# The Relationship Between Liability Recourse System and the Efficiency of the Contractual Execution of the Business Alliance*

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*Abstract*—**Commercial union use collective reputation as collateral to make believable promise, earning the trust of consumers. This article illustrate the collective reputation how to play a role in consortium, And what kind of responsibility recourse mechanisms should the consortium take to reduce default, and improve the efficiency of contract? It constructs a responsibility recourse model to draw the conclusions, and test these conclusions by experimental economics method. Finally, the conclusions are proved by the responsibility recourse mechanisms, which are significant impact to the experimental results. Joint and several liability recourse mechanism is better at the contract maintenance than collective responsibility recourse mechanism in consortium. These conclusions prove the hypothesis of this article.**

*Keywords—liability recourse mechanism; collective reputation; consortium; experimental economics*

## I.    INTRODUCTION

Online shopping has been accepted by more and more people, but online shopping can't really contact with merchants or actually touch commodities. Due to such high uncertainty and potential risks, trust in merchants plays a crucial role in online shopping.

Most of the previous E-commerce research focused on the problem of trusting individual businesses. However, in the development of the E-commerce industry, there are some phenomena of related businesses or enterprises. These organizations are called business alliances. Members of these business alliances have common customers and have strong interdependence and interaction. Take the business alliance in Taobao as an example. Since the second half of 2003, the spontaneous formation of the merchants has sprouted. Various forms of business alliances have been formed in various places. The overall classification is divided into 3 categories: 1. Based on geography, such as Shanghai Business Alliance, Beijing Business Alliance, Hangzhou

Business Alliance, etc.; 2. Based on industry, such as cosmetics major league, flower business alliance, automotive supplies, etc.; 3. Based on the theme, such as original brand business alliance, crown club, Magic Bean Mother Alliance, etc. Business alliance members share benefits and complement each other's advantages by division of labor and collaboration.

The business alliance uses the collective reputation of the group as collateral to make a credible commitment to gain the trust of consumers. Greif (2004) examined the role of the Community Responsibility System (CRS) in promoting trade expansion during the late Medieval commercial revolution. The system of collective responsibility exists in Europe in the 12th century – Italy, France, the United Kingdom and Flanders. At that time, the personal identity of a businessman was difficult to verify. It was very difficult to investigate individual defaults. The personal actions of businessmen were difficult to observe, and personal reputation could not be effective. The spread of breach of contract information is also very slow, which makes it difficult for multilateral reputation mechanisms to function. Greif uses historical evidence to show that cities use collective responsibility systems to ensure that merchants take honesty. A collective responsibility system is a self-enforced institutional arrangement that operates on the collective responsibility of the community and the individual responsibility within the community: if a person in community A defaults on a transaction with someone in community B, the collective reputation of community A will be impaired, every member of the community will be legally responsible for the loss of Community B. If Community A refuses to compensate for Community B of the losses, any merchant in Community A entering Community B will be confiscated for damages. In order to prevent innocent members from being punished, the courts within Community A must investigate the member's breach of contract and require the defaulting member to compensate the members of Community B for their losses. The collective responsibility system guarantees the honesty of the parties and effectively promotes the development of long-distance trade.

The collective liability system in the business alliance and Greif is an institutional arrangement based on collective

reputation, or in other words, a moderate "even sitting system", meaning being punished for being related to or friendly with somebody who has committed an offence, which enhances the penalties that the buyer can implement through the sitting system, thus strengthening the seller's commitment and credibility. Li Wei'an et al. (2007) verified the role of Taobao Online Business Alliance: after controlling other factors, the sellers belonging to a certain business alliance have higher transaction volume in a certain period of time than sellers who do not belong to any commercial alliance. It explains that buyers are more reliant to join the sellers of the trade unions, and the promises made by the sellers are credible. This article will explain how the collective reputation of the business alliance works on the basis of Greif (2004) and Greif et al (1994), and what kind of responsibility recourse system is adopted by the trade union to help reduce the default of the alliance and improve the efficiency of contract execution.

## II. PROBLEM STATEMENT AND CONSORTIUM MECHANISM MODEL

Based on the analysis of the community responsibility system (CRS) by Greif et al. (1994) and Greif (2004), this paper draws on the analysis methods of Wu Desheng and Li Wei'an (2009) to expand and correct the model of the business alliance mechanism.

