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Research on the Status Quo and Countermeasures of Logistics Terminal Distribution Risk

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A B S T R A C T

The occurrence of disputes is an intuitive manifestation of risks. The risk of logistics terminal distribution has been transformed into real disputes and exposed to people's lives. Based on this, the article first analyzes the status quo of logistics terminal distribution, and analyzes the risk status of the typical case of takeaway distribution in the logistics terminal distribution in real life, and classifies its risk into trust, security and economic risk three categories; Secondly, refining the participants involved in the three risks, analyzing the relationship between the participants, and designing the logistics terminal distribution risk aversion management mechanism around the participants' objectives.

Key words: terminal distribution; risk analysis; mechanism design

Introduction

With the rapid growth of the number of Internet users in China and the gradual upgrading of the consumption structure, the logistics industry is affecting and changing people's lifestyles, and its terminal distribution has become a topic of concern in recent years. Among them, the express delivery industry and the food delivery industry are typical representatives of logistics terminal distribution. According to the China Internet Network Information Center statistics report, as of December 2018, the number of Internet users in China reached 892 million, and the number of mobile Internet users reached 871 million(China Internet Network Information Center, 2019: 28). According to the statistics of the post office, in 2018, China's express delivery business exceeded 50 billion, reaching 50.71 billion pieces. The express business income exceeded 600 billion yuan, reaching 603.84 billion yuan. The average daily processing capacity of national express delivery enterprises was 140 million pieces, and the maximum daily processing capacity reached 420 million. Piece (China Post Bureau, 2019: 04).According to iiMedia Research (Ai Media Consulting) data, the number of Chinese takeaway users reached 358 million in 2018, and the size of the takeaway market exceeded 240 billion yuan (Ai Media New Retail Solution Center, 2019).In the CNKI database, the "Logistics Terminal Distribution" keyword was entered for literature search. Through the review of the literature, it was found that the logistics terminal distribution was very few in the early years, until the past five years, more people paid attention to it. As of April 2019,

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a total of 535 related documents were retrieved in the CNKI database. Since 2011, the literature volume of related research has increased year by year, especially in 2015, as shown in <Figure 1>. It can be seen that the research on the logistics terminal distribution has become a research hotspot in public management. Therefore, logistics terminal distribution risk research has become a non-negligible aspect of public management in the current risk society.

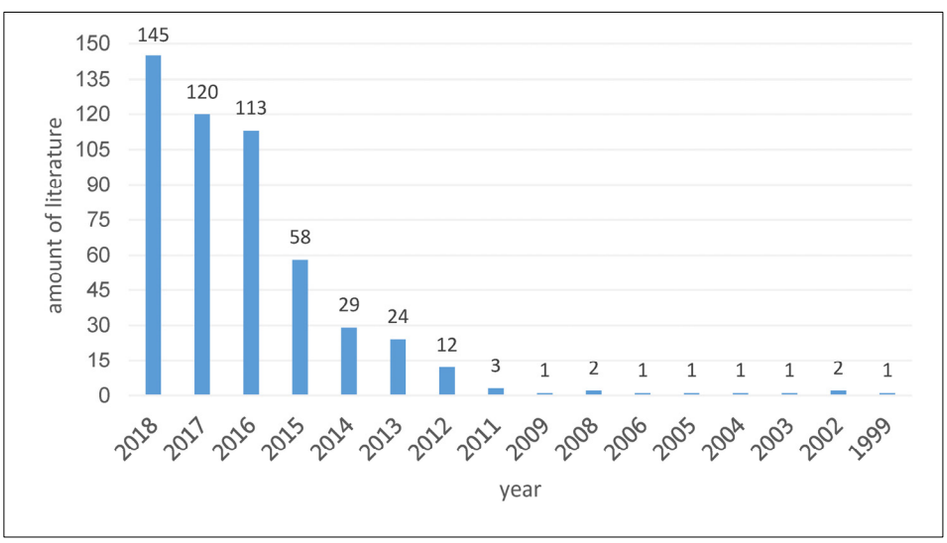
By further combing and counting some of the literature topics related to the risk of end-delivery, it is found that the research entry points mainly focus on the current situation analysis of the logistics terminal distribution, internal and external risks, risk assessment, distribution mode, legal dilemma, distribution cost and benefit distribution. In the research method, entropy method, grey correlation degree analysis method, Raiffa solution, game theory method, Shapley method, fuzzy comprehensive evaluation method, HJB equation method, linear programming method and literature analysis method are mainly used, and the modeling and application analysis is carried out with an example.

