

Research on Logistics Outsourcing Risk Management in E-Commerce Enterprise Based on Agency Theory

Pingping Xiao¹, Dianyu Wang²

¹*School of economics and management, Beijing Jiaotong University, Beijing, China*

²*School of economics and management, Beijing Jiaotong University, Beijing, China*

Email: ppx228@gmail.com

Abstract: This paper establishes a game pay - off matrix between the e-business enterprise as a client and logistics enterprise as an agent, with the application of principal-agent theory based on the analysis of the risk aversion problem in logistics outsourcing of e-commerce enterprises. And makes a research on the prevention strategy of risk from the process of e-business enterprises in logistics outsourcing, combined with the degree of importance that the clients paid to outsourcing business and the agents paid to the clients.

Key words: principal-agent theory; E-commerce; outflow of outsourcing; risk management; game

1 Introduction

The application of network technology on business has become a new trend and an inevitable development of enterprises for the keen competence in the global economic development. E-commerce emerges as the require of saving time. It is a powerful tool for enterprises to develop and enhance their core competitiveness. The whole process of e-commerce includes business flow, information flow, cash flow and logistics. In general, the business flow, information flow, and cash flow can be resolved through the existing network technology, and the Internet can easily achieve the transfer of ownership. However, logistics is beyond the ability of networks, therefore in the e-commerce transactions process, logistics accounts for most of the time and cost. Therefore, it is generally agreed that the level of logistics services is the bottleneck of e-commerce development.

In order to improve their core competitiveness and to get better logistics schemes, e-commerce companies frequently chooses outsourcing logistics, an approach which can reduce costs and improve service quality, to resolve the issue of logistics bottlenecks. Logistics outsourcing refers to that an enterprise entrust logistics service companies with its internal logistics business and keep in touch with the logistics service companies by information systems to manage and control the whole logistics process. However, since the logistics outsourcing activities involve many dependent economic entities, such as the upstream and downstream cooperative partners, and the third-party, logistics companies, any information asymmetry between the two will affect the agency relationship between the e-commerce companies and the third party logistics service companies.

Currently, studies on logistics outsourcing mainly focus on the application of traditional bilateral agent model, and simply consider the agency relationship in

logistics outsourcing based on the contractual relationship between logistics outsourcing companies and third party logistics. These studies failed to consider the impact from logistics outsourcing behavior on the upstream and downstream partners of the outsourcing enterprise in the supply chain. Hence, they ignored the fact that the information-sharing degree between the shipper and consignee can influence the choice behavior of the third-party logistics companies.

Therefore, analyzing the risk aversion problem in e-business logistics outsourcing based on principal-agent theory is indispensable in the e-businesses logistics outsourcing risk prevention strategy study.

2 Simple Literature Review

People generally believe that the quality of logistics services is the bottleneck of e-commerce development. Yang WEN^[8] analyzed the bottlenecks of the development of China's logistics in e-commerce environment and proposed specific methods to address the problems of small and medium enterprises in China. Shuhong XU^[9] analyzed the characteristics of e-commerce and traditional logistics and discussed how to use e-commerce features to design suitable logistics solutions to ensure not only that the goods can be transported safely, satisfied and on time, but also efficiently and at a low costs of logistics.

Logistics outsourcing is a very important business practices in the whole world. In the United States, 49% of the enterprises have their logistics outsourced, and in Europe this number is 65%. In China, 18% of production enterprises outsource their logistics to a third party and 55% of them outsourced partly. It is thus clear that, outsourcing has become more and more common. Since competition is more and more intense and price competition and service competition keep profits quite low, re-

duce logistics costs is becoming an important way for e-commerce companies to earn more profits. Moreover, good logistics service is essential for e-commerce enterprises.

Principal-agent theory is the main element of the Institutional Economics contract theory. The principal-agent relationship it mainly research refers to that one or more agents according to a express or implied contract, assign or hire other actors to offer services, at the same time grant the latter certain decision right and provide corresponding compensation payment according to the quantity and quality of services. Authorizer is the principal, and the authorized is the agent. Logan^[1] over-viewed application of agent theory in outsourcing. Cuihua ZHANG and Xiaoyuan HUANG^[10] analyzed outsourcing under asymmetric information, related quality assessment and transfer payments policy.

