Empirical Study on Guanxi and Performance of the Agricultural Supply Chain Based on Knowledge Sharing Intermediary

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ABSTRACT

“Guanxi” is a very special and important factor in Chinese traditional agricultural society and economic activities, and it has an important impact on all participants in the agricultural supply chain. Taking four dimensional attributes of guanxi—renqing (reciprocal favour exchange), mianzi (face), ganqing (emotional attachment), and xinren (trust) as the endogenous latent variables—this research established and empirically analyzed the structural equation model (SEM) of guanxi, knowledge sharing, and supply chain performance (SCP). Research found that renqing, mianzi, ganqing, and xinren have positive and significant effects on knowledge sharing, among which ganqing is the most significant factor, and renqing, mianzi, ganqing, and xinren have a positive impact on SCP through the mediating role of knowledge sharing. The influence mechanism of four dimension of guanxi on knowledge sharing and SCP and the influence of measurement variables on latent variable were analyzed. The results provide guidance for business decision making in the agricultural supply chain.

KEYWORDS
Ganqing, Guanxi, Knowledge Sharing, Mianzi, Renqing, SEM, Supply Chain Performance, Xinren

1 INTRODUCTION

Influenced by the Confucian philosophy for more than two thousand years, China is often described as a relational society, where the cultural concept of “guanxi” (personal relationship or connections) has infiltrated into Chinese society, commerce, politics and other fields, and has great influence on people’s behavior standards (Styles & Ambler, 2003; Wiegel & Bamford, 2014). China is the world’s largest country with a population of 1.4 billion, including 570 million in agriculture (National Bureau of Statistics of China 2020). As the Chinese saying goes, “People regard food as their prime want”, the supply, production and circulation of agricultural products are related to the national economy, people’s livelihood and social stability. China has the greatest variety, output and consumption of agricultural products in the world. Agricultural products are characterized by diversity, regionality and seasonality. There are many nodes and participants in the supply chain of agricultural products, and the enterprises engaged in agricultural production, operation and sales are mainly self-employed or small and micro enterprises. Wiegel & Bamford (2014) found that compared with large enterprises, small
and medium-sized enterprises (SMEs) are more dependent on guanxi. Due to the lack of resources and government support, guanxi is very important in cultivating business relations, maintaining distribution channels, ensuring supply chain stability and enterprise production (Chu et al., 2021). The employees in each node of the agricultural supply chain have the characteristics of low academic qualifications and limited education level. Poor level of education is hindering their abilities to acquire and analyse knowledge, which makes them more dependent on guanxi. Guanxi networks also help increase farmers’ participation in modern high-value markets (such as supermarkets and international markets) (Lu et al., 2020). There is a growing research interest in guanxi marketing, which has been considered the Chinese version of relationship marketing (Shi et al., 2011). China’s guanxi theory has existed in Confucianism for more than 2,000 years. In the social value system of Chinese guanxi culture, guanxi has been regarded as the key factor in China’s commercial field (Kriz et al., 2014), and it has strong implications for interactions among individuals in Chinese society (Ko & Liu, 2017). Guanxi is the lifeblood of business activities in China, just as an old Chinese saying goes, “Doing business is all about building up guanxi.” Through the guanxi networks, enterprises can establish mutually beneficial relationships that are crucial to the success of enterprises (Chan, 2008), and this has an important impact on supply chain performance. The Chinese market has huge business potential, but its knowledge management still faces great obstacles. One of the reasons may be due to China’s unique institutional rules and cultural factors (Liu et al., 2019). From the perspective of the upstream and downstream of the agricultural product supply chain, guanxi can reduce the conflict between farmers and enterprises, because the farmers will adopt different principles towards “their own people” and “outsiders”. As the cultural quality of agricultural employees is generally not high, they trust relatives, classmates and fellow villagers more, forming a closer relationship. In addition, the production of agricultural products in China has distinct regional characteristics, thus, it is a common phenomenon that fellow villagers are engaged in and control the upstream and downstream of the industrial chain. Guanxi can deepen the stability of agricultural supply chain, so as to improve the competitiveness and performance of the supply chain.

Knowledge management has attracted more and more attention. Knowledge sharing and application are the core objectives of an effective knowledge management system (Rezvan et al., 2016). Knowledge sharing has an important impact on enterprise and supply chain performance (Todorovam & Mills, 2018; Wang & Hu, 2020). Agricultural knowledge management is a critical success factor for agricultural development (Alemu et al., 2018). In order to cope with the complex and challenging environment in the agricultural supply chain, all participants in the chain must continuously enhance their knowledge potential, and produce and share knowledge, so as to improve the organizations’ performance (Rosa, 2020). Nonaka & Takeuchi’s (1995) SECI model states that implicit and explicit knowledge can be transformed into useful organizational knowledge through the combination of socialization and externalization. Socialization means knowledge sharing through social interaction. In Chinese culture, the implementation of knowledge sharing through guanxi, the Chinese-style social activities, is an important way of socialization.