First, in the analysis of the status quo: Wu and so on through the analysis of the domestic and foreign fresh food cold chain logistics development model to construct a cold food distribution research framework system for fresh food (Wu, Han, & He, 2016: 33). On the basis of constructing the framework model of urban common distribution alliance, Chang proposed and constructed a diversified income distribution model and income distribution model under the two stages (Chang, 2015). Xu introduced the service design concept into the food and beverage takeout o2o, and established a service prototype with a gourmet community and a reward system (Xu, 2015).

Second, internal and external risks and their evaluation: Lu & Wu proposed to control the e-commerce crowdsourcing model from four aspects: perfect supervision, standardization of designated operations, improvement of performance evaluation and improvement of distribution efficiency (Lu & Wu, 2018). Chen believes that in the logistics terminal distribution, enterprises face three major external risks of nature, policy and market, and two internal risks of business and management (Chen, 2013: 35). Liu proposed using the analytic hierarchy process to design the e-commerce terminal distribution logistics risk index system from seven dimensions: environmental risk, financial risk, management risk, personnel risk, cargo risk, service risk and information transmission risk (Liu, 2012: 06).

Han combines the development status of China's fresh e-commerce terminal logistics distribution to build an index evaluation system for its terminal logistics distribution risk (Han, 2017). Shen & Shi believes that the most risky part of fresh e-commerce companies is their end-delivery (Shen & Shi, 2017). Shi constructed the perceived risk of catering takeout o2o - the purchase intention model, and used spss19.0 and amos21.0 to find that privacy risk most affects the trust level of consumers (Shi, 2018).

The third is in the distribution mode: Yan and so on to improve the service quality of B2C e-commerce logistics terminal crowdsourcing distribution, designed a full-subject, full process, comprehensive quality control system (Yan, He, Zhang, & Zhang, 2017: 09). Li proposed a strategy for constructing a coordinated distribution model for electric terminal logistics (Li, 2017: 39). Luo believes that the case-type enterprise chooses the mixture flow distribution mode to improve the terminal distribution efficiency, reduce the logistics cost, and facilitate the development of core business (Luo, 2015). Li constructed an improved Shapley value distribution model by



<Figure 1> Distribution of the annual order of the literature

introducing risk factors to solve the contradiction in the end common distribution alliance (Li, 2016: 34). Zhou used linear programming and mathematical modeling to design a better distribution plan for the takeaway brother (Zhou, 2019: 28). Ma and Li believe that there are five major problems in distribution security, quality, service, efficiency and cost in the current three modes of catering enterprise distribution, O2O platform distribution and third-party logistics enterprise distribution (Ma & Li, 2016: 22).

The fourth is in terms of legal dilemmas: Su based on the perspective of cost sharing, the corresponding legal framework of express delivery system is constructed (Su, 2018: 32). Zhang, *et. al.* believe that the current college express delivery lacks systematic and poor legal efficiency in the terminal distribution process (Zhang & Liu, 2016: 11). Zhang put forward precautionary measures against legal risks in two different angles before and after (Zhang, 2016: 32).