This paper uses principal-agent theory to analyze risk aversion issues in e-business logistics outsourcing. Through establishing multiple game pay-off matrixes with outsourcing enterprise as a principal and logistics as an agent, combined with client's emphasis on the outsourcing and agent's emphasis on client, we study the risk prevention strategies for outsourcing companies in outsourcing process.

3 Main Research

3.1 Outsourcing Game Model Based On Agency Theory

The e-business can choose supervise or not the outsourcing process in which the outsourcing companies are treated as principals, and there are two kinds of monitoring process: process monitoring and results monitoring.

Process monitoring refers to the agent can control and track goods through the whole process. If any discrepancy is found, it can be immediately rectified, it. Specifically, we can connect the database of third party logistics with that of e-commerce enterprise so that e-commerce enterprises can to grasp the situation immediately. Clearly, this mode of supervision can hedge their risks better but with high costs.

Results monitoring costs relatively less. Outsourcing companies assess logistics business through a number of key indicators instead of controlling the whole process. Since the third-party company will reduce service quality without supervision in order to reduce the costs, e-commerce companies outsource their business to third-party logistics enterprises and care not the logistics process will reduce third-party logistics service quality.

Logistics, as a contractor, can be considered as agent in outsourcing. Assume that he has two service levels: service level I, and level II. Level I, which cost more but with better service quality, can bring market

reputation to e-commerce companies; Level II, with the small cost but poor service quality, will cause losses to the client. Therefore, when e-commerce businesses realize that logistics enterprises as agents offer service in level II, they will charge some fine F according to the contract. Such a charge will bring loss D to logistics in the future, such as lost opportunities and so on.

To establish the pay-off matrix for the agents and principals, first, assuming that: (1) If the logistics outsourcing business pays sufficient attention, then there will be no mistakes in the working process; (2) When using the process monitoring, e-commerce businesses can find problems in time and make it correct, left no loss to outsourcing companies. To describe the process conveniently, we note:

F : fines suffered by logistics companies for their violence.

D : Logistics future losses, including losing opportunities to cooperate with e-commerce business, loss of corporate reputation, etc.

$M1$: profits of logistics for high level services.

$M2$: profits of logistics for low level services.

$M2 \geq M1$; If client uses the process monitoring, then when the logistics enterprises offer low level services, they will be identified soon, so that the return of logistics enterprises $M2 = M1$.

N : the loss of e-commerce business when logistics enterprises offering low level services, including intangible losses, such as the decline in the quality of business services, corporate reputation damage etc.

$C1$: the cost of process monitoring for e-commerce businesses.

$C2$: the cost of results monitoring for e-commerce businesses. Obviously, $C1 > C2$.

Pay-off matrix for the agents and principals is shown in table 1:

Table 1.

| Agents \ Principals | Service Level II | Service Level I |
|---------------------|----------------------|------------------|
| | Process Monitoring | $C1, M1 - F - D$ |
| Results Monitoring | $C2 + N, M2 - F - D$ | $C2, 0$ |
| Without Monitoring | N, M | $0, 0$ |

We can see from Table 1 that when principal select process monitoring, once agents will be found whenever they offering service level II. Then the return at this time will only be $M1$, and at the same time they have to compensate F accordance with the contract, and future losses D . So if the principal selects process monitoring, and $F + D > M1$, then the agents will choose to offer service level I; if $F + D \leq M1$, the agents will select service level II.

When principals choose the results monitoring, once

the agents were found offering service level II, their income will be M_2 , and they have to pay compensation F according to the contract, and future losses D . If $F+D > M_2$, then the agents will choose service level I; if $F + D \leq M_2$, the agents might choose service level II.

When principals choose not to monitor, the agent will offer service level II.

When agents choose service level II, and if $C_1 < N$, which implies that $C_1 < C_2 + N$, then the best option is process monitoring for principals; if $C_2 + N < C_1$, then $N < C_1$, principals' best choice will be not monitoring.

When agents choose service level II, the principals' best choice is not supervision.

