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Review on Supply Chain Coordination by Wholesale Contracts under Fairness Concern

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Abstract: *In recent years, behavioral supply chain research become a hot topic in management research, and many scholars have proved that fair preference behavior has a significant impact on supply chain contract coordination. But very few literatures to sort out and summarize the existing research. So this paper will review the researches in the terms of the behavior assumptions. We find out some problems. For example most of the researches were under the assumption about the limited symmetry information of fairness preference, and the fairness reference points are too much to provide the scientific strategy. Aiming to solve these problems, we point to the future direction combined with the theoretic and practical issues in the real supply chain operation and management.*

Keywords: *Fairness preference; Supply chain; Asymmetric information; Review*

1. INTRODUCTION

Recently, fairness is becoming popular in all areas, and people are paying more and more attention to the social unfairness phenomenon, such as the case of Wuchang rice which is a typical supply chain problems caused by unfair. Sales price of Wuchang rice is 199 CNY, while farmers only get 2 CNY, so it's damaged the interests of farmers, which are not good for the operation of the grain supply chain.

Some management practitioners believe that fairness is an important factor in the maintenance of channel relationships as well as in multi-channel supply chains. So some of them have introduced the fair preference into the field of supply chain contract research, and analyzed the influence of fair preference to contract parameter value, coordination and operational efficiency of the supply chain.

At present, top journals in international scope, such as "Management Science" and "Journal of Management Science" published many papers about fairness preference academic. From this, we can see that fairness preference has become an important factor in the study of supply chain contract, which can provide a solid micro behavioral basis for supply chain optimization.

It can be seen that the study of supply chain contract coordination based on fair preference has become a hot topic in management research. Although some scholars have done a comparative study of behavioral supply chain research, such as: Liu et al. [1] analyzed the international behavioral supply chain research from three dimensions which are the levels of literature, the topics of research and the methods of research; Zhang et al. [2] summarized the hot topic of research and focus on the model of behavioral supply chain decision from the research level and research theory of literature, and pointed out that the research on the behavioral operation of our country is still in the "budding stage".

However, there are only a small amount of literature studied the SCM under fair preference. For example, Lin [3] classified the existing researches on the aspects of the theoretical model of fairness preference, the research progress of the supply chain and the experimental research. Tan [4] founded that both domestic and abroad are mostly concentrated in the management of the two aspects: one is supply chain contract coordination; the other is a supply chain partnership according to the literature research.

From the above literature, it's not difficult to see that only a small amount of literature on the research of supply chain contract under fair preference. Lin [3] and Tan [4] summarized the existing literature only from the horizontal perspective. In this paper, we mainly focus on the four stages of the development of the supply chain to analyze the existing literature review and the unresolved issues, and put forward the directions of future research according to the theoretical and practical problems. The four stages are as follows: complete rational supply chain contract; bounded rationality supply chain contract; supply chain contract based on symmetric information of fair preference; supply chain contract based on fair preference information asymmetry.

2. LITERATURE REVIEW

Supply chain contracts have been extensively studied because they have very important means to solve the double marginalization and achieve supply chain coordination. According to the research process it can be divided into the following four stages:

2.1 The first stage: Totally rational research based on the traditional "broker" hypothesis

Traditional research on SCM mostly based on rational brokers in neoclassical economics. That is, they assumed that people are rational and maximize their own interests as the goal.

There are numerous literatures that on the "totally rationality" of the decision makers:

Abroad: Demirkan et al.[5] developed a risk-sharing strategy to increase the profitability of service supply chains by studying the coordination of risk sharing between service providers and service integrator under information sharing. Su [6] established the bounded rational newsboy model and obtained the bounded rational solution for the number of newspaper subscriptions. Su [7] established an inventory control model which directed against for consumer returns that based on the traditional newsboy model. Groznik et al. [8] pointed out that the wholesale price contract can improve the benefits of manufacturers and retailers, and also can improve the overall performance of the supply chain. Ai et al.[9] put forward that retailers should use different pricing strategies to achieve the coordination in the two-level supply chain under the bounded rational conditions.