Sixth, in terms of distribution cost, benefit distribution and other aspects: Zhou improved the Raiffa solution common distribution cost allocation model based on multiple impact factors and carried out simulation checking to prove its effectiveness (Zhou, 2017). Wang established a game model between the government and the terminal co-allocation enterprises, the terminal co-allocation enterprises and the express delivery enterprises (Wang, 2017). Pan proposed to build a comprehensive cost negotiation allocation model based on Shapley value method and encourage enterprises to form a common distribution alliance to reduce cost improvement benefits and customer viscosity (Pan, 2017). Xian constructed an evolutionary game model between the participating subjects (Xian, 2016). Zhu, *et. al.* believe that crowdsourcing logistics can reduce the cost of expansion scale and improve the market adaptability of distribution services (Zhu, Yan, & Sun, 2016: 06). Cai introduced two factors of risk difference and service innovation and used fuzzy comprehensive evaluation method to establish the terminal distribution benefit distribution model (Cai, 2015). Xu & Zhou verified the impact of terminal value on value function and optimal policy (Xu, & Zhou, 2012: 56).

At present, scholars have carried out rich explorations in the research content, research methods and practical applications of logistics terminal distribution, and their research results also provide important reference value for solving the risks faced by terminal distribution. However, there are still some shortcomings in the research of logistics terminal distribution risk, such as: 1 Most scholars focus on the discussion of issues related to the distribution model, but the risks faced by logistics terminal distribution in real life are relatively weak; 2 There are many modeling classes in the process of logistics end-of-sales research, but there are few analysts involved in the actual dispute process; 3 logistics terminal distribution risk considers its legal dilemma, how to avoid or reduce end-delivery There is still room for improvement in risk.

In summary, the article analyzes the above three issues. Firstly, it analyzes the current situation of the takeaway industry in the end-of-sale distribution of logistics, and analyzes the risk status of the case in the real life by selecting the typical representative of the out-of-sale distribution in the logistics terminal distribution. Secondly, through the participation involved in the case. Differently analyze the relationship among the distribution risk at the terminal of logistics; again, design the logistics terminal distribution risk avoidance management mechanism by the type of risk and the relevance of its participants to the terminal risk of logistics.

Logistics terminal distribution status and risk analysis

Takeaway distribution is a typical representative of logistics terminal distribution, and its risks have been transformed into real disputes and exposed to people's lives. The occurrence of disputes is a direct manifestation of risks. Therefore, this paper uses the dispute cases induced by take-away distribution to characterize the distribution risk of dispute logistics. Disputes refer to the perception of interests or value differences between the parties, and the willingness or action to take countermeasures. Such a situation is a dispute. Therefore, this section first analyzes current situation of the external sales industry. Secondly, it combines case disputes to classify and analyze the risks of logistics terminal distribution.

The status quo of logistics terminal distribution - take take-away meals as an example of the selling industry

From germination to development, China's online takeout industry has shown a strong momentum, the takeout industry chain has gradually improved, the takeout market has gradually matured, the number of takeout users and riders is rising, and the whole industry has entered a period of stable growth. As shown in <Table 1>:

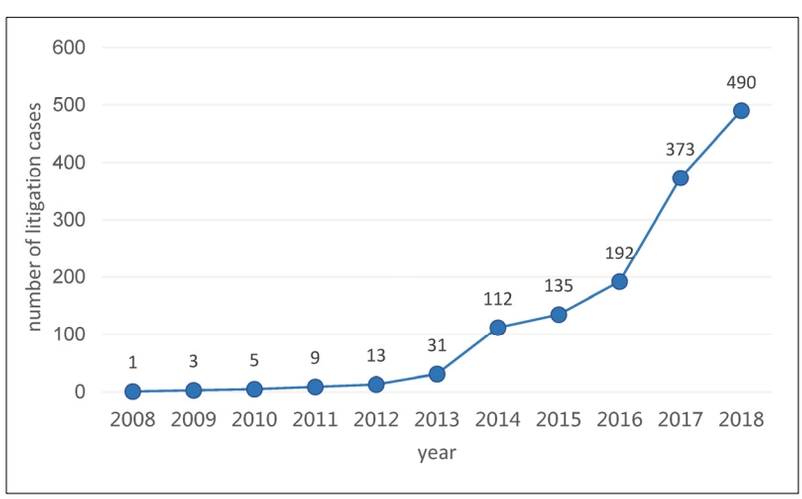
Logistics terminal distribution risk analysis

