs. It provides the theoretical support for Chinese enterprises to enhance innovation during the period of changing development mode, and also provides the empirical evidence for Chinese enterprises to implement ESOPs.

2. Literature review

2.1. Literature on corporate innovation

While corporate innovation has high returns, it also has to bear relatively high risks. Motivated by the salary difference between key subordinate executives and chief executive officers, they have higher enthusiasm for innovation, which makes enterprises have more innovation output (Zhang et al., 2020). The positive relationship between the employee protection and corporate innovation capability is more obvious in enterprises with trade unions (Tong et al., 2018). With constant upgrades in technological capability, the level of innovation is an important factor that allows a firm to have competition with other firms. A relatively stable team of top management will enable enterprises to have a relatively high level of tacit understanding when making decisions about innovation, and they will have the same actions in innovation activities to improve innovation efficiency (Zhang et al., 2018). Institutional investors in enterprises can promote the output of corporate innovation (Balsmeier et al., 2017). Institutional investors also reduce the short-sighted behavior of management, and the period of investment injection is positively correlated with the number of patents (Kim et al., 2019). At the present stage of China's economic development, the introduction of foreign banks can bring sufficient capital, advanced technology and management methods, while the spillover effect is adopted to rapidly improve the innovation efficiency and innovation output of Chinese enterprises (Bai et al., 2018).

2.2. Literature on ESOPs

When enterprises implement ESOPs, the market can have a relatively positive response (Chen et al., 2020), which promotes the improvement of enterprise productivity and performance (Shen et al., 2018). ESOPs enable employees to have dual identities of insiders and owners of the enterprise, and have the motivation and ability to participate in the operation and management of the enterprise, which shows that ESOPs alleviate the conflicts of interest between the employees and major shareholders (Shen et al., 2018).

2.3. ESOPs and corporate innovation

Zhou et al. (2019) explain the impact of the implementation of ESOPs in A-share listed companies on corporate innovation, and the main research object is all employees including the management. When the number of employees covered by ESOPs increases, the scale of capital and the proportion of management subscription increases, and the lock-up period becomes longer. Therefore, the number of invention patents and patent applications of enterprises will increase, and the innovation ability will be enhanced. ESOPs promote corporate innovation by reducing agency costs and improving enterprises' ability to take risks. The higher the per capita subscription ratio of executives is, the more likely it is for executives to avoid their own opportunistic behaviors, which can reduce agency costs and promote corporate innovation. The development of ESOPs in listed companies can enable the owners of enterprises and employees to share the interests, and bind the interests of employees with the long-term interests of enterprises, which can reduce agency costs and improve innovation ability (Zhou et al., 2019).

Meng et al. (2019) use the data of A-share listed companies from 2011 to 2017 to test the relationship between non-senior management employees and corporate innovation in the

implementation of ESOPs, and explain that the shareholding of non-senior management employees is conducive to corporate innovation by increasing employees' enthusiasm for work, efforts and teamwork ability, so the efficiency of corporate innovation is improved. Meanwhile, when the proportion of employees with higher education and technical level is large, the output of corporate innovation can be increased. Employees can generate more innovative ideas when providing products and services (Bradley et al., 2016). When ESOPs promote corporate innovation, the main effect is generated by the shareholding of non-senior management employees rather than the management (Meng et al., 2019). The shareholding of non-senior management employees has a significantly positive impact on the quantity and quality of corporate innovation output, and the implementation of ESOPs in non-state firms can better promote corporate innovation output than that in state-owned enterprises (Huang and Jiao, 2019).

