Research on Agricultural Products Marketing Channel Conflict Governance based on Three Party Game Model

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Abstract. Through the analysis of the behavior between the parties in the agricultural products marketing channel conflict, this paper constructs three-party-game model of the Agricultural-product Market Association (AMA), the farmer and the leading enterprise using the evolutionary game method, and then the equilibrium point is obtained. Based on the equilibrium point, this paper finds that the possibility of reconciliation chosen by the farmer and the leading enterprise depends on the cost of the mediation, the possibility of successfully mediate through AMA and the loss of not choosing reconciliation which should be bore by the farmer and leading enterprise. In addition, in view of the limitation of the regional distribution of AMA in China, this paper introduces another party-Farmer Professional Cooperatives (FPC), and then forms the effective path of channel conflict management.

1 Introduction

In the process of agricultural production, farmers and leading enterprises closely link the interests of both sides by signing purchase and sale contracts[1]. As the main body of agricultural product marketing, leading enterprises play an intermediate role in the connection between farmers and agricultural product market[2]. However, the cooperation instability between leading enterprises and farmers is becoming increasingly prominent. The high default rate reduces the cooperation intention of farmers and leading enterprises, leading to the cooperation relations instability and the frequent occurrence of channel conflicts[3].

Zhang and Fan(2019) proposed that channel relationship quality is an important source for enterprises to achieve value co-creation and obtain sustainable competitive advantage[4]. Although existing researches have conducted relevant researches on the cooperative relationship and channel stability between the two sides of the channel based on the perspective of game between farmers and leading enterprises, they believe that effective channel governance is conducive to restraining the conflict between the two sides of the channel and maintaining the relationship between the two sides[5-7], and put forward suggestions on the governance of the channel relationship between farmers and leading enterprises from the perspective of explicit contract, at present most farmers and leading enterprises are more with the management channel control mechanism, which causes channel conflicts from time to time[8].

As the two main types of channel governance, market-oriented and hierarchical governance have great differences in their specific application fields. For example, independent and unrelated channel members are suitable to apply market-oriented governance to control the transaction behavior or cooperation relationship between them. Hierarchical governance is mainly used for the situation of both parties with continuous relationship. Different ways of transaction or cooperation will result in different channel governance results. Furthermore, relevant research shows that both sides of the channel can cultivate mutual understanding by using normative governance mechanism, such as through cooperation, commitment, mutual trust to influence, change or control each other, so normative governance is also called relational governance. In addition, some scholars have proposed that relational governance is mainly used by relatively independent channel members with
more or less transactions to control channel relations, so it is a relatively balanced and compromise channel governance strategy. As a feasible, cost-effective and main means of inter-organizational behavior control and coordination, the effective relationship governance mainly depends on the channel members’ strict restriction and control of their own behaviors in order to maintain the long-term cooperation relationship\[9\]. The application of relationship channel governance among different channel members or organizations is mainly reflected in that channel members improve the level of channel cooperation, restrain conflicts and improve channel governance results based on their participation in making plans and solving problems through consultation in advance. Therefore, in order to solve the channel conflict effectively, this research introduces the AMA and constructs the tripartite game model, then puts forward the effective channel governance path.

2 Tripartite game model

2.1. Model building

As shown in Table 1, the leading enterprises groups are represented by letter ‘A’, and the farmers groups are represented by letter ‘B’. The AMA can choose to mediate the conflict between group A and group B or not to participate in the mediation. The probability of AMA participating in mediation is \(P_m\), the probability of not participating in mediation is \(1-P_m\), the probability of choosing mediation and success is \(P_S\), and the probability of choosing mediation but not success is \(1-P_S\). The probability of reconciliation between farmers and leading enterprises is \(P_C\), and the probability of not reconciliation is \(1-P_C\). In this game model, the benefits of the AMA mainly include the opportunity cost of group A and group B choosing reconciliation under the mediation of AMA, the mediation cost obtained as an intermediary and the benefits brought by absorbing farmers and leading enterprises joining in AMA, etc.

