Research on the Management of the Tragedy of Public Land of Industry, University and Research by Enterprise Information Disclosure

Liuyang Ji*, Menglei Tu
School of Management, Jiangsu University, Zhenjiang, Jiangsu, 212013. P.R. China

Abstract: Based on the interviews with the retired researchers of the rich experience about in industry-university-research collaboration from the universities, this study adopts the ideas and methods of grounded theory analysis and finds that the rent-seeking, collusion, and opportunism are three major forms of corruption, which jeopardize China's industry- university-research collaboration. In order to test the mediation behavioral inhibition mediation effect model, the multiple mediation effect model and the chained multiple mediation effect model, the structural equation model is used. The results show that if the companies increase the disclosure of relevant information about industry-university-research collaboration, which will have some inhibitory effects on the rent-seeking, collusion, and opportunism in the collaboration.

1   Introduction

The industry-university-research collaboration is an important part of the national innovation system [1]. However, there is a certain feature called "tragedy of public land" because of the existence of corruption in China, such as rent-seeking, collusion, and opportunism. If we do not timely manage the tragedy, it will not only make the industry-university-research collaboration inefficient, but also cause serious setbacks in its development. Therefore, how to implement the prevention and control of the industry-university-research corruption, increase the governance, and reduce the loss of the scientific and technological funds, which have become an urgent problem to be solved in our domestic industry-university-research management strategy.

The cooperation among industry, university and research institute is an important form for the collaborative innovation by the means of taking advantage of their respective strengths [2]. Among the different types of the industry-university-research cooperation in China, the cooperation between the state-owned enterprises and the universities is a typical type of severe corruption. On this occasion, the cooperation and management is chosen as the research object.

Enterprise information disclosure is one of the core elements of the internal control, whose essential function is to avoid and mitigate various operational risks. Therefore, it has natural applicability to the suppression of corruption in industry-university-research collaboration. In the theoretical research system of industry-university-research, the role of corporate information disclosure has been concerned, but has not yet formed a mature management channel. Some researchers had discussed the role of information disclosure or publication in the corruption governance. Wei and Su pointed out that the corporate information disclosure can be used to deal with the "internal control" behavior. By increasing the information disclosure of project value, cost and acceptance, it can effectively stop the managers' behavior for self-interests [3]. Tian found that the corporate governance of state-owned enterprises had not achieved good results, and the phenomenon of "internal control" was common. Therefore, it was necessary to strengthen the disclosure of various scientific and technological management information [4]. Liu and Wang investigated the problem of the rent-seeking and corruption in the R&D investment of enterprises. In addition, the research suggested that the phenomenon of using technology funds to

---

seek personal gains will be moderately avoided if the enterprises disclose the whereabouts and uses of technology funds within the enterprise [5]. Valentina argued that the differences in knowledge background, professional skills and research experience between university researchers and corporate personnel often led to opportunistic behaviors of the university researchers, but if the companies disclosed the R&D process in detail, they can effectively avoid it [6]. Huang agreed that public release of the demand for industry-university-research can reduce the collusion between the university researchers and corporate executives, and the unwarranted loss of corporate technology funds could be avoided as well [7].

2   Research model design

2.1   Effect analysis of enterprise information disclosure on rent-seeking, opportunistic and collusive behavior inhibition

Enterprise information disclosure means the information disclosure of industry-university-research cooperation project within or outside the enterprise, so that the behaviors of executives or approving officers are supervised, the successful probability of the industry-university-research cooperation will be increased and the possibility of rent-seeking, collusion, and opportunism can be reduced.

Based on the above analysis, the following research hypotheses can be proposed:

H1-1: Corporate information disclosure helps to inhibit the rent-seeking behaviors in industry-university-research collaboration.

H1-2: Corporate information disclosure helps to inhibit the opportunistic behaviors in industry-university-research collaboration.

H1-3: Corporate information disclosure helps to inhibit the collusion in industry-university-research collaboration.

2.2   Analysis of the governance effect of rent-seeking, opportunism and collusion suppression on tragedy of public land

In the industry-university-research cooperation, the rent-seeking behavior is that the university researchers bribe the executives of enterprises to obtain research and development projects by means of the legal or illegal means. In China, the phenomenon of rent-seeking in scientific research management was extremely common [8], which had become an important factor hindering the scientific innovation of industry-university-research [9]. Once the behavior was restrained, it will inevitably prevent the loss of resources of industry-university-research, and the science and technology collaborative innovation ability will be greatly enhanced [10].

