

Article

The Impact of Tie Strength on the Sustainable Participation of Farmers in Contract Farming: An Empirical Study in Inner Mongolia, China

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Abstract: Contract farming can reduce transaction costs and improve agricultural productivity. With the establishment of stable and effective contractual relationships, not only have agricultural products been provided with a stable market, but the standardization, refinement, and branding transformation of agricultural products can also be realized, thus further promoting the progress of agricultural modernization. The willingness of farmers to renew their contracts is a key factor in maintaining long-term, stable cooperative relationships. This research involves the empirical verification of the impact model of tie strength between enterprises and farmers in contractual agriculture on the willingness of farmers to renew their contracts and reveals the working mechanism of tie strength on sustainable participation of farmers in contract farming. We utilized survey data from 276 agricultural households in Inner Mongolia, China, and the method of structural equation modeling (SEM), with the following results: (1) Interaction and reciprocity have a significantly positive influence on trust; (2) trust has a significantly positive impact on farmers' willingness to renew their contracts. Also, reciprocity and interaction have an indirect impact on contract renewal willingness through trust; and (3) the perceived economic value can significantly increase the contract renewal willingness of farmers and plays a mediating role between trust and contract renewal willingness. Overall, on the basis of tie strength, this research provides a new perspective for the investigation of the sustainable stability of contract farming and presents empirical evidence for the sustainable development of the contract farming supply chain.

Keywords: tie strength; contract renewal willingness of farmers; trust; interaction; reciprocity



Citation: Gao, Z.; Liu, X.; Zhang, X. The Impact of Tie Strength on the Sustainable Participation of Farmers in Contract Farming: An Empirical Study in Inner Mongolia, China. *Sustainability* **2024**, *16*, 1538. <https://doi.org/10.3390/su16041538>

Academic Editor: Teodor Rusu

Received: 6 January 2024

Revised: 5 February 2024

Accepted: 9 February 2024

Published: 11 February 2024



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1. Introduction

Contract farming, which is an effective method to improve production efficiency and realize supply chain coordination, has been widely applied in agricultural production in developing countries. There are many benefits for farmers in contract farming, including access to new markets, technical assistance, employment opportunities, stable income, and poverty alleviation [1–5]. At the same time, contract farming can reduce fluctuations in crop prices and help farmers shoulder production and market risks [6,7]. Generally, farming contracts can be divided into sales contracts and resource-providing contracts that provide credits, inputs, and technical services. Different types of contracts have different influences on market access, transaction costs, financing, and incomes of cooperative farmers, with both good and bad results [8–10]. Because of the differences in resource endowments and the characteristics of agricultural products, an optimal type of contract farming is nonexistent. However, the consensus is that contract farming can promote the transition from traditional agriculture to modern agriculture [11].

In northern China, there are arid and semi-arid areas with low temperatures, large temperature differences, and less precipitation. In these areas, drought-resistant crops, such

as cereal grains, millet, and corn, are commonly cultivated. These crops have relatively low yields, causing most farmers such problems as a small production scale, low product-added value, and weak risk resilience. Therefore, developing agricultural industry chains through contract farming has a more significant impact on rural areas in China and other developing and less-developed countries. In China, early farming contracts are primarily simple sales contracts. However, with the continuous innovation and evolution of cooperation modes, based on the sales contracts of agricultural products, agricultural enterprises, cooperatives, and intermediary organizations may sign a series of contracts involving technical guidance, social services, and financial support with farmers, thus forming a complete and effective contractual system. These efforts are directed toward constructing a long-term and stable community of shared interests and enhancing the overall efficiency of industrial chains, thus enabling farmers, businesses, and other members of supply chains to share value chain benefits [12,13].

However, in practice, the cooperative relationship between contract farmers and enterprises, especially their long-term cooperative relationships, is very unstable and even leads to frequent conflicts. In recent years, relationship governance has been widely used in studying the stability of relations [14–16]. Relationship governance is a governance mechanism that uses interpersonal relationships and emotional means to ensure the smooth implementation of contracts. Formal contracts can be used to specify the rights, responsibilities, and penalty mechanisms of the parties involved, thus helping to reduce breach rates and opportunistic behaviors [17]. However, because contract members such as businesses and farmers are independent and rational operation individuals, their objectives to maximize their own interests can lead to decision-making behaviors that conflict with the objectives of supply chain systems. Therefore, it is necessary to coordinate objective conflicts and enhance cooperation stability through embedded relationships [18]. Relationship governance is of vital importance for the sustainable development of contract farming.

In the long run, stable and safe relationships among contract members are a prerequisite for the sustainable development of contract farming supply chains. Compared with businesses, farmers present poor sustainability in participating in contract farming. Therefore, in this study, we utilized the contract renewal willingness of farmers to measure their sustainability in participating in contract farming. Relationship governance is conducive to establishing a long-term and stable cooperative relationship. Currently, abundant research has been conducted on the approaches involving relationship measurement, such as relationship instruments and relationship norms. Relationship norms include information exchange, flexibility, and cooperation [19], while relationship instruments include flexibility, solidarity, and information sharing [20]. Based on the notions of strong and weak ties in the social network theory, tie strength indicators (including reciprocity intensities, interaction intensities, and trust level) were established in this study to measure the relationships of farmers with agricultural enterprises, cooperatives, and intermediaries. Michael et al. (2007) revealed that three properties of tie strength (reciprocal services, mutual confiding, and emotional intensity) are positively related to buyer commitment to the selling organization [21]. Whether tie strength has the same effect on the sustainability of contract farming is a topic worthy of study. In recent studies, researchers have also shown an increasing interest in cooperation caused by the level of reciprocity, commitment, and trust. Communication is very important for cooperation [22]. The constructs of trust, commitment, and reciprocity are considered important precursors to foster collaboration [23]. However, the current research has mostly investigated cooperative stability from the perspective of some single-dimensional connection relationships. Less research has been performed on the mutual relationships among various dimensions of tie strength (reciprocity, interaction, and trust) and their collective mechanisms on the contract renewal willingness of farmers.