In the three-party game model, the AMA as the mediation subject of channel conflict, should pay a certain mediation cost in the process of conflict mediation, whether the mediation is successful or not, which is expressed by C. As shown in table 1, if the AMA successfully mediates the channel conflict between group A and group B, and both groups choose to reconcile, then both groups will get certain benefit income, which is expressed as \(I_A\) for group A and \(I_B\) for group B. However, if group A and group B are still unwilling to reach a consensus and choose not to reconcile under the condition that the AMA successfully mediates the conflict between the two sides, then both groups will have additional losses. The loss of group A is expressed as \(P_a\) and the loss of group B is expressed as \(P_b\).

If group A and group B only reconcile some or some problems to a certain extent under the condition of unsuccessful mediation between the two parties by the AMA, then both parties cannot obtain all the benefits brought by the complete reconciliation. Then, the benefits of group A can be expressed as \(I_A'(I_A'<I_A)\), and the benefits of group B can be expressed as \(I_B'(I_B'<I_B)\). If the AMA fails to mediate the conflict between the two parties, group A and group B are not willing to reconcile, then group A still bears the loss of \(P_a\), group B still bears the loss of \(P_b\), and the price that the AMA needs to pay for the loss of itself and the two parties caused by the unsuccessful mediation is \(C+S\).

If group A and group B are forced to minimize their own losses and solve some problems or conflicts effectively through multiple negotiations under the condition that the AMA does not participate in the mediation between the two parties, then both groups can obtain certain benefits. The relevant benefits obtained by group A are expressed as \(I_A'\), and the relevant benefits obtained by group B are expressed as \(I_B'\). If group A and group B do not intend to reconcile under the condition that the AMA does not participate in the mediation between the two parties, then the two groups will have no income, that is, the income is 0, and the losses caused by the distrust and non-participation of farmers and leading enterprises are borne by the AMA, and the loss is expressed as S. In the process of agricultural product channel conflict governance, the relationship between the two sides is deadlocked due to some problems, and the two sides are unable to effectively communicate with each other, they often rely on the third party to participate in
mediating the conflict, thus forming a tripartite game situation. The emergence of the third-party participants helps to break the rigid situation of this relationship, resolve the channel conflict, and obtain certain benefits, so as to maintain the both sides interests, and provide an effective way to govern the channel conflict.

| Model Analysis |
|----------------|

### 2.2. Model solving

It is known that the probability of group A and group B choosing reconciliation is \( P_c \), then the expected income of AMA participating in mediation of channel conflict is \( E(U_1) \), the expected income of AMA not participating in mediation is \( E(U_2) \), \( P_c = 1 - C/(S \times P_s) \).

\[
E(U_1) = P_c[P_s \times (-C) + (1 - P_s) \times (-S)] + (1 - P_c)[P_s \times (-C) + (1 - P_s) \times (-C - S)]
\]

\[
E(U_2) = P_c \times 0 + (1 - P_c) \times (-S)
\]

Given that the probability of AMA participating in mediation is \( P_m \), the expected return of group A choosing reconciliation is \( E(U_3) \), and the expected return of group A choosing not reconciliation is \( E(U_4) \).

\[
E(U_3) = P_m[P_s \times I_a + (1 - P_s) \times I_a'] + (1 - P_m) \times I_a
\]

\[
E(U_4) = P_m[P_s \times (-P_a) + (1 - P_s) \times (-P_a')] + (1 - P_m) \times 0
\]

Similarly, for group B, it is known that the probability of AMA participating in mediation is \( P_m \), the expected return of group B choosing reconciliation is \( E(U_5) \), and the expected return of group B choosing not reconciliation is \( E(U_6) \).

\[
E(U_5) = P_m[P_b \times I_b + (1 - P_b) \times I_b'] + (1 - P_m) \times I_b
\]

\[
E(U_6) = P_m[P_b \times (-P_b) + (1 - P_b) \times (-P_b')] + (1 - P_m) \times 0
\]

To sum up, the equilibrium solution of the game among AMA, group A and group B is as follows.

\[
P_c = 1 - \frac{C}{S \times P_s}; \quad P_m = \frac{I_a'}{P_s \times (I_a' - I_a) - P_a}
\]

\[
3. Model Analysis

3.1. An analysis of the equilibrium stability of AMA participating in mediation

If AMA participates in channel conflict mediation with probability of \( P_m \) > \( \max \{ I_a' / [P_s \times (I_a' - I_a) - P_a], I_b' / [P_b \times (I_b' - I_b) - P_b] \} \), it shows that AMA aims to speed up the alleviation of channel conflict between group A and group B and realize the maximization of all parties interests. If probability of AMA participating in channel conflict mediation is \( P_m \) < \( \min \{ I_a' / [P_s \times (I_a' - I_a) - P_a], I_b' / [P_b \times (I_b' - I_b) - P_b] \} \), it shows that the channel conflict resolution of AMA is insufficient and the effect of channel governance is not significant.