Domestic: Ding et al. [10] designed a way to achieve supply chain coordination through the study of the second production and order model contract under the condition of "totally rationality". Wang et al. [11] studied the retailers' rationality and the two-level incentive contract model of the supply chain under the fairness by using the Principal-Agent Model. And he also designed the supply chain incentive contract under the symmetry and asymmetry information. Lu [12] drew a conclusion that it can achieve Nash equilibrium and coordination of service supply chain contract in the case of supply chain members make simultaneous and sequential decision by establishing of cost-sharing strategy of the service supply chain model. Li et al. [13] effectively coordinated the application service supply chain and achieved the optimal performance by using the revenue sharing contract. Pang et al. [14] studied the problem of three-level supply chain coordination, which consisted of manufacturers, distributors and retailers, under the assumption that the supply chain members are completely rational. In order to coordinate the supply chain they also designed a revenue-sharing contract and price subsidy contract, in addition they demonstrated that the joint contract enables the supply chain to coordinate and increases the members' gains as long as appropriate contractual parameters are developed. Fang et al. [15] established the utility function of the retailer's decision based on the prospect theory, and explained the reasons why the wholesale price contract could not coordinate the supply chain.

2.2 The second stage: Limited rational research

With the deepening study of the supply chain, it found that the theoretical research results based on the traditional completely rational hypothesis are not consistent with the reality, which makes the scholars begin to reflect the correctness and practicability of the rational hypothesis. Many game experiments, such as ultimatum game, unilateral designation game, gift exchange game and empirical studies have proved the prevalence of behavior preferences such as fairness, reciprocity, compassion, envy, (Loch et al.[16]; Ho et al. [17]). Decision makers are bounded rational. That is to say. They are not only considered to maximize their own benefits but also take their own and others' incomes into the utility function of the decision-making. Bounded rationality began to be introduced into the supply chain contract theory. Herbert Simon introduced the concept of bounded rationality into economics first and established various models. Prospect theory was proposed by Kahneman and Tversky's in 1979, and it has been the basis for explaining irrational behavior in supply chain contracts.

Abroad: Su [18] explained uncertainty phenomenon of the order quantity in the behavior experiment, and gave a major cause of the bullwhip effect: uncertainty order behavior of the decision maker. Pavlov [19] established a new model based on fair and bounded rationality to extend the existing supply chain coordination studies. They also argued that contracts were rejected should be attributed to the supply chain members fair preference information asymmetry. Katok et al. [20] used experimental methods to validate inequality, limited rationality, and incomplete information. The study confirmed that

bounded rationality has a significant effect on the decision-making behavior of manufacturers and retailers. Michael et al. [21] built a bounded rational game model and shown that it has a stronger explanatory.

Domestic: Yang et al. [22] studied the inventory optimization problem of the integrated supply chain in the uncertain demand environment with an assumption that decision makers are bounded rational. Zhang [23] studied a hybrid qualitative simulation method for combining quantitative and qualitative simulation of supply chain cooperative game under rational hypothesis. The results show that: the whole of the supply chain, different distribution of benefits will affect the degree of supply chain cooperation, and even occur the phenomenon of free rides. Song et al. [24] studied the bounded rational inventory control model in a two-level supply chain system, confirmed that the order quantity of the retailer is lower than the optimal order quantity for the fully rational retailer. No matter whether the manufacturers are allowed to return or not, bounded rationality will reduce the retailers' order quantity.

2.3 The third stage: Research on Symmetry information

With in-depth study, scholars have found that fair preference has a significant effect on supply chain decision in bounded rationality, that is, suppliers and retailers tend to pay attention to their own incomes, if their own income is less than the other side, it will produce additional negative effects. For example, Pavlov et al. [19] found if the fair preference did not take into account, the supplier's desired order quantity will be greater than the actual order of the retailer, thereby increasing the bullwhip effect.

In this regard, fair preference also began to introduce into the supply chain contract theory behavior, so as to further improve the explanatory power and guidance of decision - making behavior.

Abroad: Cui et al. [25] introduced a fair preference into wholesale price contracts under linear demand conditions. They found that suppliers can achieve supply chain coordination at a higher wholesale price than retailers are concerned about equity. Ozgun et al. [26] extended it to non-linear requirements and found the similar conclusion with Cui et al. [25]. And he based on the research work of Cui [25] extended the demand function from only the linear case to the more general nonlinear situation, such as exponential distribution, demand elasticity as constant. They also found that when retailers are concerned about equity or retailers and suppliers at the same time concerned about fair that suppliers can use the wholesale price discount to achieve the supply chain coordination, but only when suppliers are concerned about the fair, it cannot use the wholesale price discount contract to achieve coordination, which is consistent with the conclusion of Cui's linear demand. Ding et al. [27] the number of discount contracts after considering the retailer's fair preference.