3. Theoretical analysis and hypothesis development

The idea of ESOPs is derived from the two-factor theory (Kelso and Adler, 1958). The two-factor theory shows that capital and labor play an important role in creating wealth as two important factors, but the development of industrialization has made the distribution of wealth uneven, and the status of capital is much higher than that of labor, which has gradually widened the gap between the rich and the poor. Therefore, ESOPs are institutional designs that can be combined with the two-factor theory, which are strategic designs that can make labor workers become capital workers. The measure can allow labor workers to have the attributes of capital in order to reduce class contradictions. From the perspective of shareholders, innovation can enhance the competitiveness of enterprises and thus increase long-term wealth. From the perspective of employees, innovation activities with the high complexity and large investments in enterprises require employees to pay more efforts than their daily work. If employees only receive fixed wages without enterprise ownership and residual income claim, they will not benefit from innovation activities, which will prevent employees from making more effort in the innovation work of enterprises. From the perspective of the two-factor theory, ESOPs are used as a type of incentive factors, which motivates employees to produce positive results and improves their enthusiasm in work to improve their work performance. In addition, ESOPs enable employees to hold shares of companies and become one of the owners of companies, which enables employees to take the initiative to participate in work and be more willing to take responsibilities. In addition to wages, employees can also enjoy the benefits of the economic growth, which can reduce the social contradictions caused by the gap between the rich and the poor. Employees enjoy the identities of enterprises' owners and employees at the same time, which binds the interests of employees and shareholders, and connects employees' personal wealth with the long-term innovation output of enterprises. As the benefits of innovation output increase, the personal wealth of employees will increase rapidly. Meanwhile, it also reduces the possibility of employees' dismission and improves employees' efforts in innovation work (Paterson and Welbourne, 2019). In this way, employees can have a stronger willingness to participate in work, actively improve products and services, strive to continuously complete innovation decisions and pay more attention to the long-term benefits of enterprises, which can promote the effective transformation of corporate innovation input into innovation output.

The principal-agent theory explains that the principal-agent relationship is defined as the principal hires an agent to sign a contract on behalf of the principal to make some decisions (Jensen and Meckling, 1976). The separation of the ownership and management rights between the agent and the principal will cause the problem of information asymmetry, which will cause the inconsistency of the interests of the agent and the principal. With the higher level of economic development in China, the competition among Chinese enterprises is becoming more and more fierce, so companies have become more concerned about the importance of human capital to add value to companies. There is not only the principal-agent problem between senior executives and shareholders, but also the principal-agent problem among employees, senior executives and shareholders in the operation of a company. A complete principle-agent chain includes shareholders, senior executives and employees. The shareholders are the ultimate principals. The management is the agent of the shareholder and the principal of the employees, and the employees are the ultimate agents. Although employees are at the bottom of the whole agency chain, their teamwork and efforts are closely related to the value realized by shareholders. Executives are the main body of innovation decisions, while employees are important roles in implementing innovation decisions. Employees are directly related to increasing the value of companies. Senior executives are the objects of resource investments and allocation in enterprises, while employees are the direct users of corporate resources. The value a company can create is related to the effort level and ability level of its employees. It is necessary to adopt a long-term incentive scheme of ESOPs to reduce agency costs. Team collaboration can improve employee cohesion and can improve the quality of innovation output in innovation activities. Establishing common goals of departments at different levels in the companies can promote team collaboration and mobilize the enthusiasm of employees and the motivation of mutual communication and cooperation, which can improve the efficiency of transforming innovation input into innovation output, thus enhancing the long-term value of the enterprises and the personal wealth of employees. Employees feel enhanced self-esteem and importance in their roles and promote stronger social relationships with colleagues (Mullins et al., 2019). The mutual binding of wealth enables employees to supervise each other and avoid the loss of collective wealth (Fang et al., 2015). Hence, hypothesis 1 of this paper is proposed:

H1: The implementation of ESOPs can promote corporate innovation output.

4. Research design

4.1. Sample and data

This paper takes A-share listed companies that have issued ESOPs from 2014 to 2021 as the research objects. This paper uses 2014 as the first year of the sample period because the "Guidance" was issued in China in 2014. This paper excludes the following samples: (1) the sample of ST, PT and ∗ST listed companies in the sample period; (2) the sample data of financial listed companies; (3) listed firms with missing data;

(4) listed companies that have declared or passed the plans of the board of directors but actually stopped implementing their employee stock ownership plans or that failed to pass the plans at the shareholders' meeting. The final sample consists of 1046 firm-year observations.

To reduce the impact of extreme outliers, this paper winsorizes all of the continuous variables at the 1st and 99th percentiles. This paper obtains the data of ESOPs from the Wind database, and other relevant data are from the CSMAR database.