Motivated by the above research gaps, we utilized the field survey data of farmers in the plant industry in Inner Mongolia, China, and employed a structural equation model to empirically analyze the influences of three constitutional dimensions of tie strength, namely, reciprocity intensity, interaction intensity, and trust level, on the contract renewal

willingness of farmers, thus revealing their working mechanisms. Also, the significance of economic drivers in business relationships is evidently crucial [21]. In the agricultural sector, potential conflicts of interest between buyers and sellers often arise due to uncontrollable factors. Contract farming can effectively address economic conflicts of interest through robust risk management systems. Generally, scholars associate contract farming with direct economic benefits and indirect economic benefits [24]. The notion of tie strength originates from the social network theory, where reciprocity and interaction are objective behaviors existing from previous cooperation, and trust is the subjective attitude toward the partner. These three dimensions do not consider economic interests. The concept of perceived value originates from the notion of customer value in the field of marketing. Customer-perceived value refers to the overall evaluation of perceived value in which customers balance their perceived benefits with the costs they pay for obtaining products and services [25]. In recent years, researchers have subdivided perceived value into the perceived social/emotional value, the perceived utilitarian value, and the perceived economic value [26]. The research framework of this study is enhanced by incorporating the mediating variable of the perceived economic value, integrating relationship governance, economic interests, and renewal intention into a coherent logic, thus exploring the transmission mechanism and deepening the scope of the investigation.

2. Theoretical Analysis

Tie strength, first introduced in Granovetter's article, *The Strength of Weak Ties*, is a concept with four elements, namely, reciprocity intensity, interaction duration, closeness, and emotional depth, reflecting communication frequencies and mutual intimacy among individuals in a social network. There are strong ties among social network members who communicate frequently and have close relationships with each other. Otherwise, there are weak ties [27]. Tie strength is primarily measured by considering the extent of relationship closeness [28,29]. There are weak ties among individuals who have infrequent communication or tend to conduct one-way communication, whereas there are strong ties among individuals with frequent communication and interactions, intensive emotions, and high mutual reciprocity. Based on the four dimensions proposed by Granovetter, scholars have sought to expand the concept of tie strength from different perspectives, with rich research outcomes achieved in the domains of sociology and management [30–32]. However, current studies have mostly focused on the construction of tie strength from the perspective of enterprises, and fewer studies have investigated the connection strength of supply chains in contract farming from the perspective of farmers. Based on the social network theory, this study proposes that the tie strength of contract farming supply chains refers to the relationship depths developed through communication and interactions between farmers and agricultural enterprises (farmer cooperatives) that have signed long-term formal contracts with farmers.

With reference to relevant studies, we measured the tie strength of farmers participating in the supply chains of contract farming through three dimensions, including trust level, interaction intensity, and reciprocity intensity [33–36]. These three dimensions can influence one another to a certain extent. Among them, interaction and reciprocity intensities can be used to assess communication and interactions and the mutual benefits achieved during the whole cooperation process. The understanding and perception of interactions and reciprocity constitute the foundation of trust, further exerting an important influence on trust. Continuous cooperation primarily relies on trust, while communication among cooperative partners has a significantly positive effect on their mutual trust [37,38]. According to instrumental motivation, reciprocity is the key to the formation of cooperative behaviors. Farmers experiencing reciprocity and satisfaction exhibit high levels of trust [39,40]. On the other hand, frequent communication and interactions between enterprises and farmers can promote their sense of identification through the sharing of information and technology, and the reciprocity-based transaction trust of farmers can be enhanced, leading to their affective or cognitive trust in agricultural enterprises. Furthermore, through interactions and

communication, information asymmetry can be reduced, and unnecessary misunderstandings can be avoided, thus enhancing the trust levels of both parties. Based on the above analysis, it can be inferred that more intensive interactions of farmers with enterprises and cooperatives will lead to higher trust levels of farmers in their cooperative partners and that higher reciprocity levels between farmers and enterprises and cooperatives will result in higher trust levels of farmers in their cooperative partners. Therefore, in this paper, Hypotheses 1a and 1b are proposed as follows:

Hypothesis 1a (H1a). *Interaction intensity has a positive influence on the trust level.*

Hypothesis 1b (H1b). *Reciprocity intensity has a positive influence on the trust level.*

Trust is a prerequisite for sustained cooperative economic behaviors [41]. In cases involving the uncertainty of cooperative behaviors, trust is an important mechanism to mitigate moral hazards and opportunistic behaviors of reversal selection caused by information asymmetry. A higher level of trust can naturally improve the possibility of continuous cooperation among organization members [42]. On the one hand, reciprocity behaviors can raise the trust levels of farmers in agricultural enterprises and cooperatives. Under such a circumstance, farmers will anticipate that their cooperative partners will not harm their interests with short-term opportunistic actions, thus presenting a higher willingness to renew their contracts. On the other hand, interaction behaviors can also raise the trust levels of farmers in their cooperative partners. Farmers can anticipate that smooth cooperation will be realized through further information and technological exchanges and recognize that their partners are reputable and responsible enterprises, thus being more willing to renew their contracts. Based on the above analysis, it can be summarized that farmers with high trust levels in their cooperative partners will show higher cooperation intentions and present a stronger willingness to renew their contracts. Therefore, Hypothesis 2 is proposed as follows:

Hypothesis 2 (H2). *The trust level has a positive impact on farmers' willingness to renew their contracts.*

Different from farmers' initial decision to participate in contract farming, the contract renewal willingness of farmers reflects the likelihood of farmers intending to renew their contracts based on their current cooperative relationships. There are three primary modes of reciprocity: generalized reciprocity, balanced reciprocity, and negative reciprocity. The model for general reciprocity is family relationships. Balanced reciprocity is practiced between peers within the same community: Exchange items are notionally of equivalent value [43]. The reciprocity between enterprises and farmers should be balanced reciprocity. If farmers perceive that the economic benefits generated by the previous cooperation are high, or that they are exchanged with equivalent value, their willingness to renew the contract will be stronger. Conversely, if farmers perceive that the economic benefits are distributed unfairly, and the income is low, they will be less willing to renew their contract. The fairness of distribution is an important factor influencing the contract renewal willingness [15]. In a previous study, it was found that the perceived value acted as an intermediary between the initial trust, use, and recommendation intention of mobile money [44]. Based on the above discussion, we hypothesize that trust has an important influence on farmers' contract renewal willingness through the perceived core economic value.

