Factors Influencing Member Satisfaction With Cooperation in an Agro-Industrialized Union

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ABSTRACT

As a new form of agricultural organization, agro-industrialized unions (AIUs) have shown strong effectiveness. Based on data from Hebei Province in China, the triple-hurdle model was used to analyze the impact of the governance structure and perceived interests on satisfaction from three stages. The main findings are: (1) Satisfaction with the AIU was affected by the governance structure and perceived interests. The former significantly impacted the final satisfaction, whereas the latter had significantly positive effects in all three stages. (2) Among the perceived interest factors, operating ability, interest sharing, and risk defense influenced attitude to whether performance had improved. (3) Attitude toward satisfaction was affected by the perceptions of operating ability and benefit sharing, whereas the overall satisfaction was influenced by benefit-sharing and risk-defense ability. Policy recommendations were suggested to strengthen the close bonds among AIU members at last.

KEYWORDS

Agro-Industrialized Union, Cooperation Satisfaction, Governance Structure, Industrial Chain, Perceived Interests, Performance Satisfaction, Rural Development, Triple-Hurdle Model

INTRODUCTION

The acceleration of agro-industrial chain integration has become a key component of efforts to enhance China’s agricultural competitiveness. Upgrades in the agro-industrial structure have highlighted the limitations of new agricultural entities (Tang et al., 2019) and revealed the challenges of surviving in the market alone (Wang & Yu, 2019). Organized agriculture provides methods to solve many problems with production and management. Moreover, the performance of agricultural cooperative organizations is a reflection of their members’ satisfaction, which is influenced by organizational performance (Bruynis et al., 2001). This relationship implies that cooperatives can only be well-performed when operating in coordination with members’ interests (Yu & Nilsson, 2021). Thus, operation in a reasonable way and the provision of services that meet members’ needs are necessary considerations for success (Liebrand & Ling, 2014). The importance of members’ satisfaction and
support has been widely considered in the existing works (Abdulahi et al., 2015), with respect to cooperative management (Powell & Meyer, 2004) and operations (Rhoades et al., 2001).

Agro-Industrialized Unions (AIUs), also known as agricultural industrialization consortia (Zhang et al., 2021), have gained broad acceptance in China (Liu, 2022). Some policies have emphasized the urgent need to support and develop AIUs with leading industries and closely linked interests, such as AIUs focused on agricultural leading enterprises, farm cooperatives, and family farms (Zhong et al., 2021). Considering their potential to promote rural-industry-integrated development and enhance industrial chain modernization, AIUs have become an important part of China’s modern rural industrial system (Chen, 2016). For example, Hebei Province has implemented AIU management organizations, based on the vertical integration of various interest-relevant entities. In 2022, Hebei Province selected 320 provincial-level AIUs, with a total output of 496.63 billion yuan. The main industries are concentrated in grain, oil, fruits and vegetables, poultry, dairy products, etc. Nowadays, the total output of AIUs in Hebei Province has exceeded the rate of quantity, indicating that the development of AIUs has achieved remarkable results and the quality level has significantly improved. Thus, it is moving toward a mature period with stabler growth.

The healthy development of AIUs depends on common view and active participation (Lu, 2017). However, a lack of internal impetus and loosely connected interests can lead to the fragmentation of an AIU, resulting in club formation or unequal cooperation that inevitably weaken internal member connections, in contrast to AIU policy expectations (Shang & Wu, 2020). Thus, supporting AIUs to ensure long-term, stable connections among members is of great importance. The satisfaction of AIU members is a key factor for stable development; thus, it is crucial to identify the factors that affect members’ satisfaction, which can help guide AIUs’ development.

There has been extensive theoretical and empirical research on AIUs. From the perspective of organization governance, the synergistic effects of AIUs vary according to governance mode. Relationship governance based on trust is greater than governance based on any contract (Jiang & Wang, 2022). Internal resource sharing affects the willingness of family farms to participate. Rational benefit distribution would be regarded as a “win-win” choice for cooperation in AIUs (Wang et al., 2022). Business status and subjective recognition influence the willingness of potential AIU members to participate, such as management status, interest distribution, socialized services, land transfer, and other issues (Liu et al., 2022). Existing research mostly focuses on the macro perspective and places less emphasis on related business entities. Additionally, most respondents are farmers. However, AIU members include leading enterprises, cooperatives, and family farms. Most research has involved subjective evaluation methods in analysis, rather than survey data, which may lead to difficulties when analyzing the internal mechanisms of AIUs. Although research regarding agricultural organizations is productive, there remains a need for further discussion on AIUs. The existing literature focuses on the general overview of the specialization division of labor and cooperation mechanism of AIUs, and does not deeply study the influencing factors of the performance of AIUs, nor distinguish the factors on the performance growth of AIUs from the objective indicators and subjective indicators, such as satisfactory evaluation. Recent studies have analyzed the impact of investment on the development of AIUs, but did not introduce governance structure factors from the perspective of organizational governance. Based on the theory of corporate governance and perceived value, this study introduced the factors of governance structure and perceived value, analyzed the members’ satisfaction in joining the AIUs, and improved the performance of the AIUs in two aspects; that is, individuals and the whole organization.