3.2 Model Analysis

From the pay - off matrix we can have: if principals choose not to monitor, the best selection for agents will be services level II, which means that principals have to choose to oversight. But which type of monitoring is better, process monitoring or results monitoring? It depends on the degree of knowledge about outsourcing business of principals and agents. From principals' point of view we should consider how important the outsourcing is for them. First, the outsourcing business's success or not will have a great impact on the outsourcing enterprise — the goods for outsourcing are valuable or the suffered losses of intangible assets, N , are very large; Secondly, the success or not of outsourcing business has little effect on the principal company — the direct loss of goods is less or the it has nothing to do with intangible assets such as corporate image, which implies that the value of N is small.

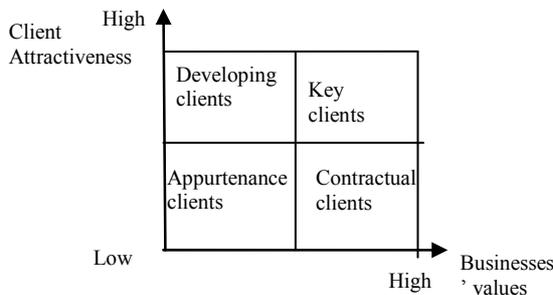


Figure 1.

Agents pay most attention to the value business and customers' attraction, as shown in Figure 1. Appurtenance clients refer to those clients whose businesses' values are always low, so that they cannot bring many profits to the agents. For these clients, the agents will use "passing strategy". Contractual clients refer to those customers whose contracts are not attractive in the future,

but the business right now can bring great value to the agents. For this type of clients, the agents would only like to finish the trade right now, and do nothing with cooperation in the future. Developing clients are those offering low value businesses right now, but has great potential for future development. To this kind of clients, agents are willing to spend more effort to obtain cooperation in the future. Key clients refer to customers whose outsourcing businesses not only can provide a larger profit right now, but also have a great potential in the future. Agents will seek to promote further cooperation with these clients, and the latter has a significant impact on the former.

If the outsourcing company, the principal, values outsourcing business highly, thus, N is very large, and is regarded as a key customer by the agent, then default to the agent will bring out a great intangible loss, which implies that D is large, the equilibrium for both sides will be (results monitoring, service level I) — principal choose results monitoring and agents choose not to default.

If the outsourcing company regards outsourcing business very seriously, and is treated as developing clients, then the equilibrium of the game would be (results monitoring, service level I), which means that the principal choose results monitoring, and agent choose not to default.

If the outsourcing company values business very seriously, and is considered to be contractual clients by agent, then if the agent violet the contract, such a default will bring negligible intangible losses, or $D = 0$. But because of the high-value outsourcing business, agent is still willing to complete this cooperation and accepts the stringent default clause in contract. Thus, in half of the cases, we have $F > M$, then the equilibrium will be (results monitoring, service level I). However, since agent does not treat the business very seriously, and the unexpected accidents will bring great loss to outsourcing companies, so process monitoring is a better option for principal.

Suppose that the outsourcing company regard the outsourcing business very seriously, and is treated as appurtenance client by the agent. If the agent violet the contract, the intangible losses for the agent will be almost negligible, or $D=0$. At this point, the agent's behavior is basically not bound by the principal, which means that the clients' supervision or not supervision will not affect the agent. Therefore, principals can only select process monitoring.

If the outsourcing companies do not attach importance to outsourcing, from the pay- off matrix we can see that if outsourcing companies choose not to supervise, the agent will choose the service level II. So outsourcing enterprises must choose supervision. If agent regards it as developing client or key client, then the agent will complete the outsourcing business better. On the contrary, if the principals are regarded as contractual or ap-

appurtenance clients, which implies that the impact of outsourcing companies is not significant, then results monitoring is a more economical choice.