Du et al. (2014[28], 2014[29]) considered the reciprocal and Nash bargaining fairness preferences, respectively. It was proved that the fairness of motivation plays an important role in the decision-making of the supply chain members, and the equilibrium result can be changed obviously. Under certain conditions, the wholesale price contract can achieve the competitive supply chain coordination.

Ho [30] introduced distributional and peer induced fairness into supply chain and established a single supplier and two retailer sequential game models. And they also studied the influence of these two kinds of fair preference types on supply chain performance or output by a mathematical model and experiment. Zhang et al. [31] studied the impact of retailers' fair preferences on dual channel supply chain product pricing and channel market share. Choi and Messinger [32] used experimental methods to study the impact of fair preference on the relevant decisions in the competitive supply chain and the overall performance of the supply chain.

Domestic: Du et al. [33] first introduced fairness preferences into supply chain contracts, demonstrated that the introduction of fair preference did not change the coordination of contracts such as wholesale price contracts, repurchase contracts and revenue sharing contracts. Zhang et al. [34] introduced a fair preference and factor loss aversion on the basis of Du's research. Respectively, he studied the supply chain contract coordination problem and drew the similar conclusion with Du by using the wholesale price contract, the repurchase contract and the joint contract of the two. As the existing literature on the supply chain contract focuses on the study of wholesale price contracts, repurchase contracts, income sharing contracts, quantitative discount contracts and two pricing contracts. Therefore, this article mainly combing from the five aspects as follows:

Wholesale price contract: Tan et al. [35] studied the impact of retailers' fair preference behavior and wholesale price contract on supply chain coordination through building the model and analyzing the data simulation. Bi et al. [36] using the fair preference model to analyze the situation that retailers' order quantity are less than the sales rebate critical value and orders are greater than or equal to the sales rebate critical value. Ma [37] showed that fair preference is a means for retailers to obtain supply chain profit. Li et al. [38] studied the impact of fairness preference wholesale contract, acquisition of shared contracts and repurchase contract on the coordination of low carbon supply chain under the background of total limit trading and carbon emissions trading.

Repurchase contract: Li et al. [39]studied the flexible supply chain contract from a fair point of view, and explored that the supplier would prefer a revenue sharing contract or a repurchase contract under a given order quantity. Lin et al. [40] used the behavioral game method to test the coordination effect of the repurchase period and analyzed the member's decision-making behavior. Qin et al. [41] studied the newsboy model by using the repurchase contract and the revenue sharing contract under the fair preference respectively, and proved that when the wholesale price, the repurchase price, the retail price and the income sharing coefficient satisfy certain relation, the two contracts are equivalent and can achieve supply chain coordination.

Income sharing contract: Meng et al. [42] designed the revenue contract with the combination of wholesale price contract and revenue sharing contract, and regarded income sharing contract as quality improvement incentives for suppliers. Pang [43] studied the coordination of the three-stage supply chain revenue sharing contract under stochastic market demand through introducing the theory of fair preference. Cao et al. [44] studied the impact of supplier's fair concern on supply chain coordination and verified its effectiveness as a dual channel supply chain coordination. Pu et al. [45] established the Stackelberg game model between suppliers and retailers to investigate the influence of supplier fairness preference on equilibrium strategy of supply chain. Liu et al.[46] studied the impact of retailers' fair preferences on the level of promotional efforts and the efficiency of supply chain operations in manufacturing-oriented supply chains, and designed the revenue sharing contract based on the Nash bargaining game to realize the supply chain coordination. Wei et al. [47] introduced the fair preference behavior of retailers and suppliers in the case of stochastic market demand, and studied the impact of fair preference on the coordination of revenue sharing contract by Nash bargaining.

Quantity discount contract: Chen et al. [48] analyzed the impact of retailer's fair preference coefficient on quantitative discount contract arrangements. Ding et al. [49] used of quantitative discount contract manufacturers to test the retailer fair concern under the circumstances of the supply chain coordination, to achieve the two sides of the Pareto improvement.

Two pricing contracts: Liu et al. [50] studied the impact of retailers with fair preference on supply chain coordination and calculated the contract parameters for two-step pricing contracts to complete supply chain coordination in different situations. Li et al. [39] found that when only suppliers had fair preferences, manufacturers were able to coordinate the supply chain by providing two pricing contracts. Li et al. [51] compared the demand for nonlinear power functions with linear requirements and found that the two pricing contracts are able to achieve the coordination of the supply chain. However, in the case of power function demand, the supply chain with fairness preference is easier to achieve, which are consistent with the findings of Ma et al. [38].