Specifically, the main aims of this research are to examine effectiveness of influencing factors on members’ satisfaction, to understand how these factors work, and to provide theoretical support for policymaking on the development of agro-cooperative organizations. Based on these considerations, the main questions to be solved in this study are: How satisfied are AIU members with their organization, and what factors affect members’ satisfaction? This paper divides the evaluation of satisfaction with AIUs into three decision stages: whether members’ conditions had improved after
joining the AIU, whether the union was effective, and whether members are satisfied with AIUs. The Triple-Hurdle model was used to analyze the impacts of governance structure and perceived interests on members’ satisfaction with AIUs. The results are expected to provide theoretical support and practical suggestions for sustainable AIU development and management.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Definition of an AIU
An AIU is an agricultural alliance that involves leading enterprises, cooperatives, family farms, and other related entities. It is mostly based on labor specialization, scaled operation, and interest linkage. Before AIUs existed, agro-industrialization had various organizational forms, which increased farmers’ income and improved product quality and agricultural supply. However, these earlier organization modes failed to establish efficient labor specialization mechanisms or stable interest connections among their members. The advantage of an AIU is that it forms a relation net among leading enterprises, cooperatives, and farmers to accommodate individual interests and labor specialization, while unifying the interests of its constituents to ensure high efficiency and sustainability. These goals are achieved in multiple ways, such as making rules, signing contracts, and sharing dividends.

Factors Influencing Satisfaction With Cooperation

Members’ Satisfaction
Satisfaction with AIU participation is achieved when the expectation of a goal is confirmed by positive product performance or profit (Kassem et al., 2021). Compared with companies, the performance of cooperatives is measured by both financial (Benos et al., 2016) and subjective indicators of a profit-maximized goal (Franken & Cook, 2015). Members’ satisfaction, commonly recognized as an outcome variable (Lario et al., 2014) to describe performance (Grashuis & Cook, 2019), has been correlated with both price (Nilsson et al., 2009) and profit, in terms of representing cooperation performance (Grashuis & Cook, 2021). According to Marhamah et al. (2020), who cite the work of Kotler, satisfaction is the feeling of achievement when a product is favorably received and meets positive expectations. AIU members’ satisfaction depends on optimal operation of the AIU’s internal management (Marhamah et al., 2020) that relates to its governance structure and the perceived interests of members.

Governance Structure
An AIU operates under the premise of good governance, positive engagement, and efficiency, relying on rules for restrained management. Studies have shown that operation ability has a significant positive influence on members’ satisfaction level (Chien & Thanh, 2022). AIU governance involves three aspects: decision-making, incentive, and supervision (Zhang et al., 2020). Considering that members’ satisfaction relies heavily on the governance mechanism (Xu & Wu, 2010), democratic decision-making processes may provoke satisfaction and a sense of trust for AIU members by promoting their participation (Liu et al., 2018). Satisfaction improves both internal and external incentives that help to increase the overall income of the AIU and members’ income (Wang, 2016). The supervision mechanism standardizes the daily operation of the organization to ensure members’ participation for performance and efficiency. The degree of relationship governance is high (Wan, 2008) in cooperatives (Chen & Luo, 2011) and the complementary relationship between trust governance and contract governance (Poppo & Zenger, 2002) affects farmers’ satisfaction (Claro et al., 2003) and the degree of cooperation (Chen, 2012).

Perceived Interests
The concept of perceived benefits was first presented in the field of product marketing (Flint et al., 2002). It is regarded as an important factor for consumers regarding their decision to purchase a
product or service (Wang & Guo, 2020). Perceived interest, introduced in the theoretical framework of the Theory of Planned Behavior, involves the belief that perceived interest generates behavioral intention. When a perceived interest is greater than the corresponding psychological expectation, a behavioral intention is immediately generated (E & Wang, 2022). Perceived interest is also used as an important basis for judging economic behavior, including behavior in the agricultural industry (Wang et al., 2021). Perceived interest is a multi-dimensional concept with different connotations and effects according to research content (Huang et al., 2019). This study analyzed three aspects of perceived interest: performance perception, benefit-sharing perception, and risk-defense perception.

- **Operational Ability Perception and Satisfaction:** Operating bodies generally tend to be more sensitive to elements directly related to themselves. Members must consider whether any organization is good enough to participate in. The fundamental connection between trust and satisfaction lies in the realization of performance and expectation (Kabst et al., 2018). Performance that meets members’ needs and interests tends to generate trust of the organization (Liu et al., 2020). The more reliable the governance structure is, the more easily the organization’s goals can be achieved (Ruan et al., 2022). According to some researches, performance has a significantly positive impact on its members’ perception of the cooperative, thus ultimately affecting members’ satisfaction with the organization. Other research shows similar findings, suggesting that organizational efficiency leads to members’ satisfaction in cooperatives (Fornell et al., 1996). Notably, George et al. (2013) had a similar conclusion regarding why cooperatives with similar external and internal conditions may have different degrees of member satisfaction.