This paper quantifies the events that have entered the litigation stage as a proxy variable that characterizes the distribution risk

<Table 1> Analysis of the status quo of China's online take-out industry

Report name	Data Display
"2018-2019 China Online Takeaway Industry Research Report	1 In 2018, the number of Chinese takeaway users reached 358 million, and the size of the takeaway market exceeded 240 billion yuan; 2 In the first- and second- tier cities, the proportion of users who subscribed for one time or more was 54.3%, and that of users in third- and fourth-tier cities was 26.6%. 3 Since 2018, the distribution of the city's online take-out users in China has shifted to third- and fourth-tier cities.
"2019 crowdsourcing rider survival truth report"	1 The number of current riders has reached 13 million, accounting for 1% of the population base, of which about 1 million active riders; 2 The average annual wastage rate of riders is as high as about 64%.
"2018 Takeaway Rider Employment Report"	1 The rider's youth traits are obvious, mostly after 80s and 90s and mainly male; 2 The rider with bachelor degree or above only accounts for about 3% of the total number of riders; 3 The rider's daily order is the most in the 21-30 single, the 21-30 single is 45%, the daily driving distance is 50% in the 50-70 km, and the daily working time is less than 4 hours. 52%, 4-8 hours accounted for 39%, and 8 hours or more accounted for 9%; 4 There are 30% of the riders' monthly income of more than 5,000 yuan, and the wages of 50% of the riders are the main source of family income; 5 Take Meituan as an example. About 35% of Meituan riders have other sources of income.
"Night Food and Beverage Data Report"	1 People spend 78% on take-out meals at night, about four times as much as on going to a restaurant; 2 The nighttime catering consumption ranking of well-known tourist cities is significantly higher than its gdp ranking.

Sources: 2018-2019 China Online Takeaway Industry Research Report; 2019 crowdsourcing rider survival truth report; 2018 takeaway rider employment report; night dining data report.



<Figure 2> Distribution of the year of the lawsuit

at the end of logistics. This is because public litigation events are more representative than the prominent logistics end-risk events in news reports and are easy to collect and classify. The litigation data in this paper is from Openlaw. Through the search for litigation events including keywords such as “food delivery personnel”, 1385 cases of take-away distribution related cases filed between 2008 and March 2019 were obtained, as shown in <Figure 2>.

These lawsuits are distributed in 222 prefecture-level cities and 4 municipalities in China, and are divided into 17 categories. It specifically includes: tort liability disputes; personality rights disputes; labor disputes, personnel disputes; contracts, non-causal management, improper management disputes; nuisance of social management order; property infringement; administrative scope; violation of citizens' personal rights, democratic rights; Security; intellectual property rights and competition disputes; civil disputes related to companies, securities, insurance, bills, etc.; property rights disputes; marriage and family, inheritance disputes; destruction of the socialist market economy; application of special procedures cases; types

of administrative conduct; Based on case studies, this paper further classifies these 17 types of risks into three types of risks, namely, trust risk, security risk and economic risk.

This article classifies 1385 litigation incidents one by one, and finally classifies 169 litigation incidents including personality rights disputes, swindling and swindling as trust risks; classifies 761 litigation incidents including tort liability disputes and administrative scope as security risks; 695 litigation events, such as property disputes and the destruction of the socialist market economy, were classified as economic risks. Since the types of cases provided by the Openlaw website are not classified according to the type of risk, there may be intersections and overlaps in the types of risks represented by different types of litigation cases. In the event of a dispute involving trust risk, there is also an economic risk: A customer in Quanzhou falsely claimed to call for meals. After the delivery of meals to the agreed location, he repeatedly stole a total of 19 electric vehicles parked by the food delivery personnel, worth 34890 yuan. Since the case involved the theft of electric vehicles many times, the lawsuit was defined as an infringement of property, but because of the deception of the customer against the meal delivery personnel, the delivery staff was stolen from the tram because of the fraud of the customer. Therefore, we classify this kind of violation of property as the risk of trust.