It is assumed that there are enterprises in each link of the production of a certain product in the market:

Hypothesis 1, the total demand for this product in the market is Q. The market demand of an individual enterprise product is related to its reputation r, and its demand is rQ, indicating that the higher the reputation of an individual enterprise, the greater the market demand, and vice versa.

Hypothesis 2, the game is limited to the unilateral Prisoner's Dilemma game, which assumes that only the product supplier in the market will have opportunistic behaviors such as fraud and other moral hazard, and the buyer has no opportunity to form moral hazard behavior.

Hypothesis 3, if the product supplier chooses opportunistic behavior—to deceive, that is, to sell the product at a lower cost $\underline{c}$, the supplier can obtain the benefit of H; if the supplier chooses the cooperative behavior—honest and trustworthy, that is, selling the product at a higher cost $\overline{c}$, the benefits is L. Also assume that the discount factor is $\delta$.

Hypothesis 4, assuming that there is an information dissemination mechanism in the market, if a single supplier cheats with low-quality products, there is a probability of detection $\rho$, and the consumer will pass the supplier's fraud information to the surrounding related consumers, resulting in declined reputation of the supplier at $\Delta r$, and the decline in reputation has led to a decline in market demand for products at $\Delta rQ$. The degree of decline in demand caused by deception is $\Delta r \rho Q$. $\Delta r$ measures the speed and range

of transmission of information, the faster the speed and the wider the range of transmission, the greater $\Delta r$ the decline in reputation.

### A. There is No Game Between Enterprises and Consumers in the Case of Vertical Cooperative Reputation Transfer

If an individual enterprise does not participate in a vertical partnership, the business is only responsible for its own individual reputation. A individual enterprise can achieve short-term gains from consumer fraud at a degree of $H - L$, but the deceived consumer will pass the information to the surrounding consumers, and the relevant consumers who obtain the fraudulent information of the enterprise will impose collective punishment on them. Consumers' collective punishment for them has caused their product market demand to fall to $\Delta r \rho Q$. Therefore, an individual enterprise chooses to deceive long-term gains that result in its loss at $\Delta r \rho Q \dfrac{-\delta}{1-\delta} L$.

When $H - L \leq \Delta r \rho Q \dfrac{-\delta}{1-\delta} L$, that is, $\dfrac{H-L}{L} \leq \Delta r \rho Q \dfrac{-\delta}{1-\delta}$, the supplier chooses to maintain good faith and do not deceive.

Among them, $\dfrac{H-L}{L}$ is the short-term rate of return obtained by cheating for a individual enterprise. In the case where the breach of contract is not easy to be found and the spread of the breach information is slow and the range is small, the right side of the inequality $\Delta r \rho Q \dfrac{-\delta}{1-\delta}$ is relatively small. If an individual enterprise guarantees to take honesty, it can only take measures to make the short-term fraud income obtained by the company low enough to be lower than the right side of the inequality.

### B. The Game Between Consumers and Business Alliances

It is supposed that the members of a company in the business alliance are n. In the event of a breach of contract in a member company, if the vertical cooperative organization can punish the member company in a timely manner and strive for forgiveness from the consumers, it will not affect the collective reputation, and consumers will not impose penalties on the vertical organization. If the vertical cooperative organization is unable to punish the deceived members, the entire vertical cooperative organization can obtain the temporary benefits of H-L, but its collective reputation is damaged, and then the relevant consumers will boycott the entire vertical cooperative collective reputation, so that the reputation of the entire vertical cooperation will decline by $\Delta r$, which led to a decline in demand for vertical cooperation market to $\Delta rn \rho Q$, and a long-term gain loss will be $\Delta rn \rho Q \dfrac{-\delta}{1-\delta} L$ from vertical cooperation. As long as $\dfrac{H-L}{L} \leq \Delta rn \rho Q \dfrac{-\delta}{1-\delta}$, the business alliance will impose penalties on member companies that have deceptive behavior.

At this point, the right side of the inequality is n times the right side of the previous inequality, which means that

vertical cooperation with its collective reputation as a guarantee greatly enhances its credible commitment. This conclusion is similar to that of Greif et al. (1994).