- **Benefit-Sharing Perception and Satisfaction:** The School of the Rational Peasant regards farmers as rational actors who tend to make decisions in pursuit of their own economic interests. Greater output and returns encourage farmers’ willingness to invest. Economic benefit, as measured by income and agricultural productivity, has a positive impact on satisfaction (Kassem, 2013). The perception of benefits is thus closely related to the farmers’ goal of acquiring economic benefits (Li & Yin, 2021). For example, perceived income changes have a strong positive effect on farmers’ satisfaction with land transfer transactions (Niu et al., 2020). The perception of benefits significantly affects satisfaction and has an interactive effect with the perception of government intervention (J. Z. Luo et al., 2022). Researchers have generally discussed the influence of perceived interests on behavioral decision-making from the perspectives of increasing income, social interests, and an improved ecological environment. The influences of perceived interests are demonstrated by increased income and product value within an agricultural industry chain. The rational allocation of resources is realized among an AIU’s operating entities. When an AIU promotes the perception of interest sharing beyond expectations, satisfaction leads to active behavior decisions.

- **Risk-Defense Perception and Satisfaction:** Risk perception emphasizes the intuitive judgment of actors in the context of potential or ongoing uncertain events. Individuals’ perceptions of risk significantly affect their behavior and attitudes (Covello et al., 2001). Farmers’ risk reduction expectations can positively affect their satisfaction with land transfer transactions (Zhang et al., 2016). The emergence of risk affects trust, and the relationship between the two strongly influences AIU operations (Yang et al., 2018). The process of organizing relevant bodies to cooperatively manage risks enhances trust and reduces the degree of risk perception. Moreover, individuals’ behavior minimizes risk to protect the state of the AIUs. Thus, risk-defense perception refers to the ability of the AIU to reduce internal and external risks.

**Research Hypotheses and Theoretical Framework**

According to the analyses above, the following hypotheses were proposed:
**Hypothesis 1:** Governance structure positively impacts satisfaction with cooperation in AIUs.

**Hypothesis 2:** Perceived ability positively impacts members’ satisfaction with cooperation in AIUs.

**Hypothesis 3:** Operating ability perception positively impacts satisfaction with cooperation in AIUs.

**Hypothesis 4:** Benefit-sharing perception positively impacts satisfaction with cooperation in AIUs.

**Hypothesis 5:** Risk-defense perception positively impacts satisfaction with cooperation in AIUs.

In accordance with the influence of the governance structure and perceived interests on satisfaction with cooperation in AIUs, the study developed the following theoretical framework for research. Here, it is assumed that management conditions improved after the establishment of an AIU. Members were not satisfied with their own conditions before joining the AIU. They agreed that the establishment of an AIU would effectively change the previous situation, characterized by high transaction costs and low benefits. Thus, the degree of satisfaction among AIU constituents was generated. For example, before AIU formation, although a cooperative relationship was established among the new agricultural bodies, it was loosely connected and depended on market conditions. It would be easy for a new form to occur when the old mode is unable to meet the requirements of modern agricultural development for the agricultural operation bodies. After the establishment of an AIU, the requirement for complementary management became more urgent. With leading enterprises at the core of the industry chain of operators, interest mechanisms were established with multiple constraints to balance supply and demand, maintaining a close relationship among members. Finally, the AIU is expected to provide economic, social, and ecological benefits. Therefore, on the basis of agreement with the improvements related to AIU initiation and operations, as well as satisfaction with the cooperation and connection of interests, factors influencing the degree of satisfaction among AIU members were further investigated. The path described in Figure 1 presents the theoretical framework of this study.

**METHODS**

**Data Collection**

Data were acquired from a questionnaire survey of provincially ranked AIUs in Hebei Province at the end of 2020, involving 126 counties and districts in 13 cities. In total, 266 questionnaires were distributed. After the exclusion of non-returned questionnaires and those with missing data, 247 questionnaires were returned (92.9%). The questionnaire contained basic information, governance structure, perceived interests, and management benefits of the AIU. The survey data showed that most core leading enterprises (approximately accounting for 80.91%) were rated as county-level or province-level. Planting and agro-processing comprised 35.22% and 32.39%, respectively. Breeding and mixed unions that consist of more than 30 members comprised more than 10% of the total each. Over 65% of AIUs were initially formed by active contact, with leading enterprises motivating cooperatives and family farms to join. The proportion of AIUs initially formed by government and leading enterprises were approximately 15% and 15%, respectively.

*Figure 1. Influence of the governance structure and perceived interests on cooperation satisfaction*
Among the 247 valid questionnaires returned, the operating conditions of 244 respondents (approximately 98.79%) improved during their involvement in the AIU. These improvements mainly included two types of conditions: consistently good operations and significantly improved (50% each). Among respondents whose operation situations had improved, 231 (94.67%) were satisfied with the cooperation of the AIU. Moreover, 94.81% of respondents approved of the growth in economic benefits, 92.71% approved of the effect of income increase, and 85.83% approved of the growth in ecological benefits. Notably, the contribution of the AIU to ecological construction could be further improved.