1. Trust risk. The trust risk in the logistics terminal distribution is mainly due to the lack of trust caused by the information asymmetry of the value exchange parties (Ganapati & Reddick, 2018; Huurne, *et. al*., 2017).That is, due to the risk of low credibility, whether the distribution staff deceives the customer or the customer wants to deceive the delivery personnel is a risk of trust, such as: reputation disputes, extortion, contract fraud, etc.
2. Security risks. Security risks in shared economic society are rooted in the characteristics of their "inter-between economy" (Schor, 2016; Tussyadiah, 2015; Wu, Ma, & Xie, 2017). For example, Appellant Wu Mou is a takeout delivery officer, at 11:30 on September 20, 2016, when a meal was delivered at the entrance of the first floor lobby of the Department of Internal Medicine, Hong Kong Road Children's Hospital, Jiang' an District, the city, due to hospital security It is forbidden for the food delivery personnel to go upstairs. After Wu and security guard Liu had a contradiction, he fled the scene after piercing Liu's left upper arm with a dagger he carried with him. After identification, Liu's degree of injury was minor. In the case of the lawsuit, when the security guard banned the food delivery personnel from delivering meals to the building, the customer's evaluation of the food delivery personnel may be affected, which may directly or indirectly affect the wages of the food delivery personnel. Therefore, when security guards prevent the delivery of meals upstairs, the behavior is most likely to cause dissatisfaction among the delivery staff, which in turn will lead to conflict.
3. Economic risks. Economic risks refer to the consequences of serious economic losses caused by conflicts or disputes, such as: theft, extortion, motor vehicle traffic accident liability disputes. The risks in the shared economy model are both social and economical (Hawlitschek, Teubner, & Gimpel, 2016). In other words, logistics end-of-service distribution is accompanied by other social risks while having economic risks. The economic risk of end-of-sales originates from its fundamental economic attributes. In addition, there are many participants, and the composition and trading methods of stakeholders are far more complicated than traditional industries (Ranchordás, 2015).

Design of risk prevention management mechanism for logistics terminal distribution

Based on the present situation and risk analysis of logistics terminal distribution, the third chapter will deeply explore the effect of avoiding the above three risks. First, refining the participants involved in the three risks, analyzing the relationship between the participants, and designing the logistics terminal distribution risk aversion management mechanism around the participants' objectives.

Analysis of the current situation of risk aversion mechanism based on participants, relationships and objectives

Analysis of the current situation of risk aversion mechanism based on participants and objectives

In general, for a management mechanism, its goal is clear, so there is no need to design too much. The "seven-tuple" in the management mechanism can be used as the main adjustment variable in the mechanism design (Chen & Wu, 2011: 7). The logistics terminal distribution model, from the development to the present, the participants in the seven-tuple group have been basically determined, the relationship between the participants has been rela-

tively mature, so this paper mainly discusses the design of the regulation based on the objectives, participants and their relationships.

Participants involved in trust risk, security risk and economic risk induced in logistics terminal delivery (except for selling meals) include: rider, platform, customer, third party (except platform, customer, guard or security), insurance company, guard or security. The objectives of the three types of risks involve the main body of each party, including fairness, justice, order, efficiency, interests and innovation. Here, the article analyzes the active participants: the rider, the platform, and the customer.

The goals and appeals of the platform: a. Benefits. As a company, profit is the first goal.b. Efficiency. As an Internet company, the efficiency of capital operation, the efficiency of technology development, and the efficiency of public relations decision-making all affect the survival of the company, so efficiency is the second largest goal of the platform.c. Innovation. In order to attract more users and develop corresponding sections for the consumption habits of different customers, the platform is required to set innovation as an eternal goal.d. Fair.Fair appeals are not only fair treatment compared to companies in the same field, but also expectations for other Internet companies in different fields. Regulatory equity is based on a good development environment for the company, while internal equity promotes healthy and sustainable development of the company.