The existing literature pointed that guanxi has a positive impact on knowledge sharing (Chan, 2008; Ko & Liu, 2017; Wang et al., 2012; Zhang, 2014), and also has studied the relationship between knowledge sharing and supply chain, pointing out that knowledge sharing can improve the performance of supply chain (Rosa et al., 2020). However, there is no literature on the mediating effect mechanism of knowledge sharing on performance under the multi-dimensional attributes of guanxi.

There is no authoritative definition of the meaning and components of guanxi. It is generally assumed that guanxi comprises one combined notion that represents the particular interpersonal ties in the Chinese context (Liu et al., 2008). The guanxi in the context of Chinese culture contains multi-dimensional attribute factors, such as renqing and mianzi (Wang & Pak, 2015; Yang et al., 2020), ganqing and xinren (Berger et al., 2017; Migge et al., 2020; Yen et al., 2017), as well as favour and jiaoqing (Ding & Jie, 2020; Ko & Liu, 2017). To address such deficiency, this paper will carry out empirical analysis on the agricultural product supply chain and take knowledge sharing as the
intermediary to establish the structural equation model of the multi-dimensional attributes of guanxi and SCP, and discuss whether knowledge sharing plays a complete or incomplete intermediary role in guanxi and SCP. It is beneficial to expand and supplement the knowledge management theory in the context of Chinese culture. Furthermore, this paper intends to study guanxi from four dimensions, reqing, mianzi, ganqing and xinren, which is conducive to broaden the understanding of the connotation of Chinese guanxi, helping the global commercial enterprises deepen the cultural understanding and recognition of Chinese economic enterprises. This paper will explore the influence of the measured factors of reqing, mianzi, ganqing and xinren, which is helpful to understand the content of guanxi correctly and deeply, so as to provide basis and guidance for business decision-making of enterprises.

2 LITERATURE REVIEW AND RESEARCH HYPOTHESIS

From the perspective of knowledge management, the agricultural supply chain is also a knowledge chain, and agricultural knowledge sharing means that practitioners in the agricultural industry chain diffuse their own experience as well as information and knowledge they have absorbed into the supply chain organization, so that members can get more methods and tools to solve problems. The SECI model was first put forward by Japanese scholar Ikujiro Nonaka in the book “The Knowledge-Creating Company”. According to SECI theory, knowledge creation and knowledge sharing of agricultural products can be achieved through four spiral stages of “imperceptible influence—external expression—aggregate combination—internal sublimation”. Combined with the structure of agricultural product supply chain, the theoretical framework of knowledge sharing of agricultural product supply chain based on SECI is obtained as shown in Figure 1. From the perspective of supply chain, agricultural product supply chain integrators are the leading and driving force of knowledge sharing, the organization and link center of knowledge sharing, and the main node for aggregate combination and internal sublimation of information and knowledge.

Knowledge sharing can promote the seamless connection of the supply chain and create favorable opportunities to retain greater value for it (Saxena & Wadhwa, 2009). Rosa et al. (2020) pointed out that in order to cope with complex and challenging environments such as business risks, market competition, climate change, energy price fluctuations, etc., all participants in the agri-food industry must continue to enhance their knowledge potential, and it is necessary to conceptualize and expand the production, distribution, refining and use of knowledge in the complex network of the agricultural food sector. Yaghoubi et al. (2013) pointed out that there is a significant relationship between knowledge creation, knowledge sharing and supply chains reform and competition which takes a case study of Jihad-e-Agriculture Organization. Wang & Hu (2020) indicated that knowledge sharing has a significant positive correlation with enterprise performance, and knowledge sharing plays a partial mediating role in the relationship between enterprise activities and performance. Leon et al. (2020) pointed out that knowledge sharing has a positive impact on the improvement of enterprise process. Generally speaking, knowledge and information sharing has a positive impact on the supply chain, but it is not always beneficial to the supply chain. For example, Yu & Shi (2020) found that information sharing is beneficial to suppliers but unfavorable to retailers when cooperating to reduce carbon emissions in the supply chain. Arun (2015) explored the correlation and relationship between knowledge sharing, supply chain management and organizational performance, and pointed out that the knowledge integrated in the supply chain management system has an impact on supply chain and organizational performance. In China, due to the low level of agricultural technology and poor information exchange, agriculture has been known as “living on the providing of Heaven” all the time. There are many intermediate links in the supply chain of agricultural products, and the scale of node enterprises is small. Many farmers and agricultural products sellers are self-employed individuals, couples or small and micro enterprises. Supply chain nodes have poor anti-risk ability. Based on the above analysis, it is believed that information sharing in agricultural supply chain is conducive to improving supply chain performance. Therefore, the following hypothesis is proposed:
Hypothesis H1: Knowledge sharing has a significant positive impact on the performance of agricultural supply chain.