**Measurement of Variables**

*Dependent Variables*

With respect to satisfaction with AIU cooperation, this paper uses three dependent variables: “improved or not,” “satisfied or not,” and “level of satisfaction.” “Improved or not” comprises the following four conditions: stay well, better, worse, and remain bad. The first two conditions suggest improvement, whereas “worse” and “remain bad” imply no improvement. “Satisfied or not” was included as a binary variable for the question. “Level of satisfaction” represents the degree to which respondents were satisfied with cooperation in terms of economic benefits, farmers’ income increase, and ecological benefits. The Likert scale was used for classification (1 to 5), with “1” representing “strongly disagreed” and “5” representing “strongly agreed.”

*Independent Variables*

The core independent variables were divided into governance structure and perceived interests.

- **Governance Structure:** Because governance structure is difficult to observe directly, it is recognized as a latent variable. So far, the literature has not provided a unified measurement standard for this parameter. Based on existing research and in accordance with the research purpose and internal logic, five dimensions were established. These dimensions are: strongly disagree, disagree, undecided, agree, and strongly agree. Exploratory factor analysis was performed using SPSS 22.0 software. P-values of less than 0.05 were considered statistically significant. The Kaiser–Meyer–Olkin value was 0.513 and the Bartlett sphericity value was 34.910 (P=0.000). It is concluded that the factor analysis result is well accepted, as it passes the 1% significance level test.

  The maximum variance method was used to obtain three common factors. The cumulative variance contributed 70.196%, and the factor loading for each variable was bigger than 0.6. The measurement result was considered good. The variance contribution rate of the first common factor was 27.526%. This factor reflected the ability to respond to internal and external risks (“risk governance” factor). The variance contribution rate of the second common factor was 22.396%, which mainly reflected management of the interest connection among business entities (“integrated governance” factor). The variance contribution rate of the third common factor was 20.275%, reflecting the coordination of the composition of governance organizations and the participation in decision-making; thus, it is called the “decision-making governance” factor. According to the score of each factor and the corresponding variance contribution rate, the comprehensive score of the governance structure was determined as follows: comprehensive score of governance structure = (0.27526 × risk governance score + 0.22396 × integrated governance score + 0.20275 × decision-making governance score) / 0.70196.

- **Perceived Interests:** Perceived interests included operational ability perception, benefit-sharing perception, and risk-defense perception. All observed variables were measured using a Likert scale. A larger value indicates a higher degree of expression. The validity and reliability of the questionnaire were analyzed using SPSS 22.0. Exploratory factor analysis was used for
questionnaire validity analysis, and the load coefficient of each latent variable was higher than 0.71, indicating that more than 50% of the variance of the observed variables could be reflected by the latent variables. Additionally, the level of the independent variables passed the validity test. In the analysis of reliability using Cronbach’s alpha values, the overall alpha values of the two latent variables and the benefit-sharing perception were 0.871, 0.839, and 0.916, respectively (all bigger than 0.60). Thus, the reliability level was considered to be good.

**Controlled Variables**

The first controlled variable was the leading enterprise, the core operating body of the AIU. Its ability affects the “leader” status in the industrial chain, as well as the level of AIU management. The second controlled variable was the main industrial type of AIU. Generally, the AIU examined in this study was dominated by processing enterprises for agricultural products. Finally, the third controlled variable was the formation of the AIU and the degree of coordination among the operating entities and their interests. This variable affects the degree of realization and recognition of the organizational goals of the AIU.

**Descriptive Statistical Analysis**

Table 1 presents the descriptive statistical analysis results of the variables. The dimensions of the latent variables are classified based on the observed variables. The recognition of the economic, social, and ecological benefits of the AIU was generally high. The perceived interests of the management ability, interest sharing, and risk defense of the AIU were also generally high. Furthermore, most AIU members noted a diversified interest connection mechanism. However, risk management was generally considered weak, with 46% and 63% of respondents noting the lack of a guarantee system and a punishment mechanism, respectively.

**Methods of Data Analysis**

A comparison of the survey data showed that there were more zero values in the explained variables. Many studies have used a restricted dependent variable model (i.e., the Tobit model) for empirical analysis. However, the Tobit model is susceptible to sample selectivity bias because of the constraints on explained variables (Liu & Wu, 2015). The Double-Hurdle Model was designed to solve this problem. Researchers commonly analyze two decision stages, willingness (Chu, 2015) and degree of it (Wang et al., 2020), as outlined by Engel & Moffatt (2014). In extensive research, the three-stage Triple-Hurdle model (Shi et al., 2018), which combined the Probit and Double-Hurdle models, was developed (L. Luo et al., 2022). With reference to existing research and based on the theoretical framework described earlier in this paper, satisfaction regarding cooperation in the AIU was divided into three stages. We believe that only operators whose condition did not worsen or even improved would provide a satisfactory or unsatisfactory evaluation of the AIUs. Inevitably, members whose conditions worsen express dissatisfaction with the AIUs. So, the first stage involved whether the members’ conditions improved after joining the AIU. The second stage involved whether members were satisfied with the effectiveness. The third stage involved the degree of members’ satisfaction. Thus, this study chose the Triple-Hurdle model to analyze the impact of the governance structure and perceived interests on satisfaction with the AIU. The evaluation process of the degree of satisfaction was refined using the Triple-Hurdle model, which has the advantage of avoiding sample selection bias. The following equations were constructed to describe these stages:

\[ Y_{i1} = \alpha X_{i1} + u_{i1} \]  

\[ Y_{i1} = \begin{cases} 1 & Y_{i1}^* > 0 \\ 0 & Y_{i1}^* \leq 0 \end{cases} \]
Table 1. Description of the main contents of the questionnaire

<table>
<thead>
<tr>
<th>Variables</th>
<th>Items</th>
<th>Description</th>
<th>Code</th>
<th>Mean</th>
<th>Std.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better or not</td>
<td>Conditions have improved since formation 0 = No, 1 = Yes</td>
<td>Y₁</td>
<td>0.99</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Satisfied or not</td>
<td>Satisfied with cooperation 0 = No, 1 = Yes</td>
<td>Y₂</td>
<td>0.94</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td><strong>Degree of satisfaction</strong></td>
<td>Economic benefit has significantly increased 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>S₁</td>
<td>4.42</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effectively drives the increase in farmers’ income 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>S₂</td>
<td>4.65</td>
<td>0.57</td>
<td></td>
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<tr>
<td></td>
<td>Ecological benefit has been strengthened 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>S₃</td>
<td>4.47</td>
<td>0.72</td>
<td></td>
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<tr>
<td><strong>Independent variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Governance structure</td>
<td>Decision-making governance 1 = Council-decided, 2 = Trust-based, 3 = Combined, 4 = Others</td>
<td>X₁₁</td>
<td>1.85</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Establish risk funds 0 = No, 1 = Yes</td>
<td>X₁₂</td>
<td>0.40</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Make punitive measures 0 = No, 1 = Yes</td>
<td>X₁₃</td>
<td>0.63</td>
<td>0.48</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obtain an interest mechanism 0 = No, 1 = Yes</td>
<td>X₁₄</td>
<td>0.99</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Has multiple interest connections 0 = None, 1 = One, 2 = More than one</td>
<td>X₁₅</td>
<td>1.79</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td>Perceived interests</td>
<td>Access to lower-cost material 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>X₂₁</td>
<td>4.59</td>
<td>0.69</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Allows to connect in industrial chain efficiently 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>X₂₂</td>
<td>4.78</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enables guaranteed material resources 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>X₂₃</td>
<td>4.77</td>
<td>0.52</td>
<td></td>
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<td></td>
<td>Convenient for quality control 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>X₂₄</td>
<td>4.75</td>
<td>0.51</td>
<td></td>
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<tr>
<td></td>
<td>Obtains reasonable benefit 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>X₃₁</td>
<td>4.71</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Able to share brand advantage 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>X₃₂</td>
<td>4.53</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Helps to strengthen cohesion 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>X₃₃</td>
<td>4.56</td>
<td>0.74</td>
<td></td>
</tr>
<tr>
<td>Risk-defense perception</td>
<td>Low odds for risks 1 = Strongly disagreed, 2 = Disagreed, 3 = Undecided, 4 = Agreed, 5 = Strongly agreed</td>
<td>X₄</td>
<td>4.70</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>Controlled variables</td>
<td>Core enterprise level 1 = County-rank, 2 = Provincial-rank, 3 = National-rank</td>
<td>CT₁</td>
<td>2.12</td>
<td>0.55</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type 1 = Planting, 2 = Breeding, 3 = Mixed, 4 = Circulation, 5 = Processing, 6 = Others</td>
<td>CT₂</td>
<td>2.92</td>
<td>1.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formation 1 = Government-pushed, 2 = Enterprise-led, 3 = Other members-asked, 4 = All-proposed</td>
<td>CT₃</td>
<td>2.10</td>
<td>0.90</td>
<td></td>
</tr>
</tbody>
</table>

\[ Y_{2i} = \beta X_{2i} + u_{2i} \]  
(3)  

\[ Y_{2i} = \begin{cases} 1 & Y_{2i}^* > 0 \\ 0 & Y_{2i}^* \leq 0 \end{cases} \]  
(4)
Equation (1) represents the selection equation, and $Y_{i1}$ indicates whether conditions improved after joining the union. Equation (3) is the resulting equation, and $Y^*_i$ represents satisfaction with the interest connection. $Y^*_{i1}$ and $Y^*_{i2}$ represent the corresponding explained variable. $i$ represents the $i$th observation. $X_{i1}$ represents a set of independent variables affecting $Y^*_{i1}$. $\alpha$ is the corresponding coefficient to be estimated. $X_{i2}$ represents a set of independent variables that affected $Y^*_{i2}$. $\beta$ is the corresponding coefficient to be estimated. $u_{i1}$ and $u_{i2}$ indicate the residuals of Equations (1) and (3), respectively, and are assumed to follow a standard normal distribution. $\text{corr}(u_{i1}, u_{i2}) = \rho$. $Y_{i2}$ could be observed if and only if $Y_{i1} = 1$. The corresponding unconditional probability model is as follows:

$$\text{Prob}[Y_{i1} = 1 | X_{i1}] = \Phi(\alpha X_{i1})$$

(5)

$$\text{Prob}[Y_{i2} = 1, Y_{i1} = 1 | X_{i2}, X_{i1}] = \Phi(\alpha X_{i1})\Phi(\beta X_{i2})$$