From the inequality $\Delta r \rho Q^{-\frac{\delta}{1-\delta}} < \Delta rn\rho Q^{-\frac{\delta}{1-\delta}} L$ , it can be concluded that: in the case of the values of discount factor $\delta$ , probability of discovery of breach of contract $\rho$ and information dissemination $\Delta r$ are constant, the recovery difficulty of consumer individual default behavior is higher than that of business alliances default behavior.

In order to avoid innocent sellers being punished, the management of the business alliance must strictly review the seller's application for membership, and the credit requirements of the seller are higher than those of Taobao. The following is an example of the business alliance with the largest turnover of members of Taobao Online, Beijing Business Alliance.

(1) The Beijing Business Alliance requires that the participants can only join the Beijing Business Alliance instead of other business alliances.

(2) The seller's shop must have more than 30 items and receive at least 5 credit evaluations per month.

(3) At least 151 favorable receptions have been validly received as sellers.

(4) There is no warning, no bad review or favorable reception rate is above 99% in the past six months.

Article (1) stipulates that sellers can only join the Beijing Business Alliance instead of other business alliances, including industry trade alliances. This rule is stricter than Taobao's requirements. Taobao requires sellers to join no more than two business alliances. The main purpose of Article (2) is to prevent sellers with inactive transactions from joining the business alliance. In order to ensure that the participation of the business alliance can bring benefits to the members, the business alliance must make demands on the scale and operational capabilities of the members' online operations. Articles (3) and (4) limit the reputation of members of the membership. This paper draws conclusions 1: The establishment of higher standards by the business alliance is conducive to reducing the default behavior of enterprises and improving the efficiency of contract execution.

Although the business alliance is an informal organization, it also has a more formal organizational structure. Some commercial alliances, such as the Pearl River Delta Business Alliance, have fixed offices and activity places. Each trade union has an ally leader, and there are several departments, such as the secretary, the personnel department, the technical department, the planning department, etc., and each department has a division of labor. Take the Zhuhai Business Alliance as an example. The secretary assists the ally leader in handling affairs of the business alliance, sharing the work of the ally leader. The secretary is responsible for drafting, amending, and cussing the relevant documents and materials of the business alliance,

collecting relevant materials and information of various industries, and sorting them to share with the members of the business alliance; The Personnel Department is responsible for managing the auditing members' application for membership and collating the members' materials; the technical department is responsible for the technical support of the business alliance activities, such as the design of the business alliance logo; the planning department is responsible for planning online and offline activities; the coordination department is responsible for handling the members of the business alliance. Departments that violate discipline and urge members to trade in good faith; the Communication Department is responsible for publicity. In order to strengthen management, the province-based business alliance also established sub-divisions. For example, the Pearl River Delta Business Alliance has Guangzhou, Jiangmen, Foshan and other districts, and each district has also established a management organization. Taobao.com Business Alliance has established its own forum. As a communication platform for members of the business alliance, the forum can bring a sense of belonging to the sellers, enhance the cohesiveness of the business alliance, and facilitate the dissemination of information, experience and lessons within the business alliance. Should there be an argument between a member of the business alliance and the buyers, the business alliance shall supervise the member to reasonably resolve the argument and impose penalties on the violation of the member. This paper draws conclusion 2: The ally leader of the alliance in the business alliance bears joint and several responsibilities, which is conducive to reducing the default behavior of enterprises and improving the efficiency of contract execution.

## III. EXPERIMENTAL DESIGN

In order to solve the related problems mentioned above, this paper mainly carries out a simple experimental simulation of the impact of contract execution efficiency through three different institutional arrangements.

The benchmark experiment was improved on the basis of the public goods resource supply experiment of Issac and Walker (1988). The benchmark experiment served as a control group to provide a reference for the other two experimental groups.

This economic experiment consists of three independent experimental parts, namely, the experimental part 1, the experimental part 2, and the experimental part 3. They respectively study the contract execution efficiency under the individual responsibility recourse system, the contract execution efficiency under the joint responsibility recourse system and the differences in contract execution efficiency under individual liability recourse and joint liability recourse system. Each experiment part conducted 20 rounds of experiments.

### A. Benchmark Experiment Part

The subjects were randomly grouped by computer software. Once determined, they would not be changed in the whole experiment. Moreover, each experimenter only knew

his or her own identity, but did not know the identity of others in the same group. In order to ensure two-way anonymity, the experiment host did not know who was in the same group with whom.