The goal and appeal of the rider: a. Benefits. The wages of about 50% of the riders are the main source of income for the rider's family. The wages of other riders are one of the important sources of family subsidies for the family. The main purpose of their work is to make a profit.b. Fair and just. As an individual, the rider exchanges his own labor for profit, and the fair and just appeal to the society is the second goal of the rider. On the one hand, it is a fair appeal to corporate resources and information services, and on the other hand, a fair appeal to supervision.c. Efficiency. The working hours of the riders are mostly during the peak hours of commuting, so efficiency is the third goal pursued by the rider, in order to serve more customers and obtain greater benefits in a limited time.d. Order.A good market atmosphere and order is the basic appeal of the rider. When the rider faces a malicious conflict with other people when he is uncertain about the customer, the rider has a higher demand for order.

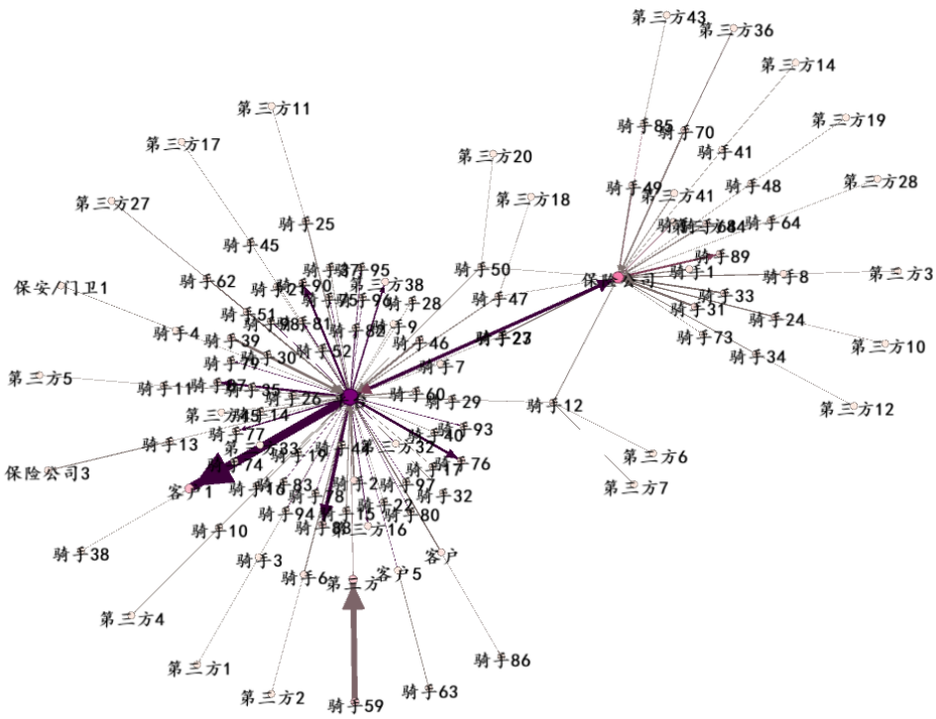
Customer's goals and appeals: a. Efficiency. The emergence of take-away offers more convenience and choice for customers' lives. As the pace of life accelerates, people's work and life efficiency can be quickly improved. While the take-away is convenient for people, customers also have high requirements for their meal delivery efficiency. Therefore efficiency is the customer's first goal. b. Order. Customers have high demands for their own safety. A safe take-out environment not only requires the rider to be safe and reliable, but also requires the rider to secure the traffic environment during the delivery process so as not to affect his own needs.

Analysis of the current situation of risk aversion mechanism based on the perspective of participant relationship

Participants have different relationships and connections with other participants based on their own goals and appeals. As can be seen from <Figure 3>:

(1) The relationship between the insurance company and the platform is mainly established by the rider, and there is a main interest and responsibility relationship between the insurance company, the platform and the rider. The main contradiction between the insurance company and the platform and the rider is whether the insurance company and platform should settle the claim and how to settle the claim after the rider is insured for the rider during the accident between work and non-work. As a result, a large number of interest litigation cases have been triggered, and then the trust risk and economic risk hidden among the three have appeared with the occurrence of dispute cases.