Trust has a positive impact on rural households' perceived economic value concerning the energy utilization of crop residues [45]. In fact, many farmers opt for payment deferral as a strategy to secure higher contract prices and sales revenues, based on the trust they place in their partners. With trust in their partners and through horizontal and vertical comparisons of their cooperative benefits, farmers will develop the idea that continuous cooperation with their partners will bring about high economic benefits for them in the future. Therefore, it can be concluded that higher trust levels of farmers in their cooperative

partners will lead to higher perception levels of economic value among them. Based on this conclusion, Hypothesis 3 is proposed as follows:

Hypothesis 3 (H3). *The trust level has a positive impact on the perceived economic value.*

Through research, scholars discovered that the perceived economic value has a significantly positive impact on the intention to continue participation [46]. The key element influencing farmers' decision to participate in contract farming for the first time and renew their contracts is their measurement of perceived economic value. That is, their decision to participate is made on the basis of their judgment criteria regarding the perceived economic value. The primary factors influencing their initial participation decision include the reputation of cooperative enterprises and the anticipation that short-term economic benefits are higher than economic costs (including production costs and opportunity costs). Meanwhile, the influencing factors on contract renewal willingness include an acceptable level of risk and the recognition that the economic benefits obtained through long-term cooperative relationships are higher than economic costs. In summary, the perceived economic value is conducive to maintaining cooperative relationships among all cooperative entities in the supply chain. Therefore, Hypothesis 4 is proposed as follows:

Hypothesis 4 (H4). *Perceived economic value has a positive influence on contract renewal willingness.*

Based on the above analysis, a theoretical analysis framework of tie strength dimensions, perceived economic value, and contract renewal willingness was proposed in this study. The specific results are shown in Figure 1.

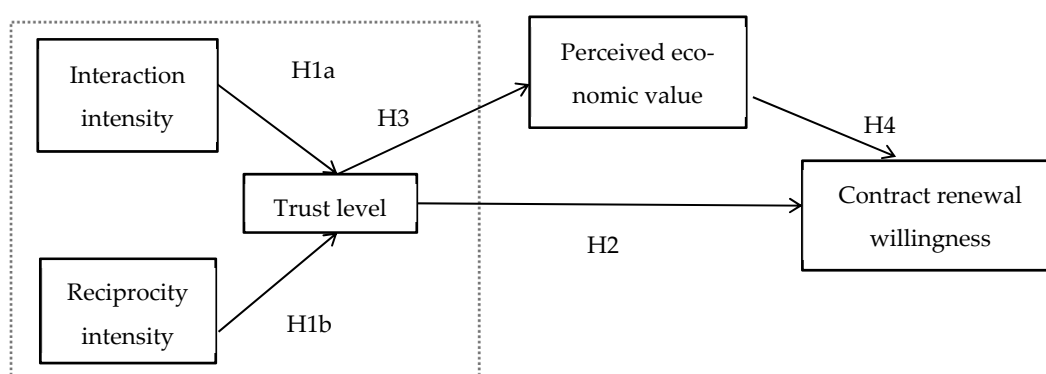


Figure 1. Theoretical framework.

3. Materials and Methods

3.1. Data Source

Field survey data from thirty-one administrative villages in seven counties of Inner Mongolia, China, were used in this study. From January to June of 2021, the research team carried out a preliminary survey in Chifeng City, Hohhot City, and Ordos City in Inner Mongolia (located in the eastern, central, and western parts of Inner Mongolia, respectively), involving a total of more than twenty agricultural enterprises and cooperatives engaging in contract farming. From August to December of the same year, some farmers who signed official contracts with seven leading agricultural industrialization enterprises and cooperatives among those involved in contract farming were selected as survey objects in this study. At the same time, for each of these seven enterprises or cooperatives, three to six administrative villages that had cooperative relationships with that enterprise or cooperative were randomly selected, obtaining a total of thirty-one villages. Subsequently, eight to ten farmers who had signed formal contracts with enterprises (or cooperatives) in each village were randomly selected and surveyed. With a combination of randomly selected cooperative villages and contracted farmers, a total of 286 questionnaires were

collected through a survey method of face-to-face interviews. With 7 invalid questionnaires and 3 noncompliant questionnaires excluded, a total of 276 valid questionnaires were finally obtained, yielding a valid questionnaire collection rate of 96.50%. The contract crops of the surveyed farmers primarily include millet, miscellaneous grains, beans (mainly buckwheat, sorghum, soybean, and mung bean), oats, potatoes, sweet corn, and sugar beet. Contract crops planted in the survey areas are primarily local specialty crops. The distance between Ar Horqin Banner in Chifeng City in the eastern region of the survey areas in this study and Zhunge'er Banner in Ordos City in the western region of the survey areas in this study is more than 1100 km. In these areas, types of cultivated land include both irrigated land type and nonirrigated land type, which primarily relies on natural precipitation. Inner Mongolia, which is one of China's six major grain-producing provinces, accounts for 8.9% of the total arable land area in the country. Therefore, the survey areas selected in this study can reflect to some extent certain characteristics of land in northern China.