The experiment was conducted in 20 rounds, and each participant received 50 points of funding at the beginning of each round. Assume that the initial point is $Y$ for the i person in the first-round account. In the first round, he will invest $X_i$ in the public account of the group. The total amount of three people in the group invested in the public account is $(X_1 + X_2 + X_3)$ , and they were then proportionally distributed among the three according to the average of the total amount $(X_1 + X_2 + X_3)/3$ of public accounts in the group. Regardless of how much you invest in a public account within a group, the revenue you receive is only related to the total amount of the public account. The three participants in the group obtained the points in each round: the income of the participant type 1 in this group is: Y- $X_1 +$ $1.7*(X_1 + X_2 + X_3)/3$ , Y is the 50 points of the initial account of each round; $X_1$ is the amount invested in the public account; $1.7*(X_1 + X_2 + X_3)/3$ is the obtained revenue from the group 1 for the participant 1. The total revenue of participant type 2 in this group is: Y- $X_2$ + $1.5*(X_1 + X_2 + X_3)/3$ ; the total revenue of participant type 3 in this group is: Y- $X_3 + 1.3*(X_1 + X_2 + X_3)/3$ .

### B. Experiment 2

If the total amount $(X_1 + X_2 + X_3)$ invested in the public account of the three people in this group is less than 60. Then, the member with the lowest input in this group has a 70% probability of being found to be in breach of contract and

unable to gain profits from the production of products, i.e., $0*(X_1 + X_2 + X_3)/3$ .

### C. Experiment 3

If the total amount $(X_1 + X_2 + X_3)$ invested in the public account of three people in this group is less than 60. Then the group member of type A with the highest product income shall be responsible for identifying the cause, and the expenses spent by member A for liability recovery is $60-(X_1 + X_2 + X_3)$ , and the probability of being able to recourse the relevant responsible person is 70%. If the member with the least investment can be recourse, the member shall not benefit from the production of the product and shall pay member A's liability in terms of recourse costs. If member A cannot recourse the responsible person, A will bear the loss and other members will gain the normal profit.

After the experiment, the authors will convert the specific experimental income into RMB and pay the subjects. Under the above experimental settings, the authors use z-tree software to program the experiment. Each participant only participated in one experiment, which lasted about one and a half hours. In the end, each participant received an average cash income of 25.2 yuan, including an appearance fee of 10 yuan.

## IV. EXPERIMENTAL DEVELOPMENT

In this chapter, a total of 36 students from the Wafangdian Campus of Dalian Ocean University were recruited and divided into three batches to participate in the experiment. These subjects came from different majors and participated voluntarily. The entire experiment process used the ztree software program to complete the operation on the computer LAN client. The details of the experiment are shown in "Table I":

TABLE I.       DESCRIPTION OF EXPERIMENTAL DEVELOPMENT

| Experiment Session | Time | Place | Number of Subjects | Experiment Content |
|---|---|---|---|---|
| Experiment 1 | November 22, 2014 9:00-10:30 | Accounting, Dalian Ocean University Computerized training room | 12 | Experiment 1 |
| Experiment 2 | November 22, 2014 14:00-15:30 | Accounting, Dalian Ocean University Computerized training room | 12 | Experiment 2 |
| Experiment 3 | November 27, 2014 18:00-19:30 | Business training room of Dalian Ocean University | 12 | Experiment 3 |

## V. ANALYSIS OF EXPERIMENTAL DATA

In this paper, the experiment of responsibility recourse mechanism in vertical cooperation relationship is divided into three experimental parts, and experiment 1 is used as the benchmark experiment, which is used as the control experiment group of other experimental parts. The basic situation of the experimental content is shown in "Table II".

TABLE II.       BASIC INFORMATION OF THE EXPERIMENT

| Experimental Group | Number of Subjects | Number of Participating Groups | Experiment Mechanism | Other Description |
|---|---|---|---|---|
| Experiment 1 | 12 | 4 | Benchmark experiment | Comparison group |
| Experiment 2 | 12 | 4 | Individual liability recourse | |
| Experiment 3 | 12 | 4 | Joint liability recourse | |

The statistical description of the participants' contribution level to the vertical partnership in the three economic experiments is shown in "Table III".