In the industry-university-research cooperation, opportunism is the act of either both parties or one party using information asymmetry to pursue their own interests through concealment and false reporting. There were a large number of opportunistic behaviors in our country, which had increased the adverse selection and moral hazard in industry-university-research [11]. Moreover, it was difficult to create high-level industry-university-research projects under opportunism, which directly threatened the efficiency of industry-university-research [12]. Therefore, if the opportunistic behavior was restrained, the level of the industry-university-research project will be further improved, and the governance of the public land tragedy will be further advanced.

In the industry-university-research cooperation, collusion refered to the act that all parties treat the cooperation of industry-university-research project as the axis to jointly seek their improper interests. As for state-owned companies, collusive behavior had seriously reduced the company's operational performance [13]. Consequently, if the collusion was restrained, the harm of it will be gradually reduced, and the governance efficiency of the tragedy of the public land will be further improved [14].

Based on the above analysis, the following research hypotheses can be proposed:

H2: The suppression of rent-seeking behavior contributes to the governance of public land tragedy.

H3: The suppression of opportunistic behaviors contributes to the governance of public land tragedy.

H4: The suppression of collusion contributes to the governance of public land tragedy.

2.3   Analysis of the governance effect of enterprise industry-university-research information disclosure on tragedy of public land

In corporate governance, various "internal control" behaviors within virtual companies are constrained by exercising the functions of corporate information disclosure. As a result, the increase on the propaganda of corruption supervision, the disclosure of science and technology funds, and the reasonable evaluation of the value of science and technology projects were not only effective strategies for tackling scientific research corruption, but also the impetus providing more positive energy for industry-university-research cooperation to improve the governance efficiency of public land tragedy [15].

Based on the above analysis, the following research hypotheses can be proposed:

H5: Enterprise industry-university-research information disclosure contributes to the governance of the tragedy of the public land.

2.4   Analysis of the promotion effect of rent-seeking and collusion suppression on the inhibition of opportunistic behavior

In the industry-university-research cooperation, many rent-seeking and collusive behaviors are realized through opportunistic behaviors. The existence of rent-seeking and collusion will aggravate opportunistic behavior, which means the suppression of rent-seeking and collusive behavior contributes to the suppression of opportunistic behavior.

Based on the above analysis, the following research hypotheses can be proposed:

H6: The inhibition of rent-seeking behavior contributes to the inhibition of opportunistic behavior in industry-university-research collaboration.

H7: The inhibition of collusive behavior contributes to the inhibition of opportunistic behavior in industry-university-research collaboration.

2.5   Pre-analysis of the mediation effect of rent-seeking, opportunistic and collusive behavior suppression

In the industry-university-research cooperation, corporate information disclosure can improve the governance of public land tragedy through the suppression of rent-seeking, collusive, and opportunistic behaviors. At the same time, other means, paths, and channels can be used to promote the management of the tragedy of public land.

Based on the above analysis, the following research hypotheses can be proposed:

H8-1: Rent-seeking behavior constraint has a mediation effect on the management of the tragedy of public land of industry-university-research by enterprise information disclosure.

H8-2: Opportunistic behavioral constraint has a mediation effect on the management of the tragedy of public land of industry-university-research by enterprise information disclosure.

H8-3: Collusive behavior constraint has a mediation effect on the management of the tragedy of public land of industry-university-research by enterprise information disclosure.

H8-4: Rent-seeking behavior suppression, collusive behavior constraint and opportunistic behavior inhibition have multiple mediation effect on the management of the tragedy of public land of industry-university-research by enterprise information disclosure.

H8-5: Rent-seeking behavior suppression, collusive behavior constraint and opportunistic behavior inhibition have chained multiple mediation effect on the management of the tragedy of public land of industry-university-research by enterprise information disclosure.