(2) The direct relationship between the platform and the rider and the indirect relationship with the third party are the strongest. The employment relationship between the platform and the rider determines that the relationship of interests and power between the two has been determined, but the relationship of responsibility has not been clarified. The determination of the responsibility relationship is directly related to the immediate interests of the rider and the platform, otherwise the legal disputes will have an adverse impact on the development of the terminal distribution industry. For example, is there a labor relationship between the rider and the platform when the labor contract is not signed? Should the platform be used to resolve conflicts or disputes between riders and others? For the customer, the probability of direct conflict and dispute with the platform is low, but The platform is a responsible mechanism for the customer. Although the customer cannot choose who to take the order, the platform needs to help solve the disputes and problems arising from the customer's service. Therefore, the platform, as the main processing party after the dispute between the rider and the third party, has an indirect relationship with the third party. In this process, the trust risk between the platform and the rider, the economic risk between the platform and the third party, and the security risk between the rider



<Figure 3> Takeaway Distribution Participant Relationship Diagram

and the third party, the economic risk swarmed.

(3) The three risk indicators faced by the rider are the highest, and the three risk indicators faced by security guards and guards are the weakest. In this relationship network, we can clearly see that the rider has the most risk points, and the relationship chain with the platform, customers, third parties, insurance companies and security or guards is the most complicated. The three risks faced by the riders are also the most complicated. The security risks and economic risks faced by security or guards are mainly due to disputes arising from conflicts of interest between the two. The main reason for the problem between the rider and the security and the guard is that the rider is blocked by the security guard or the guard on the way to the upstairs. The rider may reduce his income because he does not allow the food to go upstairs. Security and guard may also be fined for allowing riders to go upstairs to deliver meals. The violence caused by the two sides for their own interests.