Of course, there is some other relevant research: Pu et al. [52] studied the effect of fair preference on the operational efficiency of the three-tier supply chain based on different reference point effects. Wang and Ding [53] established a channel model agency and found that the retailer's fair preference behavior can improve the level of their own efforts and the degree of incentive to achieve the channel Pareto improvement. Zhang [54] studied the impact of retailers and manufacturers' reciprocity preferences on the benefits of closed - loop supply chain system and channel efficiency. Dong et al. [55] analyzed the impact of retailers' fair preference on supply chain coordination under the line rebate contract and the target rebate contract. Qin et al. [56] proved that the retailer's altruistic behavior can't alleviate the supply chain "double marginal effect", the supplier altruistic preference can alleviate the supply chain can't eliminate the "double marginal effect", but suppliers and retailers altruistic behavior are conducive to increasing supply chain effectiveness. Li et al. [57]

studied the impact of fair preference on the profit distribution of dual channel supply chains. Ma and Hong [58] demonstrated that the retailer's fair preference had a significant effect on the wholesale price, the retail price, and his own marketing efforts, and also pointed out that it could improve their ability of price negotiation and get more profit.

These studies and conclusions assumed that the fair preference information is symmetric.

2.4The fourth stage: Asymmetric supply chain contract based on fair preference information

Although the above studies took the fair preference behavior of the decision makers into account and proved that the fair preference behavior has a significant impact on supply chain decision-making and supply chain coordination, which provide a more realistic theoretical basis for the actual supply chain operation. However, these studies basically assume that the fair preferences are the common knowledge, which are obviously not consistent with the subjectivity and impartiality of fair preferences. Thus, it is necessary to study the supply chain contract under the asymmetric condition of fair preference information. At present, there are only a small part of the literature began to study it.

Abroad: Pavlov et al. [19] combined with theoretical and empirical studied of the impact of fair preference as private information on supply chain coordination. It explained many problems in the empirical research of contract, such as denial, inefficiency and so on, and pointed out that the main reason for the uncoordinated covenant can be that the fair preference information is asymmetric. Kalkanci et al. [59] introduced the fair preference behavior into the supply chain contract design under the condition of asymmetric demand information, explained that most of the supply chain contracts in reality are simply linear contracts rather than complex nonlinear contracts. Katok et al. [60] found that fairness preference information asymmetry reduces supply chain operational efficiency under the wholesale price contract.

Domestic: Zhao and Lu [61] designed the VMI coordination contract model based on the quantity discount under the symmetry and asymmetry condition of the supplier cost information respectively, and they also proved the validity of contract coordination by using numerical examples and sensitivity analysis. Xu et al. [62] studied the relationship between profit sharing and supplier's quality input and fair preference under the asymmetric information which based on the FS model. Qin and Wei (2015) [63] [64] studied the impact of retailer fair preference information asymmetry on the optimal pricing decision in the retailer-supplier game under the wholesale price contract. The study found that retailers can exaggerate or disguise their own fair preference strength information to get more supply chain profits. So the retailer's fair preference behavior may not be a spontaneous behavior but a game strategy. Cao and Hou [65] used the principal-agent theory to study the asymmetric degree of fair preference information on the retailer's optimal order quantity, supplier profit, and retailer's profit in the condition of private information of retailer's fair preference.

3. PROBLEMS IN EXISTING RESEARCH

Recently, scholars introduced the bounded rationality especially the fair preference in the existing literature, into the supply chain contract which broke the previous research. In this situation, it obtained the theories which are closer to the reality and promoted the development of the emerging discipline of the behavior supply chain.

However, there are still some problems in the supply chain contract research under the fair preference. For example, some existing researches basically assumed that the fair preference information is symmetrical and fixed, and different literature adopted different fair reference points which are lack of consistency, and also ignored the heterogeneity of preference behavior.

3.1 The research assumed that the information of fair preference is symmetric

An important prerequisite for the study of supply chain contract is that introduces fair preference behaviors and assume that the fair preference psychological information of the supply chain decision maker is symmetrical, that is, the members with fair preference psychology know their own fair preference intensity, the other members also know it, too.