Sharing knowledge among supply chain organizations is a way to improve strategic competitiveness (Cheng & Fu, 2013). Social networks are important sources of information (Millington et al., 2006). The high degree of trust in guanxi networks facilitates the flow of strategic information and knowledge, further adding value to business (Chan, 2008). Guanxi benefits and guanxi activities will improve its value-based supply chain relationship, thus enhancing the environmental knowledge sharing of the whole supply chain (Cheng, 2011). Guanxi and trust have positive effects on knowledge sharing (Wang et al., 2012), trust, ganqing and jiaoqing can promote knowledge sharing and knowledge transfer (Zhang, 2014). Traditional rural knowledge is shared through generation to generation (Chantarasombat al., 2020), however, it is difficult for farmers to obtain accurate marketing information and price information due to the information asymmetry. From the perspective of economic men’s interests, the seller will hide information to obtain additional benefits. However, in the long run, information transparency is an inevitable trend. The behavior of sellers hiding information will lead to the lack of long-term cooperation, and the transaction relationship maintained only by the price mechanism is fragile, making it difficult to maintain long-term cooperation. Rational economic men have the expectation and motivation to maintain the long-term stable development, which can save the transaction cost of both sides and maintain the transaction stability. Relationship orientation plays an important role in the process of knowledge sharing between organizations, because relationship orientation can reduce the relationship risk in the process of knowledge sharing between organizations (Cheng & Fu, 2013). It is easier for the partners with good relationship to realize information exchange and information sharing, so as to break the information asymmetry, guanxi such as ganqing and rening can weaken the opportunism caused by information asymmetry (Yang et al., 2020). Knowledge sharing often occurs among members with strong ties, and guanxi is very important for knowledge creation and transfer.
As the basic cultural norm of China, guanxi is very important in the supply chain environment, and there is a significant positive correlation between guanxi and operational performance (Feng et al., 2017). Guanxi has a significant impact on strategic procurement, outsourcing and supplier development of supply chain management (Lee & Humphreys, 2007), traditional guanxi can promote the purchase intention of buyers and sellers. In marketing, guanxi often leads to more business volume and performance. Buyers look for and establish stable relationships with suppliers who are interested in the buyers’ interests or welfare and can be motivated to seek joint gains (Liu et al., 2008). Therefore, it is generally believed that the relationship has a greater impact on the performance of the supply chain. Lu et al. (2009) took the vegetable supply chain as an example and pointed out that the relationship network (called guanxi in China) has a significant impact on performance. However, there are also studies indicating that relationships have an inverse effect on supply chain performance. Butt et al. (2019) revealed that purchasing managers are not actively looking for suppliers of better services and products due to their existing relationship, which leads to the increase of procurement costs of the company. Huang et al. (2011) did some research, pointing out that the guanxi between supplier sales staff and retail buyers may weaken the positive impact of supplier performance on retailer satisfaction. In the supply chain of agricultural products, the widely existed relations among fellow villagers and classmate restrict other competitors from entering the industrial chain, and maintain the stability and competitiveness of the existing industrial chain. Thus, the following hypothesis is proposed:

Based on the above arguments, the following hypothesis is proposed:

Hypothesis H2: guanxi has a significant positive impact on knowledge sharing in supply chain.
Hypothesis H3: guanxi has a significant positive impact on SCP.

There is no authoritative definition of the meaning and components of guanxi. It is generally assumed that guanxi comprises one combined notion that represents the particular interpersonal ties in the Chinese context (Liu et al., 2008). “Guanxi” literally means an interpersonal relationship that leverages the quality of communication, and is implicitly based on mutual benefit (Ding et al., 2017; Ou et al., 2014). Blair & Chareunsy (2008) indicated that the cultural attribute of “guanxi” in China is a unique style of Confucian culture based on trust and mutual obligation. Wang & Pak (2015) pointed out that guanxi and mianzi are important concepts for understanding social relations and people’s behavior in the context of Chinese culture. Park & Luo (2001) proposed that helping each other, saving mianzi and ganqing are necessary components of guanxi. By summarizing the relevant literature, it is generally believed that guanxi’s sub-dimensions include ganqing, renqing, xinren (interpersonal trust) (Yen et al., 2017), mianzi(face), jiaoqing (friendship) (Wang & Pak, 2015), chengnuo (commitment) (Ding et al., 2020) and other dimensions. Scholars have studied different dimensions and applications of guanxi. For example, Yang et al. (2020) studied the role of three components of guanxi (renqing, ganqing and mianzi) in asymmetric research and development partnerships. Ding et al. (2020) studied the correlation between three factors of guanxi (information sharing, trust, commitment) and supply chain capability. Ko & Liu (2017) studied the governance mechanism of knowledge transfer based on relationships, such as ganqing, jiaoqing, renqing, and mianzi. According to the literature, the concept of renqing includes “favor” and “opportunity” (Khan et al., 2016; Yen et al., 2017), or reciprocity and exchange (Dobrucal, 2019; Liu & Zhu, 2020); mianzi or face refers to social status and prestige recognized by others (Chen et al., 2019; Wang and Pak, 2015; Zhou & Zhang, 2017); xinren or trust is the evaluation of the credibility of another party, which can be regarded as the combination of honesty and kindness (Berger et al., 2017; Migge et al., 2020); ganqing reflects the emotional attribute of interpersonal relationship (Dobrucal, 2019) embodying the emotional attachment of both parties (Yen et al., 2017). In Chinese culture, there is no authoritative definition and explanation of the multi-dimensional attributes of guanxi. This article will discuss the influence mechanism of the four common factors of guanxi (renqing, mianzi, ganqing, xinren) on
supply chain performance based on Knowledge Sharing, and establishes a model to explain the effect of guanxi on supply chain performance in agricultural supply chain based on knowledge sharing.