3.3 Risk aversion strategy

In summary, if the agent enterprises treat our companies as key clients or developing clients, then principals can simply select the lower-costs results monitoring to avert the risk of outsourcing. However, once the agent violates the contract, it will suffer a great loss, such as high value goods. In this situation, principals should choose process monitoring to avoid risks. Conversely, if the agent treats principal just as its appurtenance client or contractual client and the outsourcing companies think that their businesses are very important, then the outsourcing company should choose process monitoring. Although the choice's cost is high, but it can effectively prevent the agent offering service level II, which might bring the principal huge losses. Therefore, the logistics outsourcing companies can take the following strategy to effectively avoid the risk of outsourcing:

- Assess the importance level of outsourcing for the enterprise. First of all, outsourcing companies should assess importance degree of the trade. If the outsourcing goods are valuable, or any little mistake from the agent will bring a significant negative influence, then outsourcing companies should pay particular attention to select a capable qualified agent and choose reasonable monitoring types.
- Assess the agent comprehensively. First, analyze the operation capacity, operation quality, error correction capability and corporate culture of the agent. Secondly, assess the degree of attention that the agent pays to its principal. Will the principal be treated as key clients, developing clients, contractual clients or appurtenance clients? Especially when the outsourcing business of the enterprise is very important while the agent regards it as its contractual client or appurtenance client, then the agent's operation quality and error correction capability will be particularly important. Only with high operation quality, low error probability, and relatively strong error correction capability agent, can outsourcing companies use process monitoring to avert risks effectively.
- Establish the outsourcing contract clause reasonably. In the contract-making process, combining the significance of outsourcing business and agent's emphasis on the enterprise, determine the amount and pattern of reward and punishment reasonably. Maximize enterprise's attraction to the agent, and arouse the working enthusiasm of the agent to avoid

default behaviors. At last, choose a logical type monitoring after a comprehensive consideration.

4 Conclusion

In this paper, we set up a pay - off matrix based on the principal – agent theory, and analyzed the game model combined with the importance of outsourcing to the enterprises and as an agent, logistics company's emphasis on the outsourcing enterprise. Our conclusion is that to effectively avoid the risks. Enterprises should first analyze the importance of the outsourcing business to itself, and at the same time, assess the agent's capability comprehensively. In addition, the enterprise should make sure the agent's perception, determine the outsourcing contract terms rationally, and choose a reasonable way to supervise the process.

References

- [1] M. S. Logan. Using agency theory to design successful outsourcing relationships [J]. *International Journal of Logistics Management*, 2000, 11(2):P21-32.
- [2] M. A. Razaque. Outsourcing of logistics functions: a literature survey[J]. *Physical Distribution and Logistics management*, 1998, 28(2):P89-107.
- [3] GIANNOCARO I, PONTRANDOLFO P. Supply chain coordination by revenue sharing contract[J]. *International Journal of Production Economics*, 2004, 89(2): 131—139.
- [4] LIANG Jing, CAI Shuqin. Quantificational Study on Information Asymmetry Based on Information Cognition[C]. 4th International IEEE Conference on Industrial Informatics INDIN' 06, Singapore, 2006.
- [5] Minahan, T. 1998a. Full-service suppliers offer peek at supply base of the future. *Purchasing*, 124(2), 8-10.
- [6] Minahan, T. 1998b. Is partnering a sham? *Purchasing*, 124(2), 61-64.
- [7] BJ La Londe, MC Cooper, Partnerships in providing customer service: a third-party perspective[J], *Council of Logistics Management*(1989).
- [8] Yang WEN. Under the e-commerce environment of third-party logistics development in China [J], *Logistics Technology*, 2008, 27(7) (Ch).
- [9] Shuhong XU. The strategy and application of E-commerce in logistics project [J]. *Sun Yatsen University Forum* (Ch).
- [10] Cuihua ZHANG, Xiaoyuan HUANG. Under asymmetric information service outsourcing quality evaluation and transfer payment decision-making [J]. 2004, 18(3) (Ch).
- [11] Junshan GAO etc. Risk compensation arrangements of outsourcing in principal-agent mode [J]. *China Journal of Management Science*, 2008, 16(5) (Ch).
- [12] Zhifeng YUAN. Enterprise logistics outsourcing and logistics enterprise game analysis [J]. *Chinese market*, 2008, 10 (Ch).
- [13] Zhixue LIU, Zengyong XU. Based on the asymmetric information theory of third-party logistics cooperation game analysis [J]. *China Journal of Management Science*. 2003, 11(5):P85-88 (Ch).
- [14] Yaoqiu WANG, Xianliang SHI. *Supply chain management* [M]. 2006(Ch).