

Agribusiness performance and supply chain concentration

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Abstract

Agribusiness performance is directly affected by the production and sale of agricultural products. Moreover, the profitability and loss of their supply chains are closely related. Using economic concentration as a lens to analyze suppliers and customers in the supply chain, the study shows that agribusiness costs and revenues are significantly influenced by the concentration of their upstream and downstream supply chains. As a result of the disclosure of financial data by Chinese agribusiness and the validation of the empirical model, we can conclude that the concentration of suppliers helps agricultural enterprises to reduce operating costs; the concentration of customer sales strategy helps agricultural enterprises to increase operating revenue; the higher the concentration of the supply chain as a whole, the lower the current overheads of agricultural enterprises. The study recommends that the market characteristics of agricultural products be clarified and that agribusinesses adapt their business strategies in order to increase the overall supply chain concentration.

Keywords: Supplier concentration. Customer concentration. Agribusiness performance.

1. Introduction

Chinese rural revitalisation policy places great emphasis on the development of rural economic capacity, which largely determines the pace of rural development. In the countryside, however, dispersed individual farmers produce a small amount of agricultural output and the quality of their products is unstable as a result of prevailing climatic conditions. The result has been the emergence of agribusiness. The agribusiness is more organized than the front-line farming activities of individual farmers. With the help of capital investment, they are not only able to develop innovative agricultural production techniques, but also have the financial capacity to buy large quantities of agricultural products from

individual farmers or collective collectives. At the same time, agribusinesses are at the heart of the agricultural buying and selling chain. They can achieve higher price returns by dumping large volumes to create market advantages. Agribusiness is a vital component of the agricultural market, acting as an intermediate bridge between agricultural production and the market economy. Agricultural enterprises, upstream and downstream customers and suppliers form a complete supply and marketing chain for agricultural products, and the economic situation between them is mutually influential. Based on the perspective of suppliers and customers, it's easy to see how the performance of agribusiness is closely related to the amount of money spent and the proportion of revenue generated by each.

Based on the performance considerations of our business, agribusinesses need to develop a buying and selling strategy that suits them. On the one hand, what kind of suppliers should be selected? Would it be better to choose a few suppliers with whom to sign orders for large amounts of agricultural products, or to invite the destruction of many suppliers in the market and spread orders so as to spread the risk? On the other hand, how should sales to customers be selected? Should you concentrate on selling large quantities of produce to large customers with sufficient funds to reduce the cost of the deal, or should you sell to the retailer on the market? Of course, the decision of which customer to sell to is not entirely up to the agribusiness itself, but the sales strategy of the agribusiness also has some influence. In summary, the analysis above shows that supplier and customer concentration affects the economic concentration of agribusinesses.

Since the main business object of agribusiness is physical agricultural products, unlike products in the tertiary sector, which cannot be replaced by the virtual internet, and all economic operations must be delivered in a physical-physical form. Compared to other research scholars who tend to be keen on the element of technological progress in their studies of the factors influencing enterprise performance, supply chains are therefore a more relevant area for research on the performance of firms. The next study will therefore focus on identifying whether the performance of agricultural firms is influenced by upstream and downstream suppliers and customers, and how the performance of firms is related to the concentration of the supply chain through the construction of logical variables.

2. Literature Review

Ma Xiaoya and Chen Qiuyan (2022) study that the vulnerability of agricultural supply comes from both internal and external risks. The internal vulnerability of the supply of

agricultural products stems from the low level of mechanisation of agricultural production in China at present, the slow process of relying on technological progress to improve the yield and quality of agricultural products, the high dependence of most agricultural production on natural conditions such as climatic conditions, precipitation and temperature during the period, and the fluctuation of the quality of agricultural products in response to environmental changes.

Ma Xiaoxia(2023) argues that modern mechanised agricultural production has a significant role to play in changing production patterns in agriculture, while promoting stability in agricultural production. The first external vulnerability of agricultural supply comes from the uncertainty of external demand, with low grain prices hurting farmers as an external risk stemming from the imbalance between supply and demand for agricultural products, while the shift in market preferences for agricultural products is an external risk with a random nature.

Xu Jingbo et al. (2023) argue that the development direction of the seed industry can adhere to demand orientation as a way to improve the quality of seeds. The second external vulnerability comes from the huge transport losses of agricultural products, and the availability of advanced cold chain transport capacity and food preservation technology largely determines the transport loss rate of agricultural products.