Reniqing (reciprocal favour exchange) and mianzi (face) are the core elements of guanxi. More than two thousand years ago, The Book of Rites mentioned, “Propriety suggests reciprocity. It is not propriety not to give out but to receive, or vice versa.” This is the cultural tradition in China. “Propriety suggests reciprocity” means that Propriety requires a return of visits received among relatives and friends. In the traditional agricultural society of China, the place where people have worked and lived for generations is where the land lies. Here, it becomes necessary for us to get along well with our neighbors (usually villagers in the same village). The essence of such kind of interaction is like that with our family members, which is based on the sentimental customs and empathy. The “worldly wisdom” took root and sprout in such land, and has continued to this day, being known as the Chinese society’s relationship norms. Receiving drips of water when in need, I shall return the kindness with a spring. Reciprocating an act of kindness is Chinese nation’s fine tradition. When you obtain others’ favors and opportunities (Khan et al., 2016). When you return the favor (renqing), you should do more instead of returning the equal favor. By such repetition the guanxi could develop ‘naturally’, cultivate ganqing, and so strengthen the power of communication and knowledge sharing between each other. Wang et al. (2008) indicated that “renqing” plays an important role in promoting trust and communication, thus enhancing the relationship between enterprises. As part of the ‘art of social relationships’, renqing requires people to adhere to the reciprocal exchange of affective elements (through gifts, condolences, etc.), so that guanxi could develop naturally from pre-existing ties of renqing indebtedness (Chang, 2012).

Mianzi and renqing are often used in combination. In China’s social relations, there is a widely accepted “hidden rule”: whether a thing can be done successfully or not depends on whether mianzi is enough or not. Mianzi is an indispensable factor in maintaining guanxi in the Chinese context (King & Wei, 2018). Mianzi is commonly viewed as social perspective of a person’s reputation and prestige. It is a kind of psychology and behavior of whether you can be looked up to by others, therefore, Chinese people have been paying close attention to their mianzi all along. Mianzi is more concerned with self-esteem, reputation, social status and prestige. It is biased towards obtaining others’ recognition and respect, and there is no substantial exchange relationship, while renqing is more focused on the relationship of exchange. Mianzi is a “double-edged sword”. A job well done will gain face, that is, mianzi, otherwise it is to lose face. Young (2014) indicated that mianzi is very important for the success of knowledge sharing in knowledge management system, and studied the factors that form the concern of mianzi. Mianzi is widely used in commercial promotion in China (Masson et al., 2017). In the agricultural industry chain, the upstream and downstream of the industrial chain tend to establish good long-term cooperative partnership. The positive incentive of mianzi will stimulate people to strengthen the psychology of being recognized and respected by others. Only when they earn money can they gain face (mianzi), and they are more willing to obtain more benefits through knowledge sharing.

Compared with the relationship of exchange of renqing, ganqing is a purer internal response. Ganqing is the further deepening and development of renqing in interpersonal relationship. It reflects the degree of intimacy to which both sides are willing to share knowledge and exchange emotion. In the agricultural industry chain, if there is no ganqing between farmers and sales personnel, their relationship can only stay at the level of reciprocity or exchange of interests in interpersonal communication. In order to facilitate the transaction, there will be no sincerity, and the real core information exchange will not be shared for free. Therefore, ganqing is considered to be the core component of guanxi, and also the most important indicator to reflect the degree of intimacy. In addition to the natural affection of blood relationship, the personal ganqing can be cultivated and accumulated. Enterprises should make full use of the key factors to improve customer loyalty, such as cultivating ganqing, renqing, in order to pursue more competitive advantages and long-term profits (Zhou et al., 2015).
Mutual trust is the foundation of good interpersonal relationship. Xinren in traditional Chinese culture means trust, and trust plays a key role in the operation of Chinese cultural circle (Bao et al., 2016; Luo & Yeh, 2012). In the traditional Chinese guanxi-based society, trust is mainly based on the acquaintance network. It is an important factor for knowledge sharing in explicit and implicit work scenarios, and has a positive impact on knowledge sharing (Bhattacharya & Sharma, 2019; Du et al., 2011). Swift & Hwang (2012) pointed out that cognitive trust and emotional trust are beneficial to knowledge sharing in learning organizations. Xian et al. (2019) pointed out that trust is positively correlated with job satisfaction and performance improvement. In all links of the agricultural product supply chain, trust is the key element of close cooperation between upstream and downstream, as well as maintaining the dynamic flexibility of the supply chain, and it is the basic source of value added.