The detailed basic characteristics of the survey samples are listed in Table 1. The ages of sample farmer household heads were distributed in the following pattern: 151 individuals, accounting for 54.71% of the total sample size, were 60 years old or above; 111 individuals had an age within the range of 45–59 years, accounting for 40.22% of the total sample size; and 14 individuals were younger than 45 years, accounting for 5.07% of the total sample size. The majority of the survey participants were elderly farmers aged 60 years or above engaging in the agricultural plant industry, followed by farmers aged 45–59 years, with young farmers accounting for only 5% of the total sample size. Household heads with an education level of elementary school or junior high school held the highest proportion among all survey participants, accounting for over 85% of the total sample size. The total household demographic data show that farmer households surveyed were primarily “empty-nest households of elderly people” whose children were mostly migrant workers or settled in cities after graduating from universities instead of engaging in local agricultural production. Over 65% of all survey participants had a planting area between 11 mu and 99 mu, and the proportion of large-scale planting households with a planting area exceeding 100 mu reached 25%. Agricultural households with an annual income of CNY 30,000–89,900 had the highest proportion among all the households surveyed. This is followed by agricultural households with an annual income of CNY 90,000 and above. Agricultural households with an annual income of CNY 30,000 and below only accounted for 10% of all the agricultural households surveyed. The primary reason lies in the fact that low-income agricultural households mostly belong to labor groups devoid of labor abilities or with low labor competence. Basically, these households do not engage in agricultural planting operations anymore. Therefore, we excluded these households from our investigation.

Table 1. Basic characteristics of samples (unit: farmer, %).

Index	Value	Freq	Prop
Age	<45 years old	14	5.07
	45–59 years old	111	40.22
	≥60 years old	151	54.71
	No degree	20	7.25
Education	Elementary school	139	50.36
	Junior high school	98	35.51
	Senior high school	18	6.52
	Bachelor's degree	1	0.36

Table 1. Cont.

Index	Value	Freq	Prop
Household scale	2 people or less	177	64.13
	3–4 people	90	32.61
	≥5 people	9	3.26
	≤10 mu *	26	9.42
Farm size	11–30 mu	86	31.16
	31–99 mu	94	34.06
	≥100 mu	70	25.36
	<CNY30,000	29	10.51
Annual net income	CNY30,000–89,999	132	47.83
	≥CNY90,000	115	41.66

* mu (a unit of area; 1 mu = 0.0667 hectares).

3.2. Questionnaire Design and Variable Measurement

Based on the characteristics of the contract renewal willingness of farmers and field survey data, questionnaire items for each variable were designed. Five latent variables, namely, trust level, interaction intensity, reciprocity intensity, perceived economic value, and farmer contract renewal willingness, and sixteen relevant observable variables were covered in the questionnaire. In this study, except for the net income of contract crop (PEV1), a 5-point Likert scale was applied to each measurement item used in the questionnaire. Scores 1–5 were used to reflect the assessment degrees of surveyed farmers on the content involved in each questionnaire item. A score of 1 represents “completely not concerned”, “completely not”, and “completely unsatisfied”; a score of 2 represents “not intimate”, “not frequent”, and “not satisfied”; a score of 3 represents “common”; a score of 4 represents “intimate”, “frequent”, and “satisfied”; and a score of 5 represents “very intimate”, “very frequent”, and “very satisfied”.

1. Tie strength: We divided tie strength into three dimensions: trust level, interaction intensity, and reciprocity intensity. The trust level refers to the extent to which farmers believe that their cooperative partners are willing and able to fulfill their corresponding obligations [47,48]. Affective trust (such as honesty, credibility, and benevolence) and trust in competence are generally regarded as elements of trust [49–51]. With reference to the above-mentioned research outcomes, and with the combination of reliability analysis based on the trust level scale, we selected three items, namely, “Based on previous experiences, it can be ensured that cooperative partners will abide by their cooperative agreements or commitments”; “Do you think your cooperative partners have the technical skills and abilities to fulfill their cooperative agreements?”; and “Do you think your cooperative partners are candid and trustworthy?”, to measure the trust level (TR1-TR3). Interaction intensity reflects how frequently farmers communicate with their cooperative partners and is normally measured with communication degrees and times through different communication approaches (telephone, face-to-face communication, etc.) [52]. Smartphones are frequently used in rural China. Many agricultural enterprises are promoting their products and technologies through their WeChat official accounts or WeChat groups. This information garners the attention of farmers, who usually add the staff of these enterprises as their WeChat contacts. With the characteristics of Chinese farmers considered in this study, four items, namely, “How are you concerned about the official accounts (WeChat groups) of your cooperative partners?”; “face-to-face communication frequency (times)”; “telephone communication frequency (times)”; and “WeChat communication frequency (times)”, were used to measure the interaction intensities among farmers (IN1-IN4). Reciprocity intensity refers to the levels of interest-based cooperation and reciprocal relationships between farmers and their cooperative partners through resource exchanges. Reciprocity is concerned with satisfaction, friendliness, and the accessibility of information to partners [53]. In this study, we believed that benefits to enterprises (cooperatives)

that cooperate with farmers and their recognition of reciprocal relationships should also be considered. Therefore, four items, namely, “Your satisfaction (gratitude) level on the cooperation with your cooperative partners”; “Do you feel you would give up fulfilling your agreements with your cooperative partners?”; “Do you recognize that you have win-win relationships with your cooperative partners?”; and “The degrees of benefit growth (development) of enterprises resulted from cooperation with you”, were selected in this study to measure the intensity of reciprocity (RE1-RE4).

2. Perceived economic value: With the combination of reliability analysis using the scale, we selected two items to measure the perceived economic value (PEV1-PEV2). PEV1 is the natural logarithm of the net income of the contract crop. The net income of the contract crop can be calculated by reducing input costs from the yield of the contract crop multiplied by the selling price. Specifically, input costs include direct material costs such as seed costs, fertilizer costs, pesticide costs, plastic film costs, and irrigation costs; direct labor costs such as self-harvesting labor costs or hired harvesting labor costs; and machinery costs such as hired machine costs for land plowing, sowing, and harvesting or the depreciation costs of self-owned machines and fuel costs. PEV2 refers to the income levels of farmers planting contract crops compared with the income levels of other farmers planting noncontract crops in the same village. It can be seen that PEV1 and PEV2 measure the perceived economic value primarily from two perspectives of absolute number and relative level, respectively.
3. Farmer contract renewal willingness: In existing studies, contract renewal willingness is only reflected with a single item of intention intensity [54]. This study holds that contract renewal behaviors are somewhat uncertain under the current circumstances. Farmers may face certain difficulties in their subsequent cooperation, and farmers who overcome difficulties and continue their cooperation will exhibit stronger intentions to renew their contracts. Therefore, three items, namely, “Intention intensity of subsequent participation in contract farming”; “Do you feel it is not difficult for you to continue to participate in contract farming?”; and “How strong is your intention to overcome difficulties to continue your participation in contract farming?”, were selected in this study to measure the intentions of farmers to renew their contracts (CRW1-CRW3). The specific measurement results and descriptive statistics of all the variables mentioned above are listed in Table 2.