TABLE III.       Contribution Level of the Subjects in the Vertical Partnership

| | Experiment 1 | Experiment 2 | Experiment 3 |
|---|---|---|---|
| Valid sample amount | 240 | 240 | 240 |
| Missing sample amount | 0 | 0 | 0 |
| Average value | 11.75417 | 24.14167 | 38.475 |
| Standard deviation | 10.41041 | 13.10326 | 10.79746 |
| Skewness | 1.250812 | 0.4792289 | -1.107165 |
| Kurtosis | 5.08294 | 2.776657 | 4.193217 |
| Variable coefficient | 0.8856779 | 0.5427652 | 0.2806357 |
| Data range | 50 | 50 | 45 |
| Maximum value | 50 | 50 | 50 |
| Minimum value | 0 | 0 | 5 |
| Total | 2821 | 5794 | 9234 |
| 25 percentiles | 5 | 15 | 33 |
| 50 percentiles | 10 | 25 | 40 |
| 75 percentiles | 20 | 30 | 50 |

"Table III" shows the level of contribution in the vertical cooperative relationship of the subjects, clearly describing the descriptive statistical characteristics of the three economic experimental data. Since there were 12 subjects in each of the three experiments and 20 rounds of experiments, the number of observations per experiment was 240. Due to proper experimental control, there was no data loss occurred and the overall data was complete.

From the perspective of the contribution level of the vertical cooperation of the subjects, the average contribution level of the experiment 1 "benchmark experiment" is 11.75417; the average contribution level of the "individual responsibility recourse vertical cooperation maintenance mechanism" in experiment 2 is 21.74167; the average contribution level of "the vertical cooperative relationship maintenance mechanism of joint and several liability recourse" in experiment 3 is 38.475.

In the three experiments, due to the different mechanisms, the contribution of the vertical cooperation relationship with the responsibility recourse mechanism was higher than that of the benchmark experimental control group. The average contribution of the vertical partnership experiment with the responsibility recourse is higher than the individual responsibility recourse. The impact of different systems of responsibility recourse in vertical partnerships on the level of contribution can be verified intuitively from experimental data structures. The difference in the average value of the contributions of the three experiments fully reflects the fact that the impact of the responsibility recourse system on the experimental results does exist. In the later empirical analysis, the author will explore the economic theory behind these phenomena.

## A. Comparative Analysis of Different Liability Recourse Mechanisms

After analyzing the details of the three economic experiments in this paper, this paper will compare and measure the contribution level of vertical cooperation under different responsibility recourse systems.
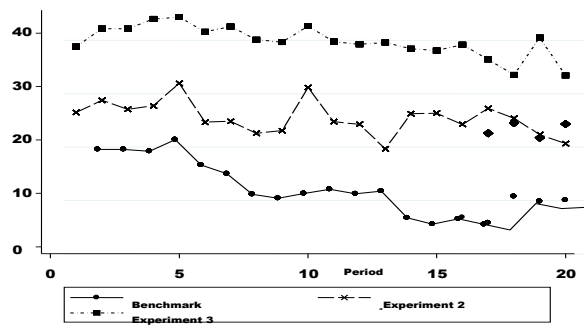


Fig. 1. Experimental contribution levels of different liability recourse mechanisms.

As shown in "Fig. 1", in the three economic experiments, the average contribution of the participants to the vertical cooperation in 20 rounds, the overall contribution of each experiment has a significant "period effect" and the overall contribution difference is extremely great. The overall trend of the contribution levels of the three experimental parts in this paper is similar to the research conclusions of Ledyard (1995), Zhou Yean and Song Zifeng (2008). It can be intuitively found from the figure that the data of the contribution level of the joint cooperative vertical cooperation relationship in the third experiment is significantly higher than the contribution level under other mechanisms and the fluctuation is relatively small and relatively flat. Experiment 2 has an individual responsibility recourse system, and its contribution level is significantly lower than that of experiment 3 but significantly higher than experiment 1. Benchmark experiment-contribution level data was significantly lower than other experimental types. This

situation shows that in the actual economic activities, there are significant differences in the effectiveness of different default liability recourse systems for multiple decision-making bodies in vertical cooperation.