Therefore, based on the above analysis, in the supply chain of agricultural products, the following assumptions are proposed:

Hypothesis H2a: “renqing” has a positive and significant impact on knowledge sharing, thus affecting supply chain performance (SCP).
Hypothesis H2b: “mianzi” has a positive and significant impact on knowledge sharing, thus affecting SCP.
Hypothesis H2c: “ganqing” has a positive and significant impact on knowledge sharing, thus affecting SCP.
Hypothesis H2d: “xinren” has a positive and significant impact on knowledge sharing, thus affecting SCP.

Hypothesis H3a: “renqing” has a significant positive impact on SCP.
Hypothesis H3b: “mianzi” has a significant positive impact on SCP.
Hypothesis H3c: “ganqing” has a significant positive impact on SCP.
Hypothesis H3d: “xinren” has a significant positive impact on SCP.

3 RESEARCH MODEL AND DATA ANALYSIS

3.1 Evaluation Index and Model

According to the above analysis and assumptions, knowledge sharing has a positive and significant impact on agricultural supply chain performance. The four dimensions of “guanxi”, renqing, mianzi, ganqing and xinren have a positive and significant impact on knowledge sharing and thus on supply chain performance (Hypothesis H2a, H2b, H2c, H2d). Renqing, mianzi, ganqing and xinren have direct positive and significant impact on supply chain performance (Hypothesis H3a, H3b, H3c, H3d). Based on the hypothetical relationship between the above variables and factors, the basic research framework of structural equation model is shown in Figure 2.
This study draws on the understanding of the six latent variables of renqing, mianzi, ganqing, xinren, knowledge sharing and SCP from various literatures, combined with the Chinese context and the measurement items preconceived, an initial measurement scale with a total of 24 items was designed. After analyzing the data obtained from the questionnaire survey of the initial measurement scale, the factor load value of some measurement factors is found to be lower than 0.6 by factor analysis method, and the path coefficient of some measurement factors is found to be less than 0.5 by structural equation model measurement. After eliminating these abnormal items, 18 items are finally retained as the final research measurement items, as shown in Table 1.

Table 1. Latent variables and measured variables

| Latent variable | Measured variables | Factor loading |
|-----------------|--------------------|----------------|
| Renqing         | A1 Give greetings or gifts to each other during the festival 0.922 |
|                 | A2 Keep in touch with each other frequently in order to maintain the relationship 0.817 |
|                 | A3 Keep in touch even after work 0.821 |
| Mianzi          | B1 Respect each other in the transaction 0.875 |
|                 | B2 Both parties attach great importance to each other’s evaluation and reputation 0.797 |
|                 | B3 Both parties will demonstrate the advantages of their own resources and use each other to gain benefits 0.845 |
| Ganqing         | C1 Both parties often participate in or organize various social and recreational activities together 0.729 |
|                 | C2 Both parties will help each other when they encounter difficulties 0.823 |
|                 | C3 The two parties are honest with each other in the exchange 0.875 |
|                 | C4 Both parties consider each other’s feelings when making decisions 0.760 |
| Xinren          | D1 The information provided to each other is true and reliable 0.786 |
|                 | D2 Keep promises to each other 0.930 |
|                 | D3 Mutual tolerance and trust when problems are encountered 0.842 |
| Knowledge sharing | F1 Both parties are willing to share market information and knowledge with each other 0.822 |
|                 | F2 Both parties believe that knowledge sharing can lead to closer cooperation 0.819 |
|                 | F3 Both parties believe that good relationship can promote knowledge sharing 0.896 |
| SCP             | G1 Knowledge sharing can bring more income 0.876 |
|                 | G2 Knowledge sharing can reduce enterprise cost 0.876 |