2.6   Establishment of research model

According to the theoretical summary of the research hypotheses and the mediation effect of the corruption behavior suppression, the specific research model is shown in $Figure\ 1$.
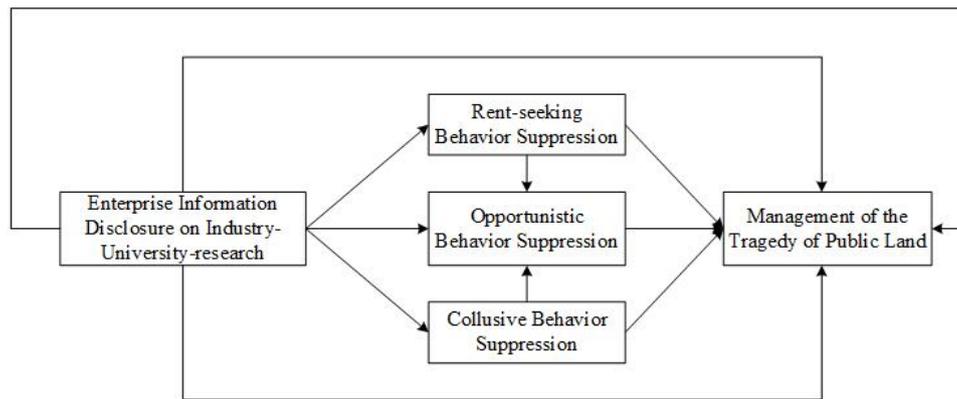
Figure 1: *A Specific Research Model on the Intermediate Effect of Corruption Suppression*

Table 1: Exploratory factor analysis

Latent variable	Manifest variable	Factor load	Cronbach's α	Explained variance (%) or Accumulated variance (%)
Enterprise information disclosure (ED)	Project prospect disclosure (ED1)	0.8282	0.7979	38.85
	Signing process disclosure (ED2)	0.8315		
	Expenditure disclosure (ED3)	0.2686		
	Project progress disclosure (ED4)	0.7043		
	Project closure disclosure (ED5)	0.7177		
	Deferred tracking disclosure (ED6)	0.3618		
Rent-seeking behavior suppression (RS)	Rent-seeking suggestion suppression (RS1)	0.720	0.876	39.18
	Cush rent-seeking suppression (RS2)	0.733		
	Gift rent-seeking suppression (RS3)	0.812		
	Project progress disclosure (RS4)	0.754		
	Emotional rent-seeking suppression (RS5)	0.799		
	Service rent-seeking suppression (RS6)	9.733		
Opportunistic behavior inhibition (OP)	Signing process disclosure (OP1)	0.812	0.777	39.99
	Expenditure disclosure (OP2)	0.740		
	Project progress disclosure (OP3)	0.822		
	Misleading negotiation suppression (OP4)	0.781		
	Quality cosmetic suppression (OP5)	0.712		
	Fraud post-project suppression (OP6)	0.828		
	Shield post-project suppression (OP7)	0.706		
Collusive behavior inhibition (CO)	Collusion arouses suppression (CO1)	0.739	0.808	41.90
	Joint collusion suppression (CO2)	0.834		
	Secondary collusion suppression (CO3)	0.766		
	Exchange collusion suppression (CO4)	0.719		
	Triple collusion suppression (CO5)	0.722		
Public land tragedy governance (ST)	Effective use of funds (ST1)	0.790	0.798	34.76
	Expertise performance (ST2)	0.866		
	Industry leading advantages (ST3)	0.752		
	Domestic leading advantages (ST4)	0.793		
	International leading advantages (ST5)	0.252		
	Clear expected goals (ST6)	0.717		
	Achievement of R&D objectives (ST7)	0.700		

3   Indicator design and test

3.1   Sample survey design

In this study, college retirees are selected as samples and an anonymous method is used for investigation. The survey lasted 129 days, using the Likert 7-point scale. After screening, 400 samples are obtained for this study. The ratio of the number of samples to the number of model indicators is about 10:1, which is in line with the data requirements of the structural equation model test.

3.2   Element MKO and BARTLETT test

Based on the sample data, using the SPSS18.0 software, the KMO test and the Bartlett test is performed. After testing, the data is in accordance with the conditions of factor analysis.

3.3   Reliability test

Based on 400 sample data and using the SPSS18.0 software, the exploratory factor analysis of the scale is shown in Table 1. According to the results, the factor load of the indicators ED3, ED6, and ST5 is low, which are deleted. In addition, the factor load values of all indicators are greater than 0.7. As a result, the retained corporate information disclosure measurement system, rent-seeking behavior suppression scale, opportunistic behavior suppression scale, collusive behavior suppression scale and retained industry-university-research public land tragedy governance measurement system have good reliability.