In a typical utility function $u_r = \pi_r + \lambda_r(\pi_r - \pi_m)$ that it represents a fair preference psychology, as a constant and common knowledge, and each of them known mutual fair preferences. (π Represents profit,

u represents utility, λ represents fair preference for psychological intensity, subscript r and m represent retailers and manufacturers respectively).

But there are unreasonable, as we all know that psychological preference is a kind of private information, so it may existing intentional concealment and camouflage. For example, a strong jealous person may disguise as an altruist to get higher profits.

There is an important prerequisite to study the supply chain research that introduces the fair preference psychology. It is necessary to identify the types of fair preference (such as peer-induced fairness, fair distribution of income, etc.) and strength (weak, medium, strong, strong, etc.). So it is unreasonable to assume that fair psychological preference is symmetry.

Thus, in the future it can study how to identify the type of psychological preference under asymmetric information about fair preference. Which should be clarified, most of existing researches mainly focus on the information asymmetry of market demand, manufacturing cost and so on. But this article refers to information asymmetry of fair preference psychology.

3.2 The existing study suggests that the fair preference intensity is constant

The research basically assumed that the fairness preference of the decision maker is constant. Performance in the typical utility function, such as $u_r = \pi_r + \lambda_r(\pi_r - \pi_m)$ that the fairness of the psychological strength of the parameters are fixed. This is also unreasonable.

There are two main reasons: the first, with the frequent transactions, the two sides know the psychological preferences from the beginning of the unclear will continue to understand until fully grasp. That is to say, with the development of transactions, decision makers on the psychological preferences will continue to update. The second, psychological preferences themselves will continue to change. The market environment change and the long-term development of supply chain relationship, psychological preferences themselves will evolve dynamically. Such as, when the decision-maker joins in another supply chain, the fair preference intensity will change due to the change of the reference object. As the market changes, supply chain decision-makers will change due to their own contribution to the supply chain (such as marketing efforts) changes.

Thus, it is necessary to study the optimization of supply chain contract in the process of dynamic evolution of fair preference information. For example, we can consider the fairness preference as a function of the effort or the contribution of the supply chain decision-maker, so as to study the supply chain contract coordination in the case of the change of the decision-makers' fair preference intensity, and study the optimal decision from the more realistic environment.

3.3 The existing research considerations are single

Although the relationship between the effort behavior of supply chain decision-maker and the performance and utility of supply chain have become the hot research in recent years, the existing research focuses on the impact of the efforts of individual supply chain members on the market demand, but the overall performance and effectiveness of the supply chain is determined by all the members. In this realistic case, it should be more practical to try to extend the research on the effects of bilateral efforts and their interaction mechanisms on supply chain performance.

There will be a strong practical significance in the framework of fair preference for analyzing of supply chain decision-maker efforts, improving the supply chain cooperation issues and explaining the reality of suppliers and retailers in different cooperation efficiency.

3.4 The existing research does not involve the screen of fair preference information

The existing literature assumed that the preference intensity information of the supply chain decision-making body is known, which is unreasonable. Because the preference is private information, and often some people deliberately conceal or even disguise it, such as an enterprise with a weak preference in order to obtain more attention and profits from cooperative enterprises may show a stronger fair preference. In addition, the vast majority of the literature concluded that retailers may have more profits and greater bargaining room if they have a fair preference. How to design an incentive mechanism to make decision makers to express their preferences exactly, it can determine which of the supply chain members have fair preference behavior,

which are jealousy strong, which are rich sympathetic. Based on these, we can get the preference structure of supply chain members.

Therefore, it is necessary to design the incentive mechanism to identify the type of decision-maker's preference, and then to describe the supply chain preference structure. It is also necessary to establish the incentive mechanism of each decision maker to express the preference information of the supply chain, so as to judge the fair preference intensity of the supply chain decision-maker accurately and realize the perfect supply chain coordination.

3.5 Existing researches are basically secondary supply chain which based on a single retailer and a single supplier

In reality, most suppliers cannot only have one retailer. It is a very common situation that two or more retailers to sell the same or surrogate products. And these retailers are competing. Each retailer's decision is influenced by other retailers. And the level of competition between retailers can reflect the complexity of the real supply chain structure, but also lead to the coordination of the supply chain decision-making complexity. Therefore, it is necessary to study the supply chain with a supplier and a number of competitive retailers.