The questionnaire in this study was designed with the Likert 5 level measurement. The number of 1-5 was used to indicate the degree of agreement with the question. The highest degree of agreement was 5, and the lowest was 1. After the questionnaires were collected, the abnormal data and blank questionnaires were eliminated, and 478 questionnaires were collected finally. In this study, field interviews and online questionnaires were used to obtain data. The respondents were employees engaged in agricultural production, circulation, wholesale, retail and terminal sales. Large wholesale markets and trade markets of agricultural products in the Pearl River Delta were visited, including Guangzhou, Shenzhen, Dongguan and other places. The agricultural products in the Pearl River Delta come from all over the country, and the sales channels cover 11 cities in the Guangdong-Hong
There is a large number of migrant population in the Pearl River Delta region, gathering the employees of various agricultural products from all over the country. The fellow-townsmen relationship and classmate relation are very common in this region, which is representative. In the sample data, 39.6% of the respondents came from the wholesale sector, 25.7% from the agricultural production sector, 18.8% of the respondents came from farmers’ markets, and 15.9% came from supermarkets and chain stores. The main agricultural products of the respondents were vegetables (16.8%), melons and fruits (20.8%), cereals (24.6%), livestock and poultry products (24.3%), seafood (10.5%) and others (3%).

### 3.2 Validity and Reliability Analysis of Sample Data

Through factor analysis, it was obtained that the first factor accounted for 33% of all explanatory variables, which meets the requirements of Harman single factor test method, thus, it can be considered that the common method biases is not significant and the sample data are valid. The value for Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.865, and Bartlett’s test of sphericity value was also found significant \( p = 0.000 \). Therefore, the validity of the questionnaire data meets the requirements. The Alpha values of Cronbach of renqing, mianzi, ganqing, xinren, knowledge sharing and SCP were 0.816, 0.793, 0.808, 0.813, 0.800, 0.796, respectively by reliability analysis of latent variables using the SPSS statistical software, indicating that the reliability is acceptable.

### 4 MODELLING CALCULATION AND FITNESS ANALYSIS

#### 4.1 Results of the Initial Model

According to the above hypothesis, do the four latent variables renqing, mianzi, ganqing and xinren have a direct positive impact on SCP? Amos software was used to calculate the model, and the results showed that the path coefficients of ganqing and xinren on SCP were 0.278 and 0.110, and that of renqing and mianzi on performance were -0.006 and -0.009 (Figure 3), which contradicts with the expectation, that is to say, Hypothesis H3a and H3b are not tenable. The significance test \( P \) values of the regression coefficients of renqing, mianzi, ganqing and xinren on performance were 0.964, 0.942, 0.108, 0.455. Obviously, the result of the model is contradictory to the expectation, namely,
the significance test of Hypothesis H3a, H3b, H3c, H3d does not meet the requirements. That is to say, the direct impact of renqing, mianzi, ganqing and xinren on SCP has not been verified by the significant hypothesis, and the model needs to be modified.

4.2 Results of the Modified Model
After further modification, the final result of the model is shown in Figure 4. According to the calculation results, renqing, mianzi, ganqing and xinren have significant positive effects on knowledge sharing in the agricultural products supply chain. The path coefficients after standardization of the four latent variables on knowledge sharing were 0.151, 0.196, 0.428 and 0.195, respectively. Knowledge sharing has a significant impact on SCP, and the path weight was 0.897. To sum up, the four latent variables play a positive and significant role in SCP through knowledge sharing intermediary.

4.3 Analysis of Fitness
For the modified SEM model, the regression weights table was obtained by using Amos software through maximum likelihood procedure, and the results are shown in Table 2. The value of the critical ratio (C.R.) is equivalent to the t-test value. If the absolute value of this ratio is greater than 1.96, it means that the parameter estimate has reached the significance level of 0.05. If the CR value is greater than 2.58, it means the parameter estimate has reached the significance level of 0.01. When
the significance probability is less than 0.001, the value in the $P$ column will be expressed with the symbol "***". Obviously, the results meet the requirements. Standardized regression weight is also known as factor loading, which reflects the importance of each measured variable. From the results, it can be seen that the regression weight of the measured variables on the latent variables are all greater than 0.5, so the model is basically fit.

The results of modified model fit index were obtained by using the AMOS software through the maximum likelihood method as Table 3, that is, CMIN/DF=1.489<2, RMSEA=0.078<0.08, IFI=0.911>0.9, AGFI=0.912>0.9, CFI=0.907>0.9, PCFI=0.735>0.5. The results show that the model fit reaches the recommended level (Kant et al., 2017).

The composite reliability and average variance extracted (AVE) was obtained as Table 4. The composite reliabilities of the latent variables are more than 0.6, which indicates that the internal quality of the model is good. The AVE value of the latent variables was more than 0.5, which shows that the model has good convergence.

The analysis shows that the significance of the path coefficients of each measured and latent variable in the modified model is not equal to 0 (all significance level of $p$ is less than 0.05), which means that the hypothesis in the modified model were supported. That is, hypothesis H1, hypothesis H2a, hypothesis H2b, hypothesis H2c, and hypothesis H2d were supported by the test results. And the hypothetical H3a, H3b, H3c, and H3d did not pass the significance test, which has been analyzed in the previous section of Figure 3. Therefore, according to the analysis of various assumptions by the SEM method, it can be seen that knowledge sharing has a positive and significant impact on agricultural supply chain performance, and “Renqing”, “Mianzi”, “Ganqing”, and “Xinren” have a positive and significant impact on knowledge sharing and thus on supply chain performance.