(6)

Equation (5) represents the probability model that conditions improved after formation of the AIU. The inverse Mills ratio (IMR) was constructed based on this equation. The IMR was introduced as a control variable, together with other explanatory variables in Equation (6), to obtain the estimated coefficient of IMR. If the original hypothesis holds true, then only direct sample estimation and Equation (6) can be used to avoid a sample selection bias problem. Otherwise, the IMR should be added in the control variables in Equation (6) to correct for sample selection bias. Equation (6) describes the probability model in which conditions improved after formation of the AIU, and the members were satisfied with the cooperation. $\Phi(\cdot)$ represents the cumulative distribution function, subject to a standard normal distribution. The satisfaction of the respondents with the benefits of the AIU can be expressed as follows:

$$Y^*_{i3} = \gamma X_{i3} + u^*_3$$

(7)

$$Y_{i3} = \begin{cases} Y^*_{i3} & Y^*_{i2} > 0 \\ 0 & Y^*_{i2} \leq 0 \end{cases}$$

(8)

$$E(Y_{i3}) = \gamma X_{i3} + \sigma \lambda(\gamma X_{i3}/\sigma)$$

(9)

From Equations (7)–(9), $Y_{i3}$ indicates satisfaction with the union, $Y^*_{i3}$ represents independent variable, and $X_{i3}$ is a set of independent variables that affect the degree of satisfaction with the benefits of the union. $\gamma$ is the coefficient to be estimated, and $u^*_3$ is a residual assumed to follow a truncated normal distribution. $E(\cdot)$ represents the conditional expectation, and $\lambda(\cdot)$ equals $\phi(\cdot)/\Phi(\cdot)$, where $\phi(\cdot)$ represents the probability density function of the standard normal distribution. $\sigma$ represents the standard deviation of the truncated normal distribution. By integrating these formulas, the likelihood function of the Triple-Hurdle model can be established for each $i$:
\( f(Y_{1i}, Y_{2i}, Y_{3i} \mid \alpha, \beta, \gamma, \sigma) \)

\[
= \left[ 1 - \Phi(\alpha X_{1i}) \right]^{I(Y_{i1}=0)} \Phi(\alpha X_{1i}) \left\{ \Phi(\beta X_{2i}) \Phi(\gamma X_{3i}) \right\} I(Y_{i2}=1) I(Y_{i3}=1)
\]

(10)

\( I(\cdot) \) represents the schematic function. When the expression in the brackets is true, the value is 1; otherwise, the value is 0.

RESULTS AND DISCUSSION

To exclude possible collinearity among the independent variables before the model estimation, this study applied the variance inflation factor method to all independent variables. The test results showed that the largest variance inflation factor was 2.64, and the mean variance inflation factor was 1.68. Thus, there was no multi-collinearity among the independent variables. In this paper, software Stata 15.0 was used to estimate the model. The IMR, acquired from Probit regression, was incorporated as a control variable for further regression in the model. It was shown that the regression coefficient of the IMR was 0.687, \( p > |z| = 0.538 \). It meant that the accepted null hypothesis indicated no sample selection bias in the cooperative satisfaction analysis of the AIUs. The chi-squared test values in the regression model were significant at the 1% level. Thus, the overall fit of the model was good, and the next regression analysis could be performed. First, the impact of the governance structure and the perception of interest on the improvement in operating conditions and satisfaction within AIUs was introduced (Table 2). Second, the governance structure and perceived benefits were introduced into the equation (Model 4 in Table 3). Finally, the explained variables were replaced, and the core explanatory variables were tested twice for robustness (Model 5 and Model 6 in Table 3).

Main Impacts

Governance Structure

In Model 1, which separately examined the influence of governance structure on the explained variables, results showed that the governance structure had a significantly positive impact on effectiveness. In particular, the impact on the degree of recognition was most significant. However, there was no significant impact on whether the business situation improved after formation of the AIUs. Model 3 showed that the governance structure only had a significant impact on the degree of union recognition. The respondents believed that the establishment and standardization of the AIU governance structure were objective requirements of its existence. The measures of governance and the establishment of rules and regulations are related to the realization and protection of interests for each business entity. Generally, a more optimal governance structure is associated with more diversified governance. Thus, more mature management ability leads to more constructive guidance. Accordingly, the integration of business entities as a standardized and stable union enhances the sense of security and trust among members. It also helps enhance active participation. Particularly for members who enjoyed the benefits provided by AIUs, a beneficent cycle will increase the degree of acceptance.