3.6 The methods of existing research are single

Most of the researches used mathematical model and numerical analysis, a small number of them used economic game experiments to test and verify the theoretical analysis of the conclusion. And very few used the case analysis method. Because fairness is private information and is also with strong subjectivity, it is not easy to quantitative analysis. Many scholars build the quantitative models which are complicating and resulting in difficulties in solving the model and cannot get the correct analysis results. For example, the existing research on the fair preference literature, the study of fair preference behavior was mostly based on the newsboy model and used a linear, s-type utility curve or segmentation function. Perhaps because of its complexity and difficulty in the model which make the current behavior of the supply chain research range is relatively narrow.

It is necessary to study the influence of fairness preference on the optimal decision making of supply chain decision makers and supply chain coordination by using a mathematical model, numerical analysis and a questionnaire survey.

4. PROSPECTS OF FUTURE RESEARCH

According to the combing of existing literature and the corresponding problem analysis, future research can proceed from the following points.

4.1 Supply chain game model with fairness information asymmetry

In view of the heterogeneity of decision makers, some of them have strong jealousy and some have sympathy. Assuming that the supplier and the retailer are in the secondary supply chain, when the retailer has a fair preference and only he knows his own fair preference strength information, then establishing a fair preference for retailer's private information supply Chain game model. Established two Stackelberg models according to the fairness of the information asymmetry and the degree of sharing, one is the suppliers as leaders and the retailers as the followers, the other is retailers as leaders and suppliers as followers. To study the supplier's optimal wholesale price strategy and the retailer's optimal order quantity strategy under the retailer's fair preference information is private information, and with the suppliers and retailers are completely rational and information symmetry under the situation of the corresponding game model for comparative analysis, so as to analyze the influence of retailers' fair preference on the profit of suppliers, the profit and efficiency of retailers, and the supply chain performance under the supply chain game model

4.2 Design and coordination of supply chain contract under dynamic adjustment of fairness coefficient

When the member of the supply chain withdraws or new members to join will lead to changes in the supply chain structure and benefits of members. Therefore, under the change of the supply chain structure, the influence of the change of preference intensity of the performance of the decision maker in the supply chain will be affected by the change of the fair reference object. For example, if the retailer's multi-references, in a different channel or in a different supply chain, the reference object will be different, then his fair income coefficient will be different because of different reference objects. It is necessary to study the coordination change of commonly used contracts such as the wholesale price

contract, repurchase contract or benefit sharing contract when the supply chain preference structure changes.

First of all, according to the actual psychological preference of the retailer and what the manufacturer thinks that of the retailer's in the different stages of the supply chain decision-making, to get the incentive compatibility constraint and the participation constraint. Then establish the model to obtain separate contract parameters based on the above conditions. Then calculate index values of the respective decisions, profits and utility and other manufacturers and retailers. Finally, compare the contract parameter value of different stages and the development path of each index, and the internal mechanism of dynamic evolution will be obtained.

4.3 Research on supply chain contract decision based on multi- fair reference point

From the fair preference of the literature review we know that the FS model and the BO model are different from the income reference criteria chosen when characterizing the fair preference. Thus in the interpretation of public goods game test FS model can explain the effect of more investment and less investment are totally different, while the BO model proved that the two effects are the same. So the BO model cannot explain the results of the public game experiment, and the FS model can, what's more, it also can explain the results of almost game experiments.

Therefore, the FS model is widely used and BO model has been ignored. Then the supply chain decision makers construct the utility function by using the BO model. Whether the conclusion can be drawn in the FS model or it can explain all the conclusions drawn from the BO model as explained by the game experiment. So it is necessary to establish a supply chain pricing model based on the FS model and BO model to study the effect of fair preference behavior on the optimal decision-making behavior and performance of decision-making body.

4.4 Research on supply chain contract with effort and fair preference

The research on the relationship between the effort behavior of decision makers and supply chain performance and utility has become the focus of academic research. The interaction between effort level and equity preference intensity may be interactive. For example, members with a high level of effort and a fairly strong preference may not work so hard, because if they work hard, they will get unfair results, which they are unwilling to accept.

Therefore, it is necessary to study the relationship between effort level and equity preference intensity, and the influence of the two on optimal decision and coordination of supply chain. Based on this, the model of fair preference model can eliminate the influence of the effort level of supply chain decision-making, so it is more accurate and more reasonable.

