

Game and Balance between IT Governance Capability and Corporate Governance Capability in Big Data Context*

Ying Qu

School of Economic Management
Hebei University of Science and Technology
Shijiazhuang, China

Mengqi Hou

School of Economic Management
Hebei University of Science and Technology
Shijiazhuang, China

Xiaoke Liu

School of Economic Management
Hebei University of Science and Technology
Shijiazhuang, China

Abstract—In the era of big data, the study of IT governance has new trends and new developments. IT governance capability and corporate governance ability constitute the most important two player game in the enterprise, and the game between the two plays a significant role in the risk management of the enterprise. With the help of "Prisoner's dilemma" of this game model, the article will carry on the game relationship of IT governance capability in enterprise and corporate governance ability analysis, the equilibrium between the two proposed optimal, and discuss the ways to crack the "Prisoner's dilemma", makes IT management ability and the ability of corporate governance in the enterprise play a better role to achieve the goal of enterprise, reduce the great contribution of risk and increase revenue.

Keywords—big data; IT governance capability; corporate governance capability; game theory; prisoner's dilemma

I. INTRODUCTION

With the gradual rise of enterprise information and network socialization, the corresponding cloud computing, Internet of things and mobile Internet and other derivatives have also been widely applied, and the speed of data growth and the change of data types all over the world are faster and faster. This not only challenges the effective storage, advanced retrieval and fast reading of information, but also brings huge market demand for data processing and analysis. Therefore, the new product "big data" is produced in the IT field. The world is hugging "big data" quickly, and the processing and analysis of large data is becoming the core supporting node of the future generation of information technology fusion. In the era of large data, data governance and IT governance complement each other. The integration of data and business promotes the new trend and

development of IT governance.

In 1990s the rise of the IT governance theory is a combination of information technology and the theory of corporate governance theory, on the one hand the introduction of corporate governance of investment decision, risk control performance of information technology to enhance the theory, on the other hand, emphasized to enhance corporate governance performance by information technology. Li Weian (2003) believes that the integration of corporate governance and network information system is one of the main reasons for the gap between corporate governance practices and governance structure. Therefore, the integration of corporate governance and information technology has become an important trend in the development of corporate governance theory and practice.

The IT Governance Institute (ITGI) proposes that IT governance includes the use of leadership, enterprise structure and process, to ensure that the enterprise's IT activities support and expand the strategic objectives of the enterprise. Weill and Ross (2005) think that the essential problem of IT governance is the problem of IT centralization and decentralization, and the main content is the distribution of IT power and responsibility of the enterprise. Therefore, the main body of IT governance is managers and their stakeholders. The purpose is to promote and achieve the strategic objectives of enterprises in various ways, so as to ensure the interests of stakeholders.

Research on IT governance theory in our country is still in the initial stage, and research on the integration of information technology and corporate governance is fragmentary. Based on the review and summary of these studies, this article choose the "prisoner's dilemma" model to analyze the game between senior managers of enterprises, corporate governance ability and IT governance and balance relation, and put forward the way to crack IT governance and

*Science and technology research project in colleges and universities of Hebei Province (ZD2017029)

corporate governance ability of the "prisoner's dilemma", making the enterprise IT governance capability and governance capacity to play a better role, reduce business risk, realize the goal of enterprise to provide a reliable guarantee.

II. "PRISONER'S DILEMMA" MODEL AND ITS APPLICATION

A. Brief Introduction to the "Prisoner's Dilemma" Model

The prisoner's dilemma is a representative example of the game theory of non-zero sum game. It is not the best choice of the group to reflect the best choice of the individual. The prisoner's dilemma is the first by the Princeton University mathematician Albert Tucker (Albert Tucker) proposed in 1950, that two suspects (A and B) were caught by the police and isolated from the trial. If two people confess, they will be sentenced to 8 years. If a person confesses that another person is not confessed, he is not openly confessed for 10 years. If he is not honest, if he is not honest, he will be sentenced to 1 year for lack of evidence.