3.4   Validity test

Based on 400 sample data, the confirmatory factor analysis is performed by means of SPSS18.0 and Losrel8.7 software, as shown in Table 2. According to the results, the factor load of index ED1 is low, lacking significance, which are deleted. Therefore, the enterprise's industry-university-research information disclosure measurement system, rent-seeking behavior inhibition measurement system, opportunistic behavior inhibition measurement system, collusive behavior inhibition measurement system, and industry-university-research public land tragedy governance measurement system have good validity.

4   Model testing

4.1   Analysis of basic model test results

This study conducts the structural equation modeling test for basic research models, as shown in Table 3. In the basic research models, Hypothesis 5 has passed the test, indicating that the information disclosure of the industry-university-research has a positive effect on the management of tragedy of public land. According to the results, under certain conditions, enterprises can appropriately expand the scope of information disclosure from internal to external and until to the whole society.

4.2   Analysis of the model test results of the mediation effect of rent-seeking behavior suppression

This study examines the structural equation model for the mediation effect of rent-seeking behavior inhibition, as shown in Table 4. Comparing with the basic model, H5 passes the test, but the path coefficient becomes smaller. Meanwhile, H1-1 and H2 have passed the test. According to the mediation effect theory, there is a mediation effect of the suppression of rent-seeking behavior. Therefore,H8-1 is established. According to the comprehensive analysis of the test results, the information disclosure of industry-university-research can exert an effect on the governance of the public land tragedy through rent-seeking behavior inhibition, which indicates that there is rent-seeking behavior in the domestic industry-university-research cooperation, and corporate information disclosure helps to inhibit it. Meanwhile, many of the conventional information disclosure functions in enterprises are still in a state of serious lack of status, which shows that there is still a long way to go in the disclosure of information on industry-university-research.

Table 2: Confirmatory factor analysis

Latent variable	Manifest variable	Factor load	Standard deviation (SE)	T (%)
Enterprise's industry-university-research information disclosure (ED)	Project prospect disclosure (ED1)	0.18	0.12	1.5
	Signing process disclosure (ED2)	0.29	0.09	3.22
	Expenditure disclosure (ED3)			
	Project progress disclosure (ED4)	0.42	0.12	3.50
	Project closure disclosure (ED5)	0.32	0.07	4.56
	Deferred tracking disclosure (ED6)			
Rent-seeking behavior suppression (RS)	Rent-seeking suggestion suppression (RS1)	0.33	0.10	3.3
	Cush rent-seeking suppression (RS2)	0.28	0.07	4.00
	Gift rent-seeking suppression (RS3)	0.42	0.14	3.00
	Project progress disclosure (RS4)	0.29	0.08	3.59
	Emotional rent-seeking suppression (RS5)	0.37	0.10	3.70
	Service rent-seeking suppression (RS6)	0.39	0.12	3.25
Opportunistic behavior inhibition (OP)	Signing process disclosure (OP1)	0.38	0.12	3.17
	Expenditure disclosure (OP2)	0.27	0.09	3.00
	Project progress disclosure (OP3)	0.43	0.10	4.3
	Misleading negotiation suppression (OP4)	0.26	0.08	3.25
	Quality cosmetic suppression (OP5)	0.33	0.11	3.00
	Fraud post-project suppression (OP6)	0.41	0.09	4.55
	Shield post-project suppression (OP7)	0.35	0.11	3.18
Collusive behavior inhibition (CO)	Collusion arouses suppression (CO1)	0.28	0.0.07	4.00
	Joint collusion suppression (CO2)	0.33	0.09	3.67
	Secondary collusion suppression (CO3)	0.29	0.08	3.63
	Exchange collusion suppression (CO4)	0.41	0.10	4.10
	Triple collusion suppression (CO5)	0.36	0.12	3.00
Public land tragedy governance (ST)	Effective use of funds (ST1)	0.40	0.12	3.33
	Expertise performance (ST2)	0.28	0.12	2.33
	Industry leading advantages (ST3)	0.31	0.10	3.10
	Domestic leading advantages (ST4)	0.32	0.08	4.00
	International leading advantages (ST5)			
	Clear expected goals (ST6)	0.29	0.09	3.22
	Achievement of R&D objectives (ST7)	0.34	0.08	4.25