### Table 2. Regression weights

| Regression Weights | Regression Weights | Standardized Weights |
|--------------------|--------------------|----------------------|
| Estimate | S.E. | C.R. | $P$ | Estimate |
| A1~Renqing | 1.000 | | | 0.974 |
| A2~Renqing | 0.637 | 0.101 | 6.316 *** | 0.686 |
| A3~Renqing | 0.636 | 0.097 | 6.555 *** | 0.691 |
| B1~Mianzi | 1.000 | | | 0.792 |
| B2~Mianzi | 0.774 | 0.143 | 5.395 *** | 0.645 |
| B3~Mianzi | 1.012 | 0.183 | 5.523 *** | 0.803 |
| C1~Ganqing | 1 | | | 0.652 |
| C2~Ganqing | 1.345 | 0.255 | 5.279 *** | 0.745 |
| C3~Ganqing | 1.338 | 0.229 | 5.841 *** | 0.836 |
| C4~Ganqing | 1.012 | 0.206 | 4.916 | 0.666 |
| D1~Xinren | 1.000 | | | 0.665 |
| D2~Xinren | 1.451 | 0.223 | 6.513 *** | 0.944 |
| D3~Xinren | 1.136 | 0.192 | 5.920 *** | 0.760 |
| F1~Knowledge sharing | 1.000 | | | 0.748 |
| F2~Knowledge sharing | 0.924 | 0.159 | 5.820 *** | 0.710 |
| F3~Knowledge sharing | 1.013 | 0.150 | 6.741 *** | 0.794 |
| G1~SCP | 1.000 | | | 0.792 |
| G2~SCP | 0.796 | 0.148 | 5.389 *** | 0.676 |

C.R.=Critical Ratio, *** significant at 0.01 level.
5. RESULTS AND DISCUSSION

Through this study, it can be discovered that the four elements of guanxi: renqing, mianzi, ganqing and xinren have positive effects on knowledge sharing, but the influence of the four variables is different. The results of standardized regression analysis showed that the path coefficient of ganqing on knowledge sharing was 0.428, which is the largest among the four latent variables, indicating that ganqing is the core of the four variables. As one of the most important emotional attributes, ganqing is different from renqing, mianzi and xinren. The correlation coefficients between ganqing and the other three exogenous latent variables are relatively high. Ganqing is an emotional attribute, and the action as well as knowledge sharing generated by ganqing is positive, heartfelt, and voluntary, while renqing and mianzi are more of an exchange relationship. From the perspective of interpersonal interaction, ganqing and xinren are the factors that have real emotional value, and they are also the most reliable factors in personal relations, where renqing and mianzi are highly purposeful and instrumental factors. It is an important way of interpersonal and social interaction to give “renqing” actively in order to boost the relationship. The factor load weights of C2 (Help each other when in trouble) and C3 (Be honest to each other in communication) are relatively large, which indicates that the direct effect of these two factors is obvious, that is, being honest to each other in communication and helping each other when in trouble can deepen ganqing.

Xinren or trust is an important influencing factor in personal relationship. Based on ganqing, renqing and mianzi, the relationship of mutual trust is established, which can quickly improve the level of cognition and knowledge sharing among supply chain enterprises. Xinren or trust in interpersonal relationship is different from that in contractual relationship. Trust in the context of Chinese guanxi culture is a relationship attribute based on ability and character, that is to say, the ability of someone to do something is trustworthy, or the character of a person is trustworthy. These two constitute the core explanation of trust. In the structural equation model, the load factor of D2 (Keep promises to each other) was 0.944, and that of D3 (Believe that the other party is trustworthy) was 0.76, which means that they have great effects. Therefore, to build a trust relationship (guanxi), we should pay attention to the fulfillment of the commitment of both sides and the mutual help of partners.

The immeasurable social resources and social support can be obtained through the operation of renqing and mianzi. In each link of the agricultural industry chain, the construction of private relations

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**Table 3. Modified model fit index results**

| Index category of fit       | Index   | Criteria value | Results |
|-----------------------------|---------|----------------|---------|
| Absolute fit measurement    | CMIN/DF | <2             | 1.489   |
|                             | RMSEA   | <0.08          | 0.078   |
|                             | AGFI    | >0.9           | 0.912   |
| Incremental fit measurement | IFI     | >0.9           | 0.911   |
|                             | CFI     | >0.9           | 0.907   |
| Parsimonious fit measurement| PCFI    | >0.5           | 0.735   |