Table 2. Variable measurement and descriptive statistics.

Latent Variable	Variable Observation	Item	Mean	S.D.
Trust level (TR)	Based on previous experiences, it can be ensured that cooperative partners will abide by their cooperative agreements or commitments.	TR1	3.917	0.641
	Do you think your cooperative partners have the technical skills and abilities to fulfill their cooperative agreements?	TR2	3.899	0.582
	Do you think your cooperative partners are candid and trustworthy?	TR3	3.844	0.560
Interaction intensity (IN)	How are you concerned about the official accounts (WeChat groups) of your cooperative partners?	IN1	2.308	1.255
	Face-to-face communication frequency (times)	IN2	2.525	0.842
	Telephone communication frequency (times)	IN3	2.185	1.232
	WeChat communication frequency (times)	IN4	1.464	0.912
Reciprocity intensity (RE)	Your satisfaction (gratitude) level on the cooperation with your cooperative partners	RE1	3.822	0.678
	Do you feel you would give up fulfilling your agreements with your cooperative partners?	RE2	3.833	0.683
	Do you recognize that you have win-win relationships with your cooperative partners?	RE3	3.754	0.701
	The degrees of benefit growth (development) of enterprises resulted from cooperation with you	RE4	3.703	0.665

Table 2. *Cont.*

Latent Variable	Variable Observation	Item	Mean	S.D.
Perceived economic value (PEV)	Net income of contract crop (In)	PEV1	9.294	1.239
	Your income level of contract crops compared with those of other farmers planting noncontract crops in your village	PEV2	3.634	1.151
Farmer contract renewal willingness (CRW)	Intention intensity of subsequent participation in contract farming	CRW1	3.558	0.934
	Do you feel it is not difficult for you to continue to participate in contract farming?	CRW2	3.239	0.818
	How strong is your intention to overcome difficulties to continue your participation in contract farming?	CRW3	3.514	0.920

3.3. Measure Reliability and Validity

In this study, a factor analysis using SPSS20.0 and Amos26.0 software was performed to test the reliability and validity of the relevant variables, with the specific results listed in Table 3. In order to examine the reliability of questionnaire data and the internal consistency of all questionnaire items, we calculated Cronbach's α values of the trust level, interaction intensity, reciprocity intensity, perceived economic value, and farmer contract renewal willingness, which were 0.849, 0.781, 0.905, 0.626, and 0.789, respectively. All these values are higher than 0.6, and their C.R. values are higher than 0.7, indicating the good validity of the scale.

Table 3. Reliability and validity tests.

Latent Variable	Item	Factor Loading	Cronbach's α	C.R.	KMO	AVE
Trust level (TR)	TR1	0.834	0.849	0.853	0.718	0.660
	TR2	0.845				
	TR3	0.754				
Interaction intensity (IN) \ 	IN1	0.642	0.781	0.798	0.749	0.500
	IN2	0.736				
	IN3	0.776				
	IN4	0.663				
Reciprocity intensity (RE)	RE1	0.796	0.905	0.907	0.836	0.709
	RE2	0.877				
	RE3	0.898				
	RE4	0.791				
Perceived economic value (PEV)	PEV1	0.801	0.626	0.714	0.500	0.584
	PEV2	0.571				
Contract renewal willingness (CRW)	CRW1	0.931	0.789	0.816	0.609	0.614
	CRW2	0.461				
	CRW3	0.871				

In terms of validity, the scales used in this study were designed and developed based on an extensive review of the literature and by referring to the relevant study outcomes and mature scales, combined with actual survey situations. The results listed in Table 3 show that except for the perceived economic value, the KMO values of all other latent variables are in the range of 0.609–0.836, which is higher than 0.6. Also, the significance probability P of Bartlett's sphere test reached a significance level, with an overall KMO value of 0.883. This indicates that all these variables are suitable for factor analysis. As all the AVE values are greater than 0.5, all questionnaire items can precisely reflect the contents to be validated, and the model designed based on previous research exhibits high convergent validity. In this study, an unrotated principal component analysis was conducted on those sixteen items involved using a Harman single-factor test, with the results indicating a 40.22% variance explanation of the greatest factor, which is below 50%. Therefore, it can be inferred that there is no severe common-method bias in this study.

4. Data Analysis and Results

4.1. Correlation Test of Variables

Before the SEM modeling, a Pearson correlation analysis was conducted in this study on the variables of trust level, interaction intensity, reciprocity intensity, perceived economic value, and farmer contract renewal willingness. The specific results are listed in Table 4. It can be seen that there are significant correlations among all variables, thus preliminarily validating the research hypotheses. In addition, the correlation coefficient of each variable with other variables is lower than the square root of the average variance extracted (AVE) value, indicating the good discriminant validity of the variables.

Table 4. The square roots of AVE and Pearson correlation coefficients.

Construct	TR	IN	RE	CRW	PEV
TR	0.812 ¹				
IN	0.463	0.707			
RE	0.662	0.440	0.842		
CRW	0.477	0.392	0.594	0.783	
PEV	0.296	0.221	0.352	0.481	0.764

¹ The square roots of AVE (shown as bold figures).

4.2. Model-Fit Analysis

In this study, Amos26.0 was used to fit the structural equation model, with the overall fit results listed in Table 5. The fit indexes listed in Table 5 indicate that the chi-square degree of freedom χ^2/df is 2.565, which is below 3. Fit indexes like GFI are greater than or close to 0.90, and the root mean square error of approximation (RMSEA) is less than 0.08, indicating a good fit of the constructed model; therefore, it meets the fit criteria and can be used to perform the hypothesis testing.