Conclusion 1: "The adoption of different vertical cooperation default responsibility recourse mechanism has a significant impact on the decision-making level of the participants in the experiment. A reasonable responsibility recourse mechanism is conducive to improving the overall effort level, and thus maintaining the stability of vertical cooperation."

### B. Joint Liability Recourse

This section will study the relationship between the default and liability recourse system and the level of contribution in the vertical partnership. In the business alliance, because the inherent attributes of the enterprise determine that the benefits obtained from the vertical organizational reputation transfer between members are different, the experiment reflects this difference through MPCR inequality. Although different types of subjects in this experiment have the same initial endowment, they have different reputation maintenance gains, which approximate the difference between different members of the vertical partnership. However, Anderson, Mellor and Milyo (2008) believe that this approach may change the Nash equilibrium. Therefore, this paper avoids the appearance of Nash equilibrium through experimental design and guarantees the quality of experimental data.

"Table IV" "Average Levels of Contributions of Experiment 1 and Experiment 3" shows the average value of the contribution of the business alliance to the joint liability and the benchmark experiment. The average contribution of the benchmark experiment was 11.75416667; the average contribution of the experiment with joint responsibility recourse mechanism was 38.475. From the average of the data of the two experimental parts, it can be preliminarily concluded that the contribution level of the contribution level of the joint responsibility mechanism is significantly higher than that of the experimental group without the responsibility recourse mechanism, that is, "the joint responsibility recourse system in the experimental group is favorable for vertical Maintenance of reputation in the relationship." In order to test this preliminary conclusion, the Mann-Whitney test method was used to test the difference in the overall contribution level between Experiment 1 and Experiment 3 (See "Table V"). Since the statistics of Z is 16.791, Prob>|z|=0.0000, it can be seen that there is a significant difference between the two.

TABLE IV.        AVERAGE LEVEL OF CONTRIBUTION OF EXPERIMENT 1 AND EXPERIMENT 3 TO REPUTATION MAINTENANCE

| Experiment Session | Experiment Content | Average Value |
|---|---|---|
| Experiment 1 (N=240) | Benchmark experiment | 11.75416667 |
| Experiment 3 (N=240) | Joint liability recourse mechanism | 38.475 |

TABLE V.        MANN-WHITNEY TEST OF CONTRIBUTION LEVELS OF EXPERIMENT 1 AND 3

| Group | Sample Observation | Sum of Ranks |
|---|---|---|
| Experiment 1 | 240 | 32308.5 |
| Experiment 3 | 240 | 83131.5 |
| Total | 480 | 115440 |
| Test statistics | Mann-Whitney U = 2290465.55<br>Z=16.791<br>Prob>\|z\|=0.0000 | |

Conclusion 2: "The joint responsibility recourse system in the vertical cooperation relationship is conducive to the improvement of the level of member efforts, which makes the reputation of the vertical cooperation organization better maintained."

### C. Collective Responsibility Recourse

In this paper, there is a critical value for the total contribution of all members in the business alliance in experiment 2. If it is higher than the critical value, all members can obtain the reputation gain according to the MPCR; if it is lower than the critical value, the corresponding member will bear the loss, that is, there is individual responsibility recourse mechanism. As a reference to experiment 1, there is no threshold requirement. This section will compare and analyze the two experimental parts of Experiment 1 and Experiment 3, in order to draw the influence of the individual responsibility recourse mechanism on the contribution of vertical cooperation.

"Table VI" "Evaluation Levels of Contributions of Experiments 1 and 2" shows the average contribution of the vertical cooperative maintenance experiment without the individual responsibility recourse mechanism and the vertical cooperative maintenance experiment with the individual responsibility recourse mechanism. The average contribution of vertical cooperation without individual responsibility recourse mechanism is 11.75416667; the average contribution of vertical cooperation with individual responsibility recourse mechanism is 24.14166666. From the average value of the data of the two experimental parts, it can be preliminarily concluded that the contribution level of vertical cooperation with individual responsibility recourse mechanism is significantly higher than that of the experimental group without individual responsibility recourse mechanism, that is, "individual responsibility recourse mechanism is conducive to the maintenance of vertical relationship."