**Table 4. Composite reliability and average variance extracted (AVE)**

| Variable          | Renqing | Mianzi | Ganqing | Xinren | Knowledge sharing | SCP |
|-------------------|---------|--------|---------|--------|-------------------|-----|
| Composite reliability | 0.834  | 0.793  | 0.817   | 0.838  | 0.7952            | 0.702 |
| AVE               | 0.632   | 0.563  | 0.531   | 0.637  | 0.565             | 0.542 |
has the characteristics of closeness. We can exchange gifts and help each other to activate renqing, further deepen private relations and improve mianzi mutually, so as to establish deeper ganqing. Among the measured variables of the latent variable “renqing”, A1 has the largest regression weight, which indicates that mutual gift giving is an important influencing factor of guanxi in China. It is also verified in this paper. Renqing needs to be paid and maintained. A good personal relationship is conducive to breaking down the hidden barriers of knowledge sharing. Blood relationship, family friends, classmates and fellow villagers form a kind of implicit trust in communication and achieve a closer personal relationship. Among the measurement variables of latent variable “xinren”, D2 has the largest regression weight, which indicates that mutual commitment is the most important art of trust. When the supply chain is impacted and affected by external forces, the members of the supply chain with good private relations are more likely to group together to help each other, and they also have the motivation, expectation and willingness to share knowledge, so as to improve the competitiveness and performance of the supply chain.

In the traditional Chinese agricultural industry chain, it is a common phenomenon that the sources of employees are complex and their academic qualifications are low. The establishment of guanxi should be paid more attention in enterprise management, so as to improve the efficiency of transactions and management in the agricultural industry chain. In communicating and interacting with practitioners in the agricultural industry chain, we should treat farmers, hawkers in farmers’ markets, etc., sincerely, and build a real relationship or guanxi, so to facilitate stable and long-term transactions. In order to establish a good relationship, we can actively participate in the major activities of farmers, actively interact with them, help and support them when they encounter difficulties, share transaction information and communicate with them honestly. In particular, we should do something, such as giving gifts, on major activity days and holidays of farmers, so as to transform the transaction relationship into a cooperative partnership, transform renqing and mianzi to ganqing, and deepen the relationship between the two sides. In the four factors of guanxi: renqing, mianzi, ganqing and xinren, ganqing is the most important factor that influences knowledge sharing. Therefore, in the traditional Chinese guanxi culture, we should further sublimate the factors like renqing and mianzi to ganqing, strengthen the attributes of ganqing and trust, so as to speed up the sharing of upstream and downstream knowledge, reduce the transaction risk of supply chain, and improve the performance of supply chain. Leading enterprises in the supply chain should create a cultural atmosphere of knowledge sharing. They can establish a knowledge sharing alliance and platform to encourage members of upstream and downstream enterprises to share and exchange knowledge, so as to improve the flow efficiency of tacit knowledge and reduce the cost of knowledge sharing.

6 CONCLUSION

This paper studied the influence of four dimensions of guanxi: renqing, mianzi, ganqing and xinren on chain knowledge sharing and supply chain performance, and revealed the interaction among several variables. The results showed that renqing, mianzi, ganqing and xinren have positive and significant effects on knowledge sharing, among which ganqing is the most significant factor. The direct effects of renqing, mianzi, ganqing and xinren on supply chain performance have not been verified by significant hypothesis, but they have a positive impact on performance through the mediating role of knowledge sharing. It shows that only when there is a mediating effect between relationship and performance can positive influence be produced.

This paper analyzed the influence of measured variables on the four guanxi dimensions, the influence and mechanism of each dimension attribute on knowledge sharing and performance, indicating that the leading enterprises of agricultural supply chain should pay attention to the relationship construction with ganqing as the core, and the mutual honesty and mutual help can deepen the affection. Moreover, it is an important way of interpersonal and social communication in Chinese guanxi style to proactively do favors at no great cost to oneself and give face to others,
but the fulfillment of the commitment of both parties and the mutual help of partners should be emphasized so as to build trust. The research of this paper is helpful to expand and supplement the knowledge management theory in the context of Chinese culture, and broaden the understanding of the connotation of Chinese guanxi, helping the global commercial enterprises deepen the cultural understanding and recognition of Chinese economic enterprises, so as to provide basis and guidance for business decision-making of enterprises.

As for the multi-dimensional attributes of guanxi, only four typical factors, renqing, mianzi, ganqing and xinren, were considered in this paper. Other factors, such as friendship and reputation, are not included in the study. In addition, the subjects of this study are the employees in the agricultural industry chain, so the scope and objects of the study have certain limitations. The multidimensional attributes of guanxi also have differences in different regions. In the future research, more dimensional attributes of guanxi should be studied. The empirical analysis in this paper is based on the agricultural supply chain industry. Whether the influence mechanism of guanxi on knowledge sharing and supply chain performance is also applicable in other industries can be further considered and empirically studied in the future.

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**CONFLICTS OF INTEREST**

The authors declare no conflict of interest.
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