Table 5. The recommended and actual values of fit indexes.

Fit Indexes	χ^2/df	GFI	AGFI	NFI	CFI	IFI	RMSEA
Recommended value	<3	>0.90	>0.90	>0.80	>0.90	>0.90	<0.08
Actual value	2.565	0.903	0.865	0.900	0.936	0.937	0.075

χ^2/df : ratio between χ^2 and degree of freedom; GFI: goodness-of-fit index; AGFI: adjusted goodness-of-fit index; NFI: normed fit index; CFI: comparative fit index; IFI: incremental fit index; RMSEA: root mean square error of approximation.

4.3. Results

To test the proposed model, a structural equation model (SEM) analysis was performed. The maximum likelihood estimation method is specifically employed for hypothesis verification. The test results of the standardized influencing pathways of model fit were obtained, which are shown in Table 6. From the parameter estimation values and test results listed in Table 6, it can be seen that the pathway coefficient of interaction intensity to trust level has a value of 0.264 and is significant at the 1% level, thus confirming Hypothesis 1a. That is, interaction intensity has a significantly positive influence on the trust level. Also, the pathway coefficient of reciprocity intensity to the trust level has a value of 0.643 and is significant at the 1% level, thus confirming Hypothesis 1b. That is, reciprocity intensity has a significantly positive influence on the trust level. Therefore, it can be seen that both interaction intensity and reciprocity intensity have a significantly positive influence on the trust level. Meanwhile, the direct pathway coefficient of the trust level to farmer contract renewal willingness has a value of 0.475 and is significant at the 1% level, thus confirming Hypothesis 2. That is, the trust level has a significantly positive influence on farmer contract renewal willingness. Farmers with stronger trust in their cooperative partners have a stronger intention to participate in contract farming continuously. The pathway

coefficient of the trust level to the perceived economic value has a value of 0.386 and is significant at the 1% level, thus confirming Hypothesis 3. That is, the trust level has a significantly positive impact on the perceived economic value. The pathway coefficient of the perceived economic value to farmer contract renewal willingness has a value of 0.420 and is significant at the 1% level, thus confirming Hypothesis 4. That is, the perceived economic value has a significantly positive impact on farmers' contract renewal willingness. This result shows that the perceived economic value plays a partial mediating role in the influence of trust on farmer contract renewal willingness.

Table 6. Path coefficients and significance.

Hypothesis	Path	Coefficient	Supported or Not
H1a	Interaction intensity → Trust level	0.264 ***	Yes
H1b	Reciprocity intensity → Trust level	0.643 ***	Yes
H2	Trust level → Contract renewal willingness	0.475 ***	Yes
H3	Trust level → Perceived economic value	0.386 ***	Yes
H4	Perceived economic value → Contract renewal willingness	0.420 ***	Yes

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The estimation results of the measurement model can reflect the relationship between observation variables and latent variables. From the relevant test results of pathway coefficients listed in Figure 2, it can be seen that the measurement variables IN1, IN2, IN3, and IN4 corresponding to the variable of interaction intensity all passed the significance test at the 1% level, with the obtained standardized coefficient values of 0.645, 0.735, 0.773, and 0.665, respectively. This indicates that face-to-face communication, telephone contact, and WeChat communication are all conducive to increasing interaction and communication frequencies among supply chain partners, and traditional face-to-face communication and telephone communication are still the most common and effective methods of communication among farmers.

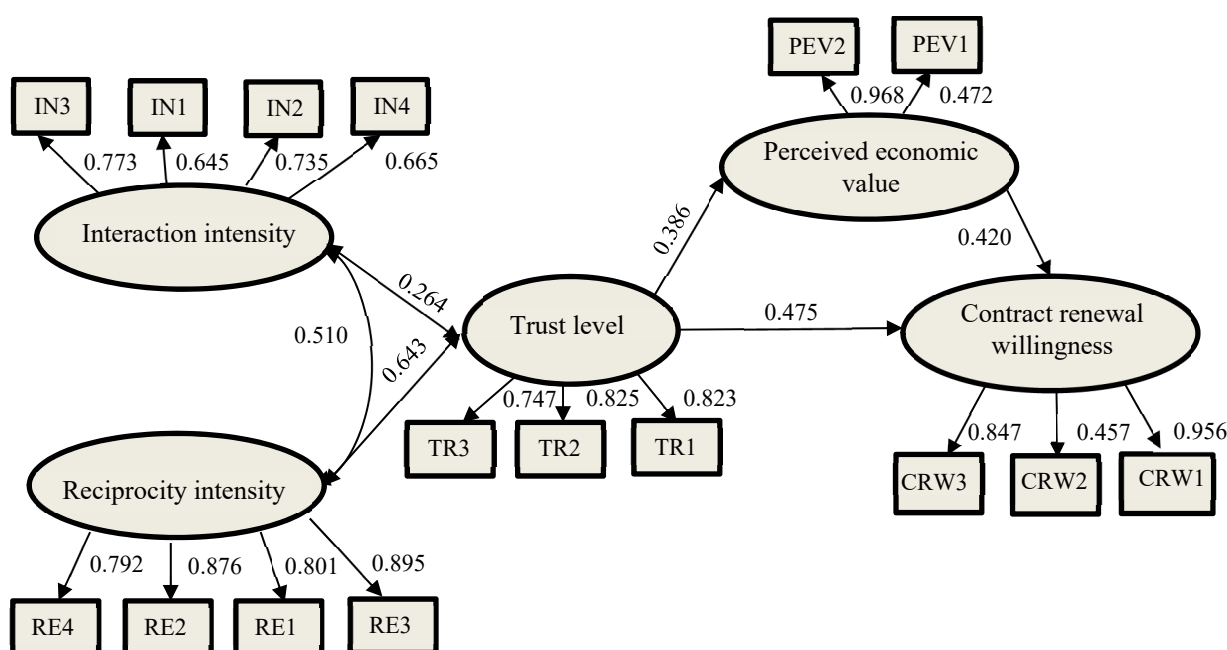


Figure 2. Analysis diagram of influencing pathways of farmer contract renewal willingness.