TABLE VI.        THE AVERAGE LEVEL OF CONTRIBUTION TO REPUTATION MAINTENANCE OF EXPERIMENT 1 AND EXPERIMENT 2

| Experiment Session | Experiment Content | Average Value |
|---|---|---|
| Experiment 2 (N=240) | Individual responsibility recourse mechanism | 24.14166666 |
| Experiment 1 (N=240) | Benchmark experiment | 11.75416667 |

In order to test this preliminary conclusion, the Mann-Whitney test method was used to test the difference in the overall contribution level between Experiment 1 and Experiment 2 (See "Table VII"). Since the statistics of Z is 10.713, Prob>|z|=0.0000, it means that there is a significant difference in the contribution level between the two experiments at the level of 1%.

Conclusion 3: When there is an individual responsibility recourse system in vertical cooperation, then the overall contribution level is relatively high, which is conducive to the maintenance of vertical cooperation.

TABLE VII.    MANN-WHITNEY TEST OF THE CONTRIBUTION LEVEL OF REPUTATION MAINTENANCE IN EXPERIMENTS 1 AND 2

| Group | Sample Observation | Sum of Ranks | Value of Expectation |
|---|---|---|---|
| Experiment 2 | 240 | 73873 | 57720 |
| Experiment 1 | 240 | 41567 | 57720 |
| Total | 480 | 115440 | 115440 |
| Test statistics | Mann-Whitney U =2308800.00<br>Z=10.713   Prob>|z|=0.0000 | | |

In this way, the part is demonstrated from the two dimensions of the group and the different types of members in the group, and the proof of the conclusion that the individual responsibility recourse contributes to the reputation maintenance is completed. This result indicates that the individual responsibility recourse mechanism does play a role in promoting the level of cooperation, which is consistent with the findings of Decker et al. (2003); Fehr and Gachter (2000); Song Zifeng and Zhou Ye'an (2011).

### D. Comparative Analysis of Individual Liability Recourse Liability Recourse

The third experiment in this paper is a vertical cooperative maintenance experiment with joint responsibility recourse mechanism. The second experiment is that the brand owner bears the vertical relationship maintenance experiment of joint responsibility. This part will compare and analyze the two experimental stations of Experiment 2 and Experiment 3, in order to draw the influence of different responsibility recourse mechanisms on the contribution of vertical cooperation.

"Table VIII" "Evaluation Levels of Contributions of Experiment 2 and Experiment 3" shows the average contribution level of the vertical cooperative relationship maintenance experiment and the vertical cooperation relationship maintenance experiment of the individual responsibility recourse mechanism. The average contribution of the vertical cooperative maintenance experiment of the joint responsibility recourse mechanism is 38.475; the average contribution of the vertical cooperative maintenance experiment with the individual responsibility recourse mechanism is 24.14166666. The following judgment can be preliminarily made from the average value of the data of the two experiment parts. The contribution of the vertical cooperative relationship maintenance experiment with the

joint responsibility recourse mechanism is significantly higher than that of the experimental group without the individual responsibility recourse mechanism. The responsibility recourse mechanism is more conducive to the maintenance of vertical relations."

TABLE VIII.    THE AVERAGE CONTRIBUTION OF EXPERIMENT 2 AND EXPERIMENT 3 TO REPUTATION MAINTENANCE

| Experiment Session | Experiment Content | Average Value |
|---|---|---|
| Experiment 3 (N=240) | Individual responsibility recourse mechanism | 24.14166666 |
| Experiment 2 (N=240) | Joint liability recourse mechanism | 38.475 |

In order to test this preliminary conclusion, the Mann-Whitney test method was used to test the difference in the overall contribution level between Experiment 2 and Experiment 3 (See "Table IX"). Since the Z statistic is -11.522, Prob>|z|=0.0000, it indicates that there is a significant difference in the contribution level of reputation maintenance between the two experiment parts at the level of 1%

Conclusion 4: "In the vertical cooperation relationship, compared with the individual responsibility recourse system, the overall contribution level of the joint responsibility recourse system is relatively high, which is more conducive to the maintenance of vertical cooperation."