Table 3: Basic model test results

Hypothesis	Path representation	Path coefficient	Path	T	Inspection results
H5	Enterprise's industry-university-research information disclosure →Public land tragedy governance	ED→ST	0.43	3.83	Pass

4.3   Analysis of basic model test results

This study examines the structural equation model for the mediation effect of opportunistic behavioral inhibition, as shown in Table 5. In the test, H5 has passed the test, but the path coefficient becomes smaller than the test result of the basic model. H1-2 has not passed the test, while H3 has passed the test, it indicates that there is no mediation effect of the inhibition of opportunistic behavior in the promotion effect of information disclosure on the governance of public land tragedy. Therefore, H8-2 fails. According to the comprehensive analysis of the test results, there is no promotion effect of the inhibition of opportunistic behavior by enterprise information disclosure in industry-university-research, which shows that the governance of opportunistic behavior in our domestic research cooperation is not deep, and the enterprise has not

Table 4: Basic model test results

Hypothesis	Path representation	Path coefficient	Path	T	Inspection results
H1-1	Enterprise's industry-university-research information disclosure →Rent-seeking behavior suppression	ED→RS	0.30	3.07	Pass
H5	Enterprise's industry-university-research information disclosure →Public land tragedy governance	ED→ST	0.38	5.18	Pass
H2	Rent-seeking behavior suppression → Public land tragedy governance	RS→ST	0.27	5.19	Pass
H8-1					Pass

played an effective role.

Table 5: Test results of the mediation effect of opportunistic behavior inhibition

Hypothesis	Path representation	Path coefficient	Path	T	Inspection results
H1-2	Enterprise's industry-university-research information disclosure →Opportunistic behavior inhibition	ED→OP	0.12	1.45	Fail
H5	Enterprise's industry-university-research information disclosure →Public land tragedy governance	ED→ST	0.36	2.97	Pass
H3	Opportunistic behavior inhibition → Public land tragedy governance	OP→ST	0.4	4.44	Pass
H8-2					Fail

4.4   Analysis of the model test results of the mediation effect of collusive behavior inhibition

This study examines the structural equation model for the mediation effect of collusive behavior inhibition, as shown in Table 6. According to the results, H5 has passed the test, but the path coefficient is significantly smaller than the test result of the basic model. At the same time, H1-3 and H4 have passed the test, which indicates there is a mediation effect of the suppression of rent-seeking behavior. Therefore, H8-3 is established. According to the comprehensive analysis of the test results, it is known that there is promotion effect of the inhibition of collusive behavior by enterprise information disclosure in industry-university-research, which indicates that there is collusion in our research. In China's enterprises, many corporate information disclosures have not received attention and implementation. If the role of information disclosure is cultivated and developed, collusive behavior will be better suppressed.

4.5   Analysis of the model test results of multiple mediation effect of rent-seeking, opportunistic and collusive behavior inhibition

This study examines the structural equation model for the multiple mediation effect of rent-seeking, opportunism, and collusive behavior inhibition, as shown in Table 7. According to the results, H1-1, H1-3, H2, H3, H4, and H5 have passed the test, and H1-2 has not passed the test. Comparing with the path coefficient of the basic model test, although H5 passes the test in this model, the path coefficient becomes smaller. It can be seen that the suppression of rent-seeking behavior, the suppression of collusive behavior, and the inhibition of opportunistic behavior have some multiple mediation effects in the governance of public land tragedy.

Table 6: Test results of the mediation effect of collusive behavior inhibition

Hypothesis	Path representation	Path coefficient	Path	T	Inspection results
H1-3	Enterprise's industry-university-research information disclosure →Collusive behavior inhibition	ED→CO	0.36	8.43	Pass
H7-3	Enterprise's industry-university-research information disclosure →Public land tragedy governance	ED→ST	0.35	5.58	Pass
H4	Collusive behavior inhibition → Public land tragedy governance	CO→ST	0.28	3.85	Pass
H8-3					Pass