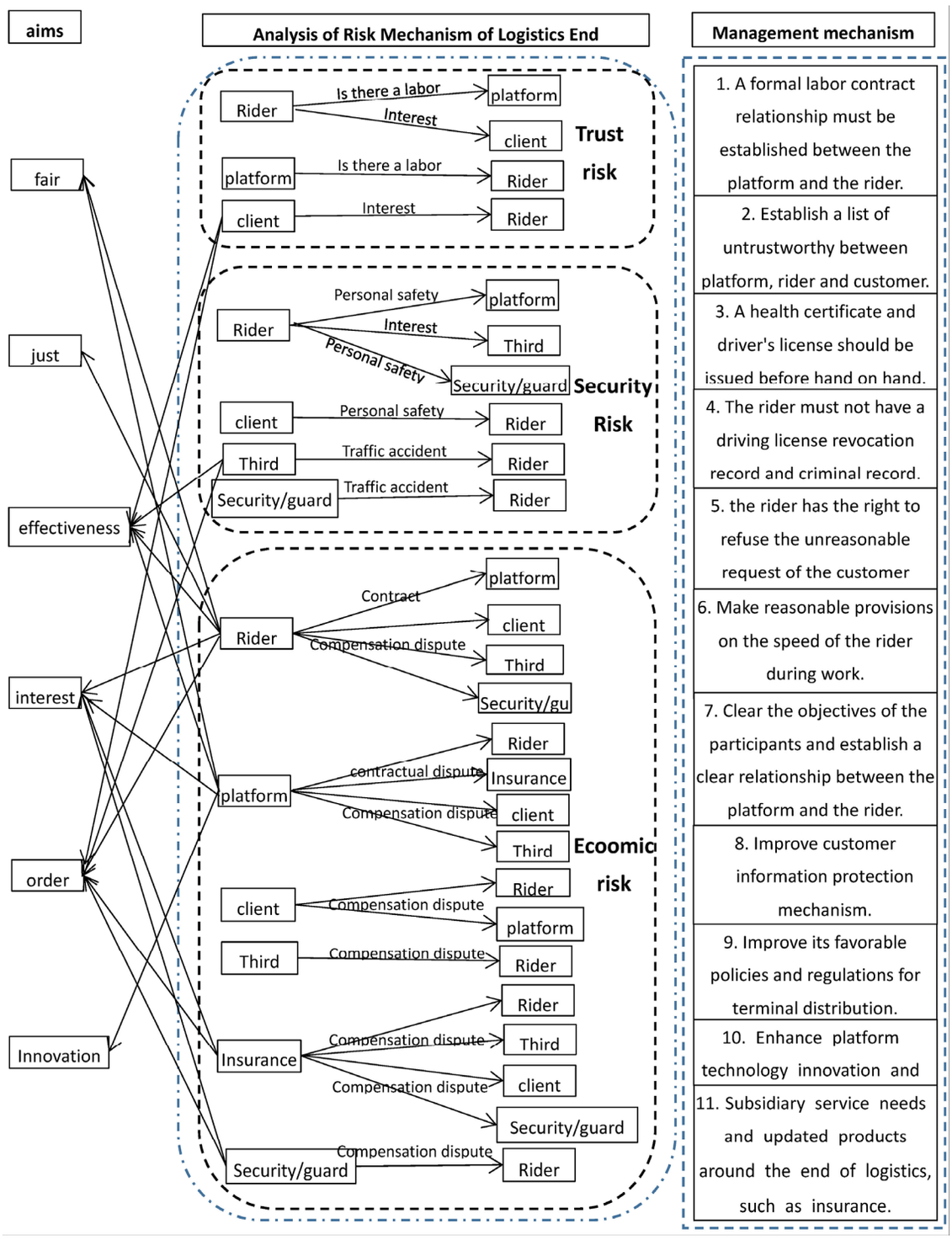
(4) Third parties face the highest security risks. From the network of participants, it is found that the third party is facing the most economic compensation, and it reflects that it faces the highest security risk. The security risks faced by third parties are mainly caused by traffic accidents caused by the rider's own interests in driving fast or red light during the meal delivery, which poses a security threat to third parties.

(5) The platform has the highest amount of claims for customers, facing the greatest economic risks, followed by riders and insurance companies. The rider and the client use each other's information blind zone to deceive each other and the risk of trust between them is also greater.

(6) When a dispute between a rider and a third party involves the platform or insurance company or the platform and the insurance company, this is also the main source of economic risks for the platform and the insurance company.

Design of logistics risk distribution prevention mechanism

Through the analysis of the participants' goals and relationships, we can more clearly understand the interests and hopes of the participants in the logistics terminal distribution. Combined with the above analysis, the logistics terminal risk distribution prevention mechanism is designed, as shown in <Figure 4> below:



<Figure 4> Logistics end distribution risk avoidance mechanism

Conclusions

Through the research on the actual cases of representative take-out distribution in the logistics trminal distribution and in-depth discussion of the objectives, interests and mutual relations of the participants, it shows that: 1. In the logistics trminal distribution process, the risk faced by the delivery personnel is the most complex, the highest risk index; 2. platform and distribution personnel face the greatest risk of trust; 3. The economic risk between the platform

and the distribution personnel and customers is the largest, followed by the economic risk between the insurance company and the customer and the third party; 4. Third parties face the greatest security risks, followed by customers; 5. security or guards face the lowest risk index.

Although the development of logistics terminal distribution has entered a period of stable growth, its market has not yet saturated, and there is still room for development in second- and third-tier cities. Therefore, the development prospects of logistics terminal distribution are still in a favorable state. On the basis of case study, this paper constructs the risk aversion mechanism of logistics terminal distribution, and studies the risk faced by logistics terminal distribution in real life. The participant relationship involved in the actual dispute process and how to avoid or reduce the risk of terminal distribution have a certain reference and supplementary role, in order to provide their own power for the development of logistics terminal distribution.

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