TABLE IX.    MANN-WHITNEY TEST OF CONTRIBUTION LEVEL OF EXPERIMENT 2 AND 3

| Group | Sample Observation | Sum of Ranks | Value of Expectation |
|---|---|---|---|
| Experiment 3 | 240 | 75114.5 | 57720 |
| Experiment 2 | 240 | 40325.5 | 57720 |
| Total | 480 | 115440 | 115440 |
| Test statistics | Mann-Whitney U =2308800.00<br>Z=-11.522   Prob>|z|=0.0000 | | |

"Table IX" is a numerical trajectory diagram of the contribution level of the experiment with the joint responsibility recourse mechanism in the experiment and the vertical cooperation relationship with the individual responsibility recourse mechanism in the vertical cooperation relationship. The results shown in the figure are consistent with the conclusions. The experimental contribution level of the joint responsibility recourse mechanism in all 20 rounds is significantly higher than that of the individual responsibility recourse mechanism experiment. And both experimental stations show the effect of the number of periods, that is, as the number of experimental periods increases, the contribution level of reputation maintenance will decrease significantly and gradually approach zero.

"Table X" is a summary of the experimental contents of this chapter and the corresponding experimental hypothesis

test conclusions. As shown in the table, there are three experiment parts in this chapter, which constantly change the responsibility recourse mechanism in the vertical cooperative relationship. By controlling other variables and conducting comparative tests, the following four conclusions are drawn. It is conducive to clarifying the specific impact and effectiveness of the method of recourse in the vertical cooperative relationship.

TABLE X. HYPOTHESIS TESTING CONCLUSION OF THE EXPERIMENT

| Experiment Parts | Number of Subjects | Experiment Mechanism | Experiment Conclusion |
|---|---|---|---|
| Experiment 1 | 12 | Benchmark Experiment | Conclusion 2: "The joint responsibility recourse system in the vertical cooperation relationship is conducive to the improvement of the level of member efforts, which makes the reputation of the vertical cooperation organization better maintained." |
| Experiment 2 | 12 | Vertical cooperative relationship maintenance mechanism under the individual responsibility recourse system | Conclusion 3: "When there is an individual responsibility recourse system in vertical cooperation, then the overall contribution level is relatively high, which is conducive to the maintenance of vertical cooperation." |
| Experiment 3 | 12 | Vertical cooperative relationship maintenance mechanism under the condition of joint liability recourse system | Conclusion 4: "In the vertical cooperation relationship, compared with the individual responsibility recourse system, the overall contribution level of the joint responsibility recourse system is relatively high, which is more conducive to the maintenance of vertical cooperation." |
| Overall conclusion of three experiments | | | Conclusion 1: "The adoption of different vertical cooperation default responsibility recourse mechanism has a significant impact on the decision-making level of the participants in the experiment. A reasonable responsibility recourse mechanism is conducive to improving the overall effort level, and thus maintaining the stability of vertical cooperation." |

## VI. CONCLUSION

Because of the customer can't truly contact with the merchants in online shopping, the trust to merchant plays a vital role. Consortium use collective reputation as collateral to make believable promise, earning the trust of consumers. Controlling for other factors, the seller belong to a consortium have much trading volume than sellers do not belong to any consortium. That means buyers more trust to seller in the consortium, the seller join the consortium is more believable. This article illustrate the collective reputation how to play a role in consortium, And what kind of responsibility recourse mechanisms should the consortium take to reduce default, and improve the efficiency of the execution of contract?

Construct consortium mechanism model. Drawing the conclusion 1: "Consortium set high standards and collective liable is benefit to improve efficiency of contract execution". And the conclusion 2: "Leaders are jointly and severally liable, in favor of reducing the default, and improving efficiency of contract execution".

Next section we will test these conclusions by Experimental economics method. The experiment mainly be used to verify the conclusions. The economics experiment includes three separate experiments, respectively experiment 1, experiment 2 rounds 3, each experiment has 20 rounds.

Because of the different responsibility recourse mechanisms, the averages in the three experiments are significant differences. Show that the responsibility system of recourse significant impact to the experimental results. In order to more accurately study how different experimental mechanism influence of contribution level, this paper analyze the above data by econometric testing method. The conclusions are as follows: responsibility recourse mechanisms are significantly impact to the experimental

results. Collective responsibility recourse systems are of benefit to the contract maintenance in consortium. Joint and several liability mechanism is of benefit to the contract maintenance in consortium. Joint and several liability recourse mechanism is better at the contract maintenance than collective responsibility recourse mechanism in consortium. These conclusions prove the hypothesis of this article.

## VII. ACKNOWLEDGMENT

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