Shi Yan (2023) conducted dynamics modelling and scenario analysis of a modern agricultural logistics system in Henan Province, China, and concluded that For the coordinated development of agricultural systems and logistics and transport, technological innovation in logistics is the key; the third comes from price competition of agricultural products; if the production volume of agricultural products is small, that producer has a smaller share of the market and loses the competitive price advantage. Especially in rural areas, agricultural products produced by retail households, it is easy to be middlemen purchasers price pressures thus resulting in blooming losses, not enough to make ends meet, Duan Jianmao (2022) to rural land as a factor of production, agricultural land transfer as a research element to explore the pricing rights of agricultural products, which also reflects from one side of the agricultural pricing influence factors quite a lot.

Guo Jiayan et al. (2023) elucidate the significance of information technology in the sales platform, concluding that the level of information penetration among farmers needs to be improved and that agricultural sales services such as after-sales services need urgent improvement. From the point of view of customer sales, the sale of agricultural products in China has its own characteristics, that is, the e-commerce platform sales channel. Thanks to

the rapid development of the internet in China in recent years, the speed and scale of e-commerce development is mind-boggling. The sale of agricultural products is naturally inevitable as part of the Internet+. The main competitive advantage of e-commerce sales of agricultural products is the simple agricultural sales process of farmer - logistics - consumer, as there is no middleman involved, the middleman difference part of the profit feeds back to the hands of farmers and consumers. And because the sale is a real-time order, which eliminates the intermediate links of collection and storage, saving time and money.

Liu Hui (2023) exposes quality problem, suggesting the implementation of the supervisory responsibilities of local regulators and the enhancement of the main awareness of production and operation to ensure the quality of agricultural products. If agribusiness or other intermediaries are omitted, the quality of agricultural products will become uneven and good quality produce will be disqualified from selling at high prices by bad quality produce. To generate income for farmers through e-commerce platforms, homogenisation of products on open platforms is a problem that cannot be ignored, and this problem is particularly reflected in the process of selling agricultural products.

Agribusinesses, as the core of production and operation, want to improve their performance level across the entire production supply chain. On the one hand, they need to enhance the stability of the supply chain and reasonably avoid the internal and external risks of the supply chain; on the other hand, to increase the sales volume of their own products, and timely out of the warehouse agricultural products are the main source of income for agricultural enterprises. Selling on a retail platform or centrally to key customers depends on the combined costs and benefits generated by these two strategies. The choice should also vary for different agribusinesses, as their production operations vary in terms of geographical location, transportation costs and operational costs. However, considering the reality in China, where the profitability of agricultural products is not high, it is not in line with business expectations for farmers to bear the decentralised and substantial logistics costs. Therefore, most agribusinesses prefer to centralize their sales.

3. Data Description

According to the 2012 industry classification of listed companies in the Chinese securities industry, listed companies in the agriculture category were identified as the object of the study of ag-businesses, and the data from the sample was selected for the period 2010

to 2020. Based on the actual production activities of agricultural enterprises, we selected the following variables to characterize customer and supplier bases.

(1) Purchase Volume of the Top Five Suppliers: In the purchasing process of an agricultural enterprise, the top five large purchasers often represent the purchasing tendencies of the enterprise. If the procurement volume of the top five suppliers is large, it represents the tendency of the agricultural enterprise to centralise procurement, and the agricultural enterprise is less likely to consider the supply side risks; if the procurement volume of the top five suppliers is small, it represents the tendency of the agricultural enterprise to decentralise procurement, and to spread out the possible risks faced by the supply side to avoid. In essence, we can understand all agricultural suppliers from the top five procurement suppliers. The top five suppliers provide an overview of the power of all suppliers to agribusiness.

(2) Supplier Concentration: The ratio of the top five suppliers' purchases to total annual purchases; B indicates the amount of purchases and B_w the total amount of purchases.

$$SC = \sum_{i=1}^5 (B_i / B_w) \quad (3.1)$$

(3) Herfindahl-Hirschman Index of Supplier Concentration: The sum of the squared ratios of the top five suppliers' purchases to total purchases.

$$HHI_s = \sum_{i=1}^5 (B_i / B_w)^2 \quad (3.2)$$

(4) Top Five Customer Sales: In the actual sales activities of agricultural enterprises, the top five customer sales often represent the sales direction of the agricultural enterprise. If the top five suppliers have a large purchase volume, the agribusiness tends to concentrate on customer sales and deliver products in a targeted manner; if the top five suppliers have a small purchase volume, the agribusiness tends to be market-oriented and sell to retail customers.