The measurement variables RE1, RE2, RE3, and RE4 corresponding to the variable of reciprocity intensity all passed the significance test at the 1% level, with the obtained

standardized coefficient values of 0.801, 0.876, 0.895, and 0.792, respectively. This indicates that the satisfaction levels of farmers in cooperation with their cooperative partners and their recognition levels of win–win relationships with their partners can significantly increase the reciprocity intensities among supply chain partners.

The measurement variables TR1, TR2, and TR3 corresponding to the variable of trust level all passed the significance test at the 1% level, with the obtained standardized coefficient values of 0.823, 0.825, and 0.747, respectively. This indicates that the recognition of farmers on their cooperative partners' compliance with agreements, contract-fulfilling capabilities, candidness, and trustworthiness can significantly enhance their trust levels in their partners.

The measurement variables PEV1 and PEV2 corresponding to the variable of perceived economic value all passed the significance test at the 1% level, with the obtained standardized coefficient values of 0.472 and 0.968, respectively. This indicates that compared with the incomes of noncontract farmers, the net incomes of contract farmers during their cooperation periods have a significant impact on the economic value they perceive from future contract cooperation.

The measurement variables CRW1, CRW2, and CRW3 corresponding to the variable of farmer contract renewal willingness all passed the significance test at the 1% level, with the obtained standardized coefficient values of 0.956, 0.457, and 0.847, respectively. This indicates that the willingness of farmers to continuously participate in contract farming and overcome the difficulties associated with their participation, as well as the difficulties related to their participation in further contract farming, are the three factors with progressively weakening influences on the contract renewal willingness of farmers.

4.4. Mediating Effect Analysis

Based on the hypotheses proposed in the “Theoretical Analysis” section of this paper and the above analysis results, it can be inferred that the level of trust can affect farmer contract renewal willingness through the perceived economic value. A Bootstrap method in Amos was used in this paper to test the mediating effect of the perceived economic value and its corresponding confidence interval, with the specific results listed in Table 7. In this table, LLCI and ULCI represent the upper and lower bounds of the confidence interval, respectively. The following assessment criteria can be applied to direct and indirect effects: If the confidence interval of the indirect effect does not include zero, there is a mediating effect among latent variables. If the confidence interval of the direct effect includes zero, those mediating variables play a complete mediating role, while if the confidence interval does not include zero, those mediating variables play a partial mediating role. The mediating effect in the “trust level → perceived economic value → contract renewal willingness” pathway is 0.162 (0.386×0.420), with a confidence interval of 0.090–0.269, which does not include zero, indicating that the perceived economic value plays a mediating role in the influence of trust on contract renewal willingness. Meanwhile, the direct effect of the “trust level → contract renewal willingness” pathway has a confidence interval of 0.338–0.593, which does not include zero, indicating that the mediating variables play a partial mediating role between the trust level and contract renewal willingness. Therefore, the total effect of the trust level on farmer contract renewal willingness is 0.637 (direct effect value of 0.475 + mediating effect value of 0.162), with the direct and mediating effects of the perceived economic value accounting for 74.57% and 25.43% of the total effect, respectively. Reciprocity and interaction intensities have an indirect impact on contract renewal willingness through the trust level. The indirect influencing effects of reciprocity intensity and interaction intensity on contract renewal willingness are 0.168 (0.264×0.637) and 0.410 (0.643×0.637), respectively.

Table 7. Results of effect value significance test (Bootstrap).

Path	Effect Value	LLCI	ULCI
Trust level → Contract renewal willingness (total effect)	0.637	0.538	0.726
Trust level → Contract renewal willingness (direct effect)	0.475	0.338	0.593
Trust level → Perceived economic value → contract renewal willingness (indirect effect)	0.162	0.090	0.269

5. Discussion

Contract farming is an important method of vertical collaboration in the value chain of agriculture and has been widely used in the world because of its advantages in optimizing production organizations, promoting technological progress, and achieving intensive production. Contract farming is of great significance in organically bridging small farmers with agricultural modernization and promoting the sustainable development of small-scale farming and rural economies. It is of theoretical and practical significance for the government to formulate policies to promote the quality development of contract farming and form a pattern of complementary advantages and labor division between enterprises and farmers in the industrial chain.

In terms of contract renewal in contract farming, current studies have not shifted their focus toward tie strength. Compared to the existing literature, this study primarily makes two marginal contributions as follows: First, we systematically examined the formation processes of farmers' contract renewal intentions and identified the key relational factors influencing the formation. The theoretical logic of interaction intensity (communication frequency), reciprocity intensity, and trust level promoting the continuous cooperation of contract farmers was explored. This study compensates for the deficiency of existing studies, which mostly focus on a certain dimension of tie strength as an influencing factor, and supplements the literature on the relationship governance of contract farming. Second, we introduced the concept of "perceived economic value" as an intermediary variable within the framework of enhancing tie strength to foster sustainable participation of contract farmers in cooperation. This study provides empirical evidence supporting the notion that both tie strength and perceived economic value serve as fundamental prerequisites for ensuring the stability of contract farming. From the results, new insights are obtained, especially in regard to the impact of trust on the perceived economic value and households' contract renewal intentions. It is hoped that the results can inform policymakers.

Through econometric analysis, it is safe to conclude that tie strength has a promoting effect on the stability of contract farming. This conclusion is consistent with the view of Maloku et al., who indicated that relationship quality (satisfaction, commitment, and trust) is conducive to acquiring better competitive advantages [24]. Specific research results show that interaction and reciprocity intensities (including the satisfaction level) have a significantly positive influence on the trust level, which has a further significantly positive influence on farmer contract renewal willingness. Also, Maloku and Corsten argued that trust plays an important role in cooperative relationships [24,55]. Likewise, Dlamini-Mazibuko found that satisfaction is a prerequisite for trust [56]. Chalker and Loosemore argued that trust can be significantly improved through effective communication [57]. Ke et al. proposed that affective trust, trust in the system, and trust in competence are positively correlated with cooperation [49]. Therefore, it is necessary to strengthen interactions and reciprocity between enterprises and farmers, and under a certain level of trust, the stability of their cooperation can be significantly improved. However, Maloku argued that satisfaction level is a trivial factor in contract farming [24].