Table 7: Test results of the mediation effect of collusive behavior inhibition

Hypothesis	Path representation	Path coefficient	Path	T	Inspection results
H1-1	Enterprise's industry-university-research information disclosure →Rent-seeking behavior suppression	ED→RS	0.28	4.7	Pass
H1-2	Enterprise's industry-university-research information disclosure →Opportunistic behavior inhibition	ED→OP	0.08	1.22	Fail
H1-3	Enterprise's industry-university-research information disclosure →Collusive behavior inhibition	ED→CO	0.41	8.92	Pass
H2	Rent-seeking behavior suppression → Public land tragedy governance	RS→ST	0.36	4.10	Pass
H3	Opportunistic behavior inhibition → Public land tragedy governance	OP→ST	0.28	2.77	Pass
H4	Collusive behavior inhibition → Public land tragedy governance	CO→ST	0.38	6.13	Pass
H5	Enterprise's industry-university-research information disclosure →Public land tragedy governance	ED→ST	0.34	6.29	Pass
H8-4					Partly Pass

4.6　Analysis of model test results of chained multiple mediation effect of rent-seeking, opportunistic and collusive behavior inhibition

This study examines the structural equation model for the chained mediation effect of rent-seeking, opportunistic, and collusive behavior suppression, as shown in Table 8. According to the results, H1-1, H1-3, H2, H3, H4, H5, H6, and H7 have passed the test, but H1-2 has not passed the test. Comparing with the path coefficient of the basic model test, although H5 has passed the test in this model, the path coefficient becomes smaller. It can be seen that the suppression of rent-seeking behavior, the suppression of collusive behavior, and the inhibition of opportunistic behavior have some chained multiple mediation effects in the governance of public land tragedy through enterprise information disclosure in industry-university-research. In this model, H6 and H7 have passed the test. At the same time, H2, H3 and H4 have also passed the test, but comparing with the test results of multiple mediation effects, the path coefficients of H2 and H4 become smaller, and the path coefficient of H3 becomes larger. Therefore, the suppression of opportunistic behavior

exerts a mediation effect on the inhibition of rent-seeking behavior and the suppression of collusive behavior in the chained mediation effect. In other words, there exists a compound mediation effect.

Table 8: Test results of chained multiple mediation effect

Hypothesis	Path representation	Path coefficient	Path	T	Inspection results
H1-1	Enterprise's industry-university-research information disclosure →Rent-seeking behavior suppression	ED→RS	0.38	9.10	Pass
H1-2	Enterprise's industry-university-research information disclosure →Opportunistic behavior inhibition	ED→OP	0.15	1.83	Fail
H1-3	Enterprise's industry-university-research information disclosure →Collusive behavior inhibition	ED→CO	0.32	2.77	Pass
H2	Rent-seeking behavior suppression → Public land tragedy governance	RS→ST	0.28	3.76	Pass
H3	Opportunistic behavior inhibition → Public land tragedy governance	OP→ST	0.43	2.29	Pass
H4	Collusive behavior inhibition → Public land tragedy governance	CO→ST	0.29	6.17	Pass
H5	Enterprise's industry-university-research information disclosure →Public land tragedy governance	ED→ST	0.35	5.58	Pass
H6	Rent-seeking behavior suppression → Opportunistic behavior inhibition	RS→OP	0.44	3.99	Pass
H7	Collusive behavior inhibition → Opportunistic behavior inhibition	CO→OP	0.36	7.28	Pass
H8-5					Partly Pass

4.7 Management Implications

(1) The enterprise shall publicize the value, role, budget, expenditure details and application prospect of industry-university-research project in the enterprise. At present, the decision-making information of the projects is not disclosed in most state-owned enterprises, which is unfair to employees. In consequence, relevant information of the project should be publicized and subjected by the supervision of the employees.Therefore, that not only can many valuable proposals be absorbed, but also a fence can be set for corruption.

(2) The enterprise shall construct an evaluation mechanism to standardize the behavior of industry-university-research. In the industry-university-research cooperation, the enterprise shall evaluate the benefits of the project and publicize it to achieve the reputation incentives for the project approver in the enterprise, thereby effectively restraining the rent-seeking, collusive, and opportunistic behavior of the project approver and reducing the loss of corporate technology funding.