Perceived Interests

According to Model 2, the combined perception of the interest-related factors had significant effects on all stages of AIU cooperation behavior, consistent with the assumptions of this paper. Moreover,
according to the survey, whether a respondent continued to cooperate or reported satisfaction with the AIU was more directly influenced by judgments of interests, as well as risks, costs, and other factors. According to Model 3, there was a difference of significance between perceived operation ability, benefit sharing, and risk defense. The specific analysis was based on the results of Model 4.

- **Management Ability Perception:** The role of this explanatory variable significantly affected whether operating conditions had improved and whether members were satisfied with the results of the union. The influence on condition improvement was greater than in other areas. Improvements in business conditions and the maintenance of a good credit relationship were strongly associated with the successful operation of an AIU. An affirmation of business ability positively affected judgment regarding business conditions. The perception of business ability was a comprehensive perception that favored low-cost utilization of elements, efficient connection to the industrial chain, stability of raw material sources, and good quality control. Ultimately, it determined the perception of an AIU’s ability to provide benefits. Notably, after including the four factors above as regression variables in Model 4, the results showed that the judgment of effectiveness satisfaction was strongly influenced (at the 5% significance level) by whether the AIU favored low-cost utilization elements ($X_{21}$) and whether it favored efficient connection to the industrial chain ($X_{22}$).

- **Benefit-Sharing Perception:** This explanatory variable, signifying recognition of the AIUs, had a significantly positive impact on whether operating conditions had improved and whether members were satisfied with the union’s effectiveness. Thus, benefit-sharing perception was strongly associated with considerations regarding the extent and quality of cooperation. The first step was an evaluation of the benefits gained and the ability to share benefits. The perception of the degree of profit acquisition affected the judgment of the members on the effects and future development of AIU operations. This perception was more direct and more important than other factors. The explained variables revealed whether agreement with union membership improved benefit sharing ($X_{31}$), advantage of brands ($X_{32}$), and strength of cohesion ($X_{33}$). In particular, after introducing the above three factors as variables into Model 4 for regression, the results showed that the combination of benefits significantly affected recognition of the AIUs at the 5% significance level.

- **Risk-Defense Perception:** Risk-defense perception significantly impacted union acceptance and whether the operating conditions had improved. The comparative coefficient indicated that risk defense had a greater influence on judgments of improved business conditions, where the effect was generally high. The positive judgment of business subjects on the risk-sharing ability of the AIU indicated that the risk-defense mechanism of the AIU was effective and reduced the occurrence of default behavior among operating entities. Here, the observations of improved business conditions included the possibilities that risks never appeared and never occurred after AIU formation. The strong risk-prevention ability of the AIUs provided members with a greater sense of security and an overall perception of improved operations. When judging the effectiveness of the union, the first consideration was the overall status of the union, followed by members’ individual business statuses and benefits. Risk wasn’t always associated with a direct cause; hence, risk-defense perception did not significantly impact the effectiveness of the union.

**Controlled Variables**

As shown in Table 2, all control variables in Model 1 exhibited insignificant effects on the dependent variables across all three stages. Models 2–4 performed similarly, so that the main industry of the AIU affected satisfaction with the connection effect. The other variables had no significant effect on any of the three stages.
The results of this study showed that there was no regulatory effect among the core explanatory variables. The influence of the governance structure and perceived interests on cooperative behavior among AIU members was also confirmed. Here, $S_1$, $S_2$, and $S_3$ were selected as new variables to replace the explained variables in the third stage of the original model. The results are shown in Model 5 of Table 3. The frequency of specific transaction discussions was selected as an explanatory variable describing the governance structure to replace the core variable in the original model. The results are shown in Model 6 of Table 3. The robustness test result indicated that the influence direction and significance of the core independent variables were generally similar to those in Model 4. Thus, the estimated results of this study are considered to be robust and reliable.

**CONCLUSION**

The stable development of an AIU depends on the all-involved cooperation of agricultural operators. The perception of interest sharing is an important factor that affects the recognition and satisfaction of management entities. Based on survey data regarding AIUs in Hebei Province, this paper analyzed the influence of governance structure and perceived benefits on the development effects of AIUs using the Triple-Hurdle model. The results showed that governance structure and perceived interests had a significant impact on satisfaction with an AIU. The perceived interests, business ability perception, interest sharing perception, and risk-defense perception, all had a significantly positive impact on attitudes toward improving management condition. Satisfaction regarding benefits was mainly affected by the management ability perception and benefit-sharing perception, whereas satisfaction with the benefit connection effect was mainly affected by benefit-sharing perception and risk-defense perception.
perception. As far as control variables are concerned, the main industry type of the AIUs affected satisfaction with the connection effect, whereas the other variables did not have significant effects on three stages.