TABLE I. THE PRISONER'S DILEMMA MATRIX

| | | |
|-------------|---------|-------------|
| A | | |
| A | Confess | Not confess |
| B | | |
| Confess | (8, 8) | (0, 10) |
| Not confess | (10, 0) | (1, 1) |

In this game, for A, he will first consider whether B frankly, if he is honest, Frank B, while two people were sentenced to 8 years, or he will be sentenced to 10 years; if the B does not confess, he chose to come will be released, otherwise the two were sentenced to 1 years; so A will choose the optimal strategy to. In the same way, B would choose its own best strategy - frankly, so two people chose to confess, and the result was 8 years. However, if two people do not plead guilty, they only need to be sentenced to 1 year. "Prisoner's dilemma" reveals to us that both sides choose the strategy that is most beneficial to them and the least risk. Under the premise that all two criminals are rational people, they will choose to confess from their own interest, who profoundly reflects the deep contradiction between individual rationality and collective rationality: the rational individual's pursuit of its own interests will damage the interests of the collective. The pursuit of individual rationality cannot ultimately achieve the maximization of personal interests. Out of the "prisoner's dilemma", we should trust each other, from mutual jealousy to mutual trust and cooperation.

B. IT Governance Ability and Corporate Governance Ability Analysis

IT governance ability refers to the ability to carry out IT governance activities and achieve the goal of IT governance by the governance body of enterprises and personnel. Taking the ultimate goal of IT governance as the guidance and taking the core idea of IT governance as the consideration, the IT governance capability oriented to IT is divided into

three aspects: strategic decision making capability, systematic integration capability and information transformation capability. Strategic decision making capability is the core ability of IT governance. Systematic integration capability is the important guarantee for IT governance in information technology, and the ability of information transformation is the inexhaustible driving force of IT governance.

Corporate governance capability refers to a comprehensive ability that is accumulated and formed in the long term production and operation process, which is closely related to the unique historical experience and historical conditions of the enterprise, and is formed and continuously developed by the governance body's application of governance tools to govern the governance objects. The corporate governance ability is a soft index in the corporate governance system, and it is the intangible asset of the enterprise. Analysis of the elements of corporate governance ability from the subject of corporate governance mainly includes: shareholders shareholder rights implementation ability and planning ability; the board of directors and the individual ability, strategic decision-making ability, culture ability; supervisors and members of the quality and independence; application ability of managers of intellectual ability and innovation ability, including learning ability and human resources information.

IT governance capacity plays an internal control role, and corporate governance capacity plays an external decisive role. They are interdependent and struggle with each other. Enterprises attach too much importance to the construction and improvement of corporate governance capability, which makes the status of IT governance capability ignored in decision-making, and to a certain extent, it affects the utilization of information resources of enterprises. Two kinds of governance ability has a common goal, from the perspective of game theory, the contradiction between them are no antagonistic contradiction, to take mutual cooperation in dealing with the relations between the two groups, in order to achieve the rational pursuit of non-confrontational game to maximize the overall interests, in order to achieve the best result is two governance capacity has increased interest or the interests of one party, the other party interests "positive sum game".

III. THE MODEL CONSTRUCTION AND GAME ANALYSIS OF THE "PRISONER'S DILEMMA" MODEL OF IT GOVERNANCE AND CORPORATE GOVERNANCE

A. The "Prisoner's Dilemma" Model Construction of IT Governance Ability and Corporate Governance

The prisoner's dilemma model of IT governance capability and corporate governance capacity can be expressed as: the participants: {corporate governance capacity, IT governance capacity}, the behavior space of them is: {excessive play, standardized use}, game matrix can be expressed as shown in "Table II". In the case of limited information resources, enterprises cannot meet the needs of corporate governance and IT governance at the same time. If the subject of corporate governance for the pursuit of