4.5 Screening the incentive mechanism of fair preference structure

How to design the incentive mechanism of the supply chain in each real decision-making body expressed their preference types, in order to determine the members of the supply chain which is fair preference behavior, on the basis of that to describe Preference structure of supply chain members. For example, fully self-interested supply chain members may conceal or even disguise as a fair person.

So it is necessary to design the incentive mechanism to identify the preference type, and then to describe the supply chain preference structure. Specifically, we can introduce the principal-agent theory into the supply chain coordination, and taken the income equity as the constraint to add the incentive model. This can reflect the main supply chain decisions in pursuit of their own profit or maximization of the utility at the same time, to achieve the perfect coordination of supply chain partners both screening preference type and strength, other members in the supply chain cooperation profit size or degree on the basis of the fair.

4.6 Supply chain coordination strategy in the condition of retailer competition

Most of the traditional research studied a supplier to a retailer. Therefore, retailer's profits can only be compared with suppliers, while ignoring the other retailers at the same level. But as for retailers, they should pay more attention to the earnings of competitors.

So it is necessary to study fair preferences into the decision makers of the same level supply chain, which also needs to extend the existing research to the retailer competition environment, but closer to the actual supply chain competitive environment. Creating a supply chain model with a supplier faces two competing retailers which not only should

consider the distribution of profits between retailers and their suppliers, but also compare the profits of retailers at the same level. Study on supply chain decision preference equity impact on various members in the supply chain decision and performance. In order to make a better supply chain coordination strategy for retailers' competitive environment, we should also study the influence of supply chain decision maker's fairness preference on each member's decision and performance.

4.7 Selection and preference control of fair preference type about retailers and suppliers

Different fair preference types and preferences of the supply and demand parties have different impacts on the supply chain contracts; accurate understanding the preferences of decision makers can quickly and effectively solve the problems in the process of supply chain development. This research can be carried out from the following two aspects:

(1) The choice of fair preference type of decision makers. The type of fair preference of decision maker is one of the most important factors in supply chain contract study, and we can choose it by cost benefit analysis. That is, if a retailer with a psychological preference is added to the supply chain, the benefits are greater than the cost of the supply, on the contrary, it is not.

(2) The degree of fairness preference of decision makers. There are two ways to study the fair bias of retailers and suppliers: One is the comparative static analysis, in which the fair preference coefficient is introduced into the general utility function. The other is numerical simulation. In the general case without explicit solution, numerical simulation is performed with Mat lab, and the optimal solution is observed and compared.

5. CONCLUSIONS

Behavioral supply chain is a hot topic in management research, and many scholars have confirmed that fair preference behavior has a significant impact on supply chain contract, but only a very small amount of literature to sort out and summarize existing research. So it is difficult to provide scientific theory for practice. Compared with the previous literature, the innovation of this paper is that according to the four stages of development of supply chain decision-making: the complete rationality, bounded rationality, fair preference information symmetry and fair preference information asymmetric supply chain contract research, combing the supply chain contract research literature under fairness preference at home and abroad. Found that there have been some deficiencies in the existing research, such as the basic assumption of fair information symmetry, the use of different fair reference points, ignoring the heterogeneity of fair preferences and so on.

According to these problems, this paper puts forward the future research direction. Such as supply chain game model with asymmetric preference information asymmetry, supply chain contract decision based on multi-fair reference point, supply chain contract considering effort and fair preference behavior.

For this research, we hope to make up the shortcomings of the existing supply chain contract research theory and revise some research conclusions. For example, most of the existing literature analyzed that fairness preferences will weaken the double marginal problem and promote supply chain coordination. However, if the information hiding and screening are also taken into account, this conclusion may not be established, because the screening of psychological preferences may not only reduce but will increase the supply chain of the double marginal problem. In addition, it can also provide a theoretical basis for the rational distribution of supply chain profits. For example, the media reported that the growers would rather let the fruit rotten and not sell; one reason is that the distribution of profits is too unfair, to a certain extent. That is, it is caused by psychological preferences. Based on the real assumptions, this paper studies the supply chain contract, which introduces the asymmetry and dynamic evolution of psychological preference information, and will provide the theoretical basis for the micro-motivation of supply chain profit distribution.

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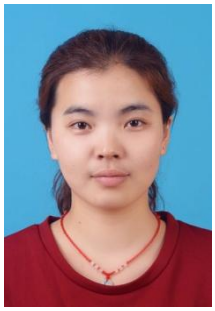

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