4.2. Model specification

In order to test hypothesis 1, regression model (1) is established. If β1 is significantly positive, the implementation of ESOPs can promote corporate innovation output, and H1 is supported. The design of model (1) is as follows:

$$Inno_{i,t} = \beta 0 + \beta 1 ESOP_{i,t} + \beta 2 Controls_{i,t} + Ind_{i,t} + Year_{i,t} + \varepsilon_{i,t} \quad (1)$$

4.3. Variable Design

4.3.1. Dependent variable

The dependent variable is corporate innovation (Inno). This paper uses the number of patents granted by enterprises in the current year (Inno) to measure innovation output (Meng et al., 2019). The corporate innovation output variable is processed by adding 1 to take the natural logarithm in the empirical study.

4.3.2. Independent variable

The independent variable is employee stock ownership plans (ESOP). The paper uses a dummy variable (ESOP) to measure the implementation of ESOPs. The year when the board of directors puts forward the implementation plans and subsequent years shall be regarded as the implementation of ESOPs, and the value within these years shall be 1, otherwise the value shall be 0 (Yu et al., 2022).

4.3.3. Control variables

Combined with previous literature studies (Yu et al., 2022; Meng et al., 2019), this paper controls the following influencing factors: firm size (Size), the leverage ratio (Lev), corporate growth (Growth), the return on total assets (ROA), management shareholding ratio (Mnghold), the shareholding ratio of top five shareholders (H5), property right nature (SOE) and the total asset turnover (ATO). Finally, the industry and year dummy variables also need to be controlled. The variable definitions in this paper are shown in Table 1.

5. Analysis of empirical results

5.1. Descriptive statistics

Table 2 presents the descriptive statistics of the variables. It can be seen from Table 2 that the maximum value of the number of patents granted (Inno), which represents the innovation output of enterprises, is 6.4998. The minimum value is 0, and the standard deviation is 1.8377, which indicates that there are certain differences in the innovation levels of the sample enterprises. The average value of whether the employee stock ownership plans (ESOP) is implemented is 0.6424, indicating that 64.24% of the enterprises in the sample implement ESOPs. The mean value of the managerial shareholding ratios (Mnghold) is 0.1942, the minimum value is 0 and the maximum value is 0.6766. The standard deviation is 0.1946, indicating that there are significant differences in the managerial shareholding ratio among the sample companies. In addition, a variance inflation factor (VIF) test is conducted, which shows that the VIFs of all the explanatory variables are smaller than 10, indicating no issues of multicollinearity.

Table 1. Definition of main variables

Variable Symbol	Variable Definition	Variable Measure
Inno	Corporate innovation	Ln (1+ the number of patents granted)
ESOP	Employee stock ownership plans	Dummy variable, the value of the time ranges from the year when the board of directors proposes the implementation plans to the last year is 1, and the value of the years before the implementation is 0
Size	Firm size	Natural logarithm of total assets
ROA	The return on total assets	Net profit/total assets
Lev	The leverage ratio	Total liabilities/total assets
Growth	Corporate growth	The firm's operating income growth rate
ATO	The total asset turnover	Operating income/average total assets
H5	The shareholding ratio of top five shareholders	The shareholding ratio of top five shareholders
SOE	Property right nature	Dummy variable, the value is 1 when the enterprise is state-owned, and 0 otherwise
Mnghold	Management shareholding ratio	The ratio of the number of shares held by the management to the total number of shares.
Year	Year	Dummy variable
Ind	Industry	Dummy variable

Table 2. Descriptive statistics

Variables	N	Mean	SD	Min	Max
Inno	1,046	2.5912	1.8377	0	6.4998
ESOP	1,046	0.6424	0.4795	0	1
Size	1,046	22.1508	1.0796	20.0433	25.2144
ROA	1,046	0.0446	0.0610	-0.2607	0.1856
Lev	1,046	0.3863	0.1810	0.0721	0.8025
Growth	1,046	0.1809	0.2964	-0.3908	1.5146
ATO	1,046	0.6117	0.2848	0.1424	1.5138
H5	1,046	0.5025	0.1315	0.2238	0.7966
SOE	1,046	0.1205	0.3257	0	1
Mnghold	1,046	0.1942	0.1946	0	0.6766

5.2. Analysis of regression results

Model (1) tests the relationship between the implementation of ESOPs and corporate innovation output. The regression results are shown in Table 3. The results show that the coefficient of ESOPs is 0.262, which is significantly positive at the 5% level, indicating that the implementation of ESOPs can significantly promote the innovation output of enterprises. Hypothesis H1 is verified.