performance, to seize a large number of information resources to achieve the strategic goal of the enterprise, in this case the ability of corporate governance is in excessive play, makes the development of enterprises lack of information technology internal support, enterprises can only obtain short-term development (say N). If the information resource allocation tends to IT governance direction, while ignoring the implementation of the overall strategy, enthusiasm will be a serious blow to the subject of corporate governance for external information resources for the enterprise, IT governance capability in this case over to play, IT of the lack of external governance bodies support for enterprise development contribution is Limited (assuming N). If the subject of corporate governance and IT governance for the limited information resources, all over themselves, in this case, not only delayed the IT study, the loss of the efficiency of enterprises, both to a small role on promoting development of enterprises can only play (say n, n); conversely, if the information the allocation of resources in the enterprise, the subject of corporate governance and IT governance body can communicate with each other and have enough trust between the two, to regulate the use of the ability of corporate governance and IT governance capability in the information resources allocation of information resources, to support the IT, research results to obtain external information resources, support the construction of enterprise, benign in order to achieve the circulation of information resources, the information resources flow to the enterprise internal external ever found, lay the foundation for the enterprise to obtain the considerable development, the In the case of the two, the contribution of the two to the development of the enterprise is not measurable (assumed to be ∞, ∞).

TABLE II. IT GOVERNANCE CAPABILITY AND CORPORATE GOVERNANCE ABILITY GAME BENEFIT TABLE

| corporate governance ability IT governance capability | excessive play | regulate the use |
|--|-------------------|----------------------|
| excessive play | (n, n) | ($N, 0$) |
| regulate the use | ($0, N$) | (∞, ∞) |

B. The Game Analysis of IT Governance Ability and Corporate Governance Ability

The first number in "Table II" represents the payment of corporate governance capacity, and the second numbers represent the payment of IT governance capability. In this case, the rational choice of the two will appear in the following two possible situations, taking the corporate governance capacity as an example. The first possibility is: IT governance over to play, if corporate governance ability is excessive play, in the process of fighting for the enterprise information resources of both sides can make some contribution to the enterprise (n, n); if the ability to regulate corporate governance, it may be due to snatch information resources to the enterprise without any contribution ($0, N$). Compared with the two phases, the corporate governance ability should be overly exerted to cope with the excessive use of IT governance. Second possible scenarios: the ability to regulate the use of IT governance, corporate governance ability if excessive play will make some contribution to the

enterprise ($N, 0$); if the ability of corporate governance also regulate the use, so the ability of corporate governance's contribution to the enterprise cannot be determined (∞, ∞). Compared with the two phases, corporate governance ability will still be used over the norm to cope with the IT governance. Therefore, no matter what the IT governance ability is, the choice of corporate governance ability is the best. In the same way, IT governance ability will also be overused. The only Nash equilibrium is: {overexertion, overexertion}, and the result is (n, n). Under the premise that both of them are rational people, they will start from the unilateral side's contribution to the enterprise, but ultimately fail to achieve the Pareto maximization result of the maximization of the collective interest. If both of them choose to use the standard, both can make an unlimited contribution to the enterprise, and the enterprise can also make great progress.

But we should also see that the premise of the ability of corporate governance and IT governance capability for decision-making are able to make their contribution to the development of enterprises, both from the business interests to make their own choices, rather than for their own interests, so the two prisoners of the ability of corporate governance, governance capacity and IT the "prisoner's dilemma" is distinct, two prisoners are external constraints in decision making, prohibit their mutual communication, collusion, police use weakness selfish human nature, forcing them to confessed crimes, in order to maximize their own interests, get the results you want, which is the biggest beneficiary of the police. But the ability of corporate governance and IT governance capability are a whole, together for the benefit of enterprises, and promote development, while there is no mutual communication and information sharing between the two external factors constraints, which both sides of the common development of enterprises as facilitator and earnings, should proceed from the collective rationality, normative and cooperative attitude for enterprises contribute to the development.

IV. THE WAY TO SOLVE THE PRISONER'S DILEMMA

According to the above analysis based on IT governance and corporate governance ability of the game model, we can conclude that, if we want to contribute to the development of enterprises, reduce business risk, realize the strategic objective of the enterprise better, we should crack the prisoner's dilemma of IT governance and corporate governance ability. There are several ways to solve the IT governance ability and the corporate governance ability "prisoner's dilemma".