In addition, the specific results of this study show that the pathway of reciprocity intensity to trust level has a coefficient value of 0.643, while the pathway of interaction intensity to trust level has a coefficient value of 0.264, indicating that reciprocity intensity has a more significant influence on trust level than interaction intensity. Compared with frequent communication and interactions, satisfaction with cooperation and recognition of win–win outcomes for farmers will enhance their trust in the cooperation. A possible

explanation is that enterprises (cooperatives) can demonstrate their social responsibility toward farmers, shareholders, and other stakeholders through various ways. That is, they can actively help supplier farmers overcome difficulties and improve satisfaction in cooperation; operate their businesses rationally to increase their profitability; provide great rewards to their shareholders; and improve their image, competence, and sustainable development levels. These behaviors can lead to increased reciprocity intensities of farmers, thus further improving their transaction trust, affective trust, and cognitive trust in their cooperative partners. In comparison, communication and interactions between enterprises and farmers can also increase their trust levels toward each other. However, the rural society in China is based on personal connections, and farmers can obtain useful information they need through their channels with other farmers, achieving similar effects as direct communication with enterprises. Therefore, frequent communication and interactions with enterprises are not very important for farmers. Reciprocity intensity, followed by interaction intensity, should be emphasized in relationship governance first.

During the field survey, it was found that although some farmers know their cooperative enterprises very well, with high levels of trust, their intention to renew their contracts is at a particularly low level. Further interviews revealed that product quality disputes and delayed payment during contract execution, which are closely related to economic benefits, could be the possible reasons. Dohmen also argued that trust and positive reciprocity are weakly correlated, while there is a remarkable negative correlation between trust and negative reciprocity [58]. Based on this, it is speculated in this study that the positive experiences of economic benefits during early cooperation periods can impact the contract renewal intentions of farmers and that the perceived economic value has a partial mediating effect on the influence of trust level on contract renewal intention. This finding is consistent with empirical results, which show that the mediating effect of perceived economic value only accounts for 25.43% of the total effect. However, the analysis of the mediating effect shows that the perceived economic value is also an important pathway of tie strength promoting the stability of cooperation, which indicates that such factors as price, yield, and cost play a key role in the continuous and sustained participation of farmers in contract farming. This insight complements the argument that trust has a direct influence on contract farming. Jayashankar also found that trust is positively correlated with the perceived value and that the perceived value has a positive effect on the adoption of the Internet of Things by farmers [59]. If reciprocity represents an altruistic behavior, then the mediating effect of the perceived economic value can reflect the applicability of farmers' economic perceptions of contract farming, indicating that balanced reciprocity is an inevitable result of the sustainable development of contract farming.

6. Conclusions and Recommendations

6.1. Conclusions

Based on survey data from farmers, this study empirically investigated three dimensions of the supply chain, namely, tie strength, perceived economic value, and contract renewal willingness of farmers, using structural equation modeling; the following results were achieved:

- (1) Interaction and reciprocity intensities have a significantly positive influence on the trust level. That is, more frequent interactions and more intensive reciprocity will bring higher trust levels between agricultural enterprises and farmers. Reciprocity exerts a more pronounced influence on trust compared to interaction.
- (2) The trust level has a significantly positive impact on farmer contract renewal willingness. The total effect of trust on contract renewal willingness has a value of 0.637, which is the sum of the direct effect value of 0.475 (trust level → contract renewal willingness) and the pathway mediating effect value of 0.162 (trust level → perceived economic value → contract renewal willingness).

- (3) Reciprocity and interaction intensities have an indirect impact on contract renewal willingness through the trust level, with indirect influence effect values of 0.168 and 0.410, respectively.

6.2. Policy Recommendations

Based on the above conclusions, we propose the following policy recommendations: First of all, reciprocity is a pivotal factor in fostering sustainable contractual relationships. Astute managers endeavor to establish a balanced or even generalized reciprocity mechanism between farmers and enterprises, thereby propelling the sustainable development of enterprises while concurrently enhancing the economic benefits of farmers, ultimately culminating in a mutually beneficial outcome. Secondly, on the basis of reciprocity, farmers' trust in enterprises should be improved through communication and interaction. Enterprises should strive to influence the attitudes and behaviors of farmers through methods such as incentivization and effective information exchange. Additionally, enterprises must actively embrace their social responsibilities by faithfully fulfilling the commitments made when establishing cooperative relationships with farmers while also providing increased assistance to farmers facing difficulties in order to enhance the perception of trust in enterprises.

6.3. Limitations and Prospect

Although in this study, we conducted theoretical and empirical analyses in a systematic way, there are still some limitations to be addressed. Firstly, only quantitative methods were used in this study. Future studies can deepen the investigation on the sustainable participation of farmers in contract farming by employing such qualitative research approaches as in-depth interviews and case studies. The second limitation of this paper involves its research scope. In this study, only supply chains in the plant industry in Inner Mongolia, China, were investigated, and the research results of this paper can only provide a reference for China and other developing countries. Future studies can expand the scope of their investigations to enrich research outcomes. Thirdly, we only investigated internal variables (reciprocity intensity, interaction intensity, and trust level) in tie strength. Future studies can further investigate the influences of external variables such as market dynamics and environmental conditions on sustainable agriculture. Finally, only one-year cross-sectional data were used in this study. Future researchers can continue to track and collect panel survey data to obtain valuable insights into the long-term influence of tie strength on sustainable contract farming.

Author Contributions: Z.G. contributed to the methodology, software, validation, formal analysis, resources, data curation, and writing—original draft preparation. X.L. contributed to the methodology, software, and data curation. X.Z. contributed to the conceptualization, writing—review and editing, and funding acquisition. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the National Social Science Fund of China (Grant Number No. 19BJY043).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available upon request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

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