6. Robustness tests

This paper conducts the following robustness tests: (1) In order to reduce the impact of omitted variables on the research results, this paper adds two control variables of the proportion of independent directors (Indep) and duality (Dual) on the basis of Model (1). The definition of the proportion of independent directors (Indep) is the ratio of the number of independent directors to the total number of directors. Duality (Dual) is the dummy variable, which equals 1 if the chairman and the general manager are the same person, and 0 otherwise. The regression results are shown in Table 4. (2) In order to ensure the robustness of the research results, this paper eliminates the samples with the number of patents granted

being 0, and only keeps the sample companies with innovation needs for the regression analysis. The regression results are shown in Table 5. The robustness test results indicate that the research conclusion of this paper is still robust.

Table 3. ESOPs and corporate innovation output

Variables	Inno
ESOP	0.262**
	(1.99)
Size	0.650***
	(9.13)
ROA	2.408**
	(2.30)
Lev	0.121
	(0.27)
Growth	-0.042
	(-0.23)
ATO	-0.205
	(-0.86)
H5	0.850*
	(1.96)
SOE	-0.025
	(-0.14)
Mnghold	0.226
	(0.74)
Constant	-14.806***
	(-8.69)
Year	Yes
Ind	Yes
N	1,046
Adj. R2	0.255

Note: The numbers in brackets are t-statistics.
*, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 4. Adding control variables

Variables	Inno
ESOP	0.280**
	(2.11)
Size	0.626***
	(8.66)
ROA	2.465**
	(2.35)
Lev	0.136
	(0.30)
Growth	-0.049
	(-0.26)
ATO	-0.220
	(-0.91)
H5	0.880**
	(2.01)
SOE	-0.050
	(-0.27)
Mnghold	0.189
	(0.61)
Dual	0.057
	(0.49)
Indep	-1.645
	(-1.58)
Constant	-13.570***
	(-7.44)
Year	Yes
Ind	Yes
N	1,038
Adj. R^2	0.252

Note: The numbers in brackets are t-statistics.
*, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 5. Eliminating the samples with the number of patents granted being 0

Variables	Inno
ESOP	0.243***
	(2.59)
Size	0.729***
	(14.41)
ROA	-0.374
	(-0.48)
Lev	-0.834***
	(-2.62)
Growth	-0.119
	(-0.91)
ATO	0.766***
	(4.18)
H5	0.422
	(1.40)
SOE	-0.300**
	(-2.36)
Mnghold	0.188
	(0.87)
Constant	-12.856***
	(-8.83)
Year	Yes
Ind	Yes
N	785
Adj. R^2	0.392

Note: The numbers in brackets are t-statistics.
*, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

7. Conclusion

This paper selects A-share listed companies that have implemented ESOPs from 2014 to 2021 as research samples to empirically test the impact of ESOPs on corporate innovation output. The results show that ESOPs can significantly promote corporate innovation output.

This study has the following implications. Firstly, ESOPs have been carried out in Chinese listed enterprises successively, and innovation incentive degrees of ESOPs are also affected by the market environment and enterprise types. Enterprises should be guided to carry out relevant work reasonably based on their own conditions to ensure that ESOPs can effectively bring the incentive effects. Additionally, we should improve the external supervision system for implementing ESOPs. The formulation of relevant laws and regulations should be further accelerated in order to provide more powerful institutional guarantees for the implementation of ESOPs. Finally, the key to the implementation of ESOPs is to provide benefits to ordinary employees. Enterprises should give more consideration to schemes benefiting ordinary employees to ensure that ESOPs can bring incentive effects in the actual implementation of innovation activities.

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