To realize the enhanced production and operating efficiency of the AIU and the coordinated cooperation of business entities, this study proposed the following policy recommendations. First, the organizational governance of the AIU should be standardized, and contract governance should be combined with relationship governance according to the closeness among entities at different stages of development. A more adaptable governance structure would improve the degree of organization among different business bodies. It is also important to establish the rules of association. A reward-and-punishment mechanism would standardize the production and trading behaviors of business entities. Second, multiple elements should be integrated in the industrial chain. With labor specialization in the agricultural industry, the traditional elements and modern elements could be integrated to optimize the AIU for each body. It is important to relocate capital, talent, science and technology, and other resources during AIU formation. With the AIU as the core driving force, advances could be made in research and development, social services, industrial associations, e-commerce platforms, and other areas that help to integrate the industrial chain of modern agriculture. Finally, the relationship between interests and risks should be carefully managed. Connection mechanisms should be constructed to promote shared connections and mutual aid, thereby improving the organization and standardization of the AIU, while ensuring the quality of its agricultural production. Furthermore, by establishing risk guarantee funds and other methods, the union can minimize the likelihood of natural and internal moral risks, improving the resilience and sustainability for the long term. This study could provide a reference for new agricultural managers to develop various interest-connection mechanisms, improving the efficiency of AIUs and driving the value-added ability of agro-industry chain.

Research on economic alliances has generally focused on a specific operating organization, such as a company or cooperative, which has a clear direction. The path of optimizing the economic alliance is based on two aspects; namely, the governance structure, such as the shareholding

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 4 (Replace dependent variables)</th>
<th>Model 5 (Replace independent variables)</th>
<th>Model 6 (Replace independent variables)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance structure</td>
<td>Stage I</td>
<td>Stage II</td>
<td>Stage III</td>
</tr>
<tr>
<td>Operational ability perception</td>
<td>-0.225* (0.708)</td>
<td>0.238* (0.250)</td>
<td>0.095** (0.051)</td>
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<tr>
<td>Benefit-sharing perception</td>
<td>2.636** (1.097)</td>
<td>0.900** (0.417)</td>
<td>0.118*** (0.100)</td>
</tr>
<tr>
<td>Risk-defense perception</td>
<td>2.114* (1.254)</td>
<td>0.752** (0.358)</td>
<td>0.382*** (0.091)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 4 (Replace dependent variables)</th>
<th>Model 5 (Replace independent variables)</th>
<th>Model 6 (Replace independent variables)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core enterprise level</td>
<td>Stage I</td>
<td>Stage II</td>
<td>Stage III</td>
</tr>
<tr>
<td>Type</td>
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<td>-0.037 (0.105)</td>
<td>0.039*** (0.017)</td>
</tr>
<tr>
<td>Formation</td>
<td>-0.355 (0.413)</td>
<td>-0.010 (0.213)</td>
<td>-0.006 (0.033)</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.313 (3.811)</td>
<td>-5.197*** (1.550)</td>
<td>1.113*** (0.354)</td>
</tr>
</tbody>
</table>

LR Chi-squared | 18.43*** | 130.21*** | 114.41*** | 82.42*** | 116.51*** | 18.32*** | 129.70*** |
Log likelihood | -7.000 | -156.741 | -195.864 | -166.899 | -208.174 | -7.055 | -156.995 |
structure, shareholding ratio and the size of the board, etc.; and the characteristics and behaviors of organizational members. This paper states that improving the comprehensive performance of the organization is the goal, along with coordinating economic relations and social relations among stakeholders. Existing research on AIUs also has a strong policy orientation. According to the results, the development of an agricultural organization has different characteristics at each stage. Scholars unanimously believed that the operation mechanism of AIUs can be roughly divided into main division of labor mechanism, interest connection mechanism, risk prevention mechanism, and industrial-chain integration mechanism. This study combines the theory of perceived value and the theory of governance structure with the agricultural organization, and deeply analyzes the interest connection between the members of the organization from some new perspectives. This conclusion explains the internal reasons why the AIU could realize the reasonable distribution of income and risk defense, as well as achieve low cost and high performance.

This study had some limitations. The survey participants were not separated by type. Leaders of AIUs were asked to cooperate with the survey. It relied on members to ensure representation of all entities within each AIU. Subsequent analysis concerning the sample heterogeneity should be considered. At present, the members of AIUs make a strong demand for support policies, and governments in some regions have given support to them, but the implementation of these projects and the effects of the support still need time to be fully assessed. Guiding policy has been relatively common; on the whole, the nationwide development of AIUs is in the primary stage. The reflection of common problems, the introduction of policies, and their adjustment measures will inevitably be expressed over a longer time frame. Therefore, research on the relationship between policy and the performance of AIUs is an important topic for the future. From the perspective of space, after the AIUs enter the more mature stage, the organizational structure will upgrade, the management will become more efficient, and the interests could be more closely connected. Related members have shown a trend toward cross-regional union, not limited to local and surrounding villages. Some operators have also joined in the AIU in order to enjoy the “membership treatment” under the leadership of the core enterprises, thus they are able to share the modern agro-industry chain profits.

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