3.2. Equilibrium stability analysis of group A and group B choosing reconciliation

From the formula \( P_c = 1 - C/S \times P_s \), it can be seen that the probability of group A and group B choosing to reconcile is affected by three factors, such as the cost of participating in the mediation
of AMA, the probability of successful mediation and the social loss caused by group A and group B choosing not to reconcile.

Therefore, in order to promote group A and group B to choose reconciliation and reduce unnecessary social losses, the government and other relevant departments such as AMA should improve the industry norms of agricultural product sales channels, strengthen the AMA personnel allocation, and improve $P_s$. In addition, by reducing the cost $C$ of AMA participating in channel conflict mediation, the $P_c$ of group A and group B choosing reconciliation can be improved.

4 The Path to Solve the Conflict of Agricultural Products Marketing Channels

The introduction of the AMA as the third party of the three-party game to participate in the agricultural products channel conflicts mediation will be beneficial to solve the channel conflict between farmers and leading enterprises to a certain extent. However, in view of the imbalance of the geographical distribution of China AMA and the expenditure of mediation costs, this research intends to build a more reasonable channel governance path to effectively solve the agricultural products marketing channel conflicts problems.

Farmers should actively participate in the local farmers’ professional cooperatives, receive the training, guidance and other related services of farmers’ professional cooperatives on the purchase, planting and sales of agricultural products, and carry out the cooperative relationship with leading enterprises through the power of farmers’ professional cooperatives, so as to reduce the channel conflict possibility caused by power gap between scattered farmers and leading enterprises in the process of cooperation, even if there is channel conflict between farmers and leading enterprises, farmers’ professional cooperatives can be used as the third party of conflict mediation to effectively ease the conflicts between different interest groups, so as to maximize the interests of all parties. If only relying on the power of farmers’ professional cooperatives cannot completely promote the reconciliation between farmers and leading enterprises, either party can report to the AMA to find an effective solution to the channel conflict governance problems.

As shown in Figure 1, this research constructs a more practical channel conflict governance path by introducing local farmers’ professional cooperatives as the first mediator of channel conflict among participants in the tripartite game model of AMA, farmers and leading enterprises. The participation of farmers’ professional cooperatives has a significant effect on channel conflict governance. On the one hand, local farmers’ professional cooperatives reduce the possibility of channel conflict with leading enterprises or increase the probability of reconciliation between the two sides by absorbing farmers’ participation in cooperatives, daily guidance and emotional communication, on the other hand, the mediation behavior of local farmers’ professional cooperatives in advance helps to reduce the cost of participating in mediation of AMA, and then effectively govern the channel conflicts problems.

![Figure 1. Conflict governance path of agricultural product marketing channels.](image-url)
5 Conclusion

With the development of diversified channels in agricultural products market, farmers and leading enterprises are facing increasingly fierce channel competition. The maintenance and governance of traditional channel relationship in agricultural products market are keys to the survival and development of channel subjects. Therefore, it is of great practical significance to explore the three-party game model among the AMA, farmers and leading enterprises, to seek the equilibrium solution and to build a targeted channel governance path.

This paper introduces the AMA to mediate channel conflict as the third party of the game model, improving the possibility of the third party to participate in mediation and the success of mediation and the choice of reconciliation among groups, reducing the relevant mediation costs, so as to effectively manage channel conflict. However, due to the uneven distribution of the AMA, the channel conflicts between farmers and leading enterprises in some regions may not be able to make the agricultural product market participate in mediation, so there are certain geographical limitations in practice, which is the reason why this paper constructs a new channel conflict governance path.

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