(3) Property rights reform is the fundamental strategy for controlling corruption, such as rent-seeking, collusion, and opportunism in China's enterprises. On account of the lack of clear property rights restrictions, enterprise operators can act without regard for any authority at some point. If property rights reform cannot succeed, the governance of the state-owned enterprise corruption is difficult to eradicate from the source.

(4) Improve the corporate governance mechanism, give play to the role of corporate information disclosure, and deepen the supervision of industry-university-research projects. From the perspective of corporate governance, rent-

seeking, collusion, and opportunism are typical "internal control" behaviors. Therefore, it is wise to use the established corporate governance mechanism to strengthen supervision of industry-university-research as much as possible.

5 Conclusion

Based on the mediation effect of rent-seeking, collusive and opportunistic behavior suppression, this paper constructs a governance effect model of corporate information disclosure on tragedy of public land. University researchers are regarded as an alternative industry-university-research sample, and the structural equation model is applied to test the behavioral inhibition mediation effect model, the multiple mediation effect model, and the chained multiple mediation effect model. The results show the following points. The first,there is a large number of rent-seeking and collusive behaviors in industry-university-research, but the risk of rent-seeking and collusion can be reduced through the increase of corporate information disclosure. The second, anti-corruption should become an important administrative function of the science and technology management institutions of governments at all levels in China. Corruption cannot be fully condemned as a crime. Therefore, it requires the participation of science and technology management organizations. The third, the thinking and guiding role of the theory of super-property rights can be helpful in the governance of industry-university-research corruption of state-owned enterprises. Super industry-university-research perspective is recommended to seek breakthroughs. The last but not least, the improvement of corporate governance is a key strategy for the governance of industry-university-research corruption in state-owned enterprises. Although the promotion of corporate governance in state-owned enterprises is faced with obstacles, which still brings a glimmer of hope to the governance of industry-university-research corruption.

6 Acknowledgments

References

[1] P. Sun, J. W. Zhang. Empirical analysis of the comprehensive of industry-academy-research cooperation in liaoning province based on entropy method. *Science and Technology Management Research*, 9 (2015): 71-76.

[2] J. Z. Li, Y. F. Sun. Research on innovation of industry-university-research cooperation mode. *Co-Operative Economy & Science*, 22 (2018): 108-111.

[3] H. Wei, Y. S. Su. The effect of institutional proximity in non-local university-industry collaborations: An analysis based on Chinese patent data. *Research Policy*, 42 (2013): 454-464.

[4] X. B. Tian. Remediation of scientific research corruption requires the restriction of two powers. *Prosecutorial View*, 11 (2014): 26-27.

[5] J. Liu. Rent-seeking, corruption and R&D investment: evidence from 12367 firms in 30 Province of China. *Studies in Science of Science*, 10 (2014): 1509-1517.

[6] T. Valentina, S. Ammon. The engagement gap: Exploring gender differences in university - industry collaboration activities. *Research Policy*, 44 (2015): 1176-1191.

[7] J. S. Huang. A Research into the integrative governance forms of industry-university cooperation. *Studies in Science of Science*, 1 (2015): 69-75.

[8] X. P. Li. Analysis of scientific research corruption. *China Economist*, 3 (2015): 49-50.

[9] M. Isabel et al. University-industry collaboration and innovation in emergent and mature industries in new industrialized countries. *Research Policy*, 42 (2013):443-453.

[10] Y. Liu, D. T. Yang. Study on the collaborative innovation of the enterprise dominant "industry-university-research institute" cooperation based on grounded theory. *Journal of Management Case Studies*, 3 (2018): 279-288.

[11] Yang Deqian. Opportunism in "industry-university-institute" pooperation and its governance. *Science of Science and Management of S. & T.*, 27 (2006): 38-41.

[12] F. Mrio, H. Heiko. University-industry cooperation: researchers' motivations and interaction channels. *Journal of Engineering and Technology Management*, 36 (2015): 41-51.

[13] S. Z. Jiang. Mechanism design of collusion proof in state-controlling corporate governance. *Economic Review*, 1 (2011): 116-126.

[14] P. Carolin Plewa et al. The evolution of university-industry linkages-a framework. *Journal of Engineering and Technology Management*, 30 (2013): 21-44.

[15] S. Z. Xu. On the construction of the system of punishing and preventing corruption in scientific research institutions of state-owned enterprises. *The South Journal*, 2 (2014): 74-75.