A. Adhere to the Principle of Cooperation

The characteristics of IT governance and corporate governance determine the two contradictions in the internal management of enterprises. The operation of enterprises is always accompanied by the dynamic role of these contradictions. But in general, the two are an important part of the enterprise. The struggle for the overall interests of the enterprises to compete for information resources by the two parties should be located in the enthusiasm of cooperation.

At present, many of our country not only face fierce domestic competition, but also face increasingly fierce international competition. The realization of the development goals of enterprises depends on the improvement of the competitiveness of enterprises. They rely on advanced governance concepts, governance capabilities and high-quality governance results. They need the combined role of corporate governance and IT governance capabilities to achieve maximum goals with limited information resources.

B. Strengthen the Communication of the Advance

In enterprises, the main body of corporate governance and IT governance entities have sufficient conditions to communicate adequately and there is a good foundation for mutual trust and information sharing between corporate governance entities and IT governance entities. In addition, from the IT governance and corporate governance ability of the "prisoner's dilemma" model we can also see that any party or both sides to seize the information resources for the information resources for the contribution of the enterprise is limited, enterprises obtain benefits can be measured, but if the two sides can communicate effectively to each other cooperation and coordination in the process of information resource allocation, both sides cannot be measured for the contribution of enterprises.

C. Strengthening the Mechanism of Supervision and Trust

In the prisoner's dilemma model, the key to cooperation is mutual trust. If a third party is the credibility of the two party, then the trust mechanism can be overcome through the third party restraint mechanism. Cooperation can be achieved. On the premise of strengthening external supervision mechanism, game ability of corporate governance and IT governance capacity of the premise and condition of Pareto optimal, and the supervisor can use selective incentives, incentives to implement different IT governance and corporate governance subject, can avoid the occurrence of IT governance capability and governance capacity to play a role the "excessive" situation. In addition, from the game model between them we can see that in the Pareto optimal condition, they cannot be measured for the contribution of enterprises, especially enterprises in an increasingly strong demand for enterprise information resource shortage, to coordinate and strengthen cooperation will get more external information resources for enterprises the development between the two, to promote the improvement of corporate governance performance of enterprises as large as possible, and get more IT control results.

V. CONCLUSION

Corporate governance and IT governance capability are integral parts of the enterprise. It is not advisable to rely solely on one side in the current business. Therefore, we must face up to the problems encountered in the development and stick to the principle of cooperation. We need the joint function of corporate governance and IT governance capabilities to achieve the maximum goal with limited information resources. In the process of information

resources allocation, effective communication can cooperate and coordinate with each other. Then, through the third party restraint mechanism, we can overcome trust problems and achieve win-win cooperation. Only by giving full play to the advantages of corporate governance and IT governance ability, can we make a great contribution to the enterprise and promote the development of the enterprise.

REFERENCES

- [1] Tang Miaomiao. Research on enterprise information security evaluation and countermeasures under large data background[D]. Maritime Affairs University Of Dalian, 2015(5).
- [2] Zhang Shaohua, Yang Lin, Li Chao et al. The application of IT governance in the era of large data[J]. Information technology and standardization, 2016(07).
- [3] Li Weian. The principle of Chinese corporate governance and international comparison[M]. Beijing: China financial and Economic Publishing House, 2003.
- [4] Peter Weill. And Jeanne W.Ross, IT governance how top performers manage IT decision rights for superior results[M], Haverd Business school press, 2004.
- [5] ITGI, Cobit 4.0 report[R], ITGI, 2005.
- [6] Xu Gang, Gao Jing, Liang Shujing. Overview of IT governance based on Corporate Governance[J]. Finance and Accounting Monthly, 2012(30).
- [7] Yang Hao, Zheng Xudong, Meng Dan. IT governance in Information Education: from the perspective of governance system and governance ability[J]. China Educational Technology. 2016(02).
- [8] Chen Jianxin, Zhao Xin. Analysis on the relationship between corporate governance ability and IT governance ability of colleges and universities from the perspective of game theory—Thinking based on the model of "prisoner's dilemma"[J]. Coal higher education. 2011(01).
- [9] Wang Ruihuan. Study on the relationship between the administrative power and the academic power of colleges and universities from the perspective of game theory[D]. University Of Qingdao, 2008(06).