(5) Herfindahl-Hirschman Index of Customer Concentration: The sum of the squared ratios of the sales of the top five customers to total sales. S indicates sales, S_w indicates total sales.

$$HHI_c = \sum_{i=1}^5 (S_i / S_w)^2 \quad (3.3)$$

(6) Supply Chain Concentration: The average of the sum of the proportion of sales purchased from the top 5 suppliers and customers.

$$SCC = \left(\sum_{i=1}^5 (S_i / S_w + B_i / B_w) \right) / 2 \quad (3.4)$$

(7) Rapid ratio: Ratio of current assets to current liabilities and measures the company's ability to reduce its current liabilities with current assets when its short-term debt falls due.

$$Ratio = CurrentAssets / CurrentLiabilities \quad (3.5)$$

(8)Overhead: It refers to the operating and administrative costs incurred in the course of a business, including but not limited to the costs of the management and staff of the business, the costs of providing the technical conditions for production, and the costs of the purchase and sale of the business. Although not included in the operating costs of production activities, they are the part of the business that is ultimately compensated by the business.

(9)Operating Costs: Operating costs are direct costs that are defined in terms of the period and to whom they are attributed. The amount of purchases from upstream suppliers is included in operating costs.

(10)Operating Income: Operating income consists of income from main operations and income from other operations. Income from main operations is the income generated by the recurring, primary business of the enterprise. Operating income is one of the main economic benefits of an agricultural business, and the proceeds from sales to major customers are included in operating income. Annual operating income and operating costs are important indicators of the annual performance of an agricultural business.

(11)Herfindahl-Hirschman Index of Shareholding of top three shareholders: It means the sum of the squared shareholdings of the top three largest shareholders. H_w means the total number of stocks.

$$HHI_3 = \sum_{i=1}^3 (H_i / H_w)^2 \quad (3.6)$$

(12)Established Years: The span of time between the observed year of the variable and the date of incorporation of the company.

(13)Registered Capital: It also called authorized capital, is the total amount of capital contribution or subscribed share capital by all shareholders or promoters as stipulated in the articles of association of a corporate enterprise and registered with the company registration authority in accordance with the law. It can reflect the scale of operation of the enterprise at the beginning of its establishment.

Table 1: Table of variables

	Variable name	Meaning
Explained variables	Operating Costs (OC)	Direct costs that define the vesting period and to whom they are attributed.
	Operating Income (OI)	Includes revenue from main operations and other operations.

	Overhead (OH)	All operating and administrative expenses incurred in the course of business.
Explanatory variables	Herfindahl-Hirschman Index of Customer Concentration (HHIc)	Sum of the top five customers' sales to total sales ratio squared.
	Herfindahl-Hirschman Index of Supplier Concentration (HHIs)	Sum of the squared ratios of the top five suppliers' purchases to total purchases.
	Supply Chain Concentration (SCC)	Average of the sum of the proportion of sales purchased from the top 5 suppliers and customers.
	Top five customer sales (TS5)	Combined sales of the top five customers.
	Supplier Concentration (SC)	Ratio of purchases from top five suppliers to total annual purchases.
Control variables	Herfindahl-Hirschman Index Shareholding of Top Three Shareholders (HHI3)	Sum of the squared shareholdings of the top three shareholders.
	Rapid Ratio (Ratio)	Ratio of current assets to current liabilities.
	Established Years (EY)	The span of time between the year of observation and the date of incorporation of the company.
	Registered Capital (RC)	Authorised capital when registering a company.

As can be seen from Table2, the operating income of the selected agricultural enterprises is large, with a mean value of ¥1.143e+09, of which the maximum value can reach ¥3.580e+09, and the amount of operating costs is also relatively heavy, with a mean value of ¥7.569e+08. In comparison with operating income, there is still a partial profit between operating income and operating costs. The amount of operating income and operating costs proves that the selected agricultural enterprises are engaged on a large scale and that both expenses and revenues are significant.

Overheads are a measure of the 'soft' costs of an agribusiness over the life of the business. A portion of these costs is determined when the business selects its upstream and downstream suppliers and customers. If an agribusiness chooses decentralised suppliers, it increases its 'contractual costs' in the purchasing process; if it chooses decentralised customers, it is subject to more pressure from the market's 'average price' in sales, and the overhead component of purchase and sales increases. As a consequence, the overheads are reflected in both the internal management structure and the external partners of the company. According to Table2, overhead costs are also considerable, reaching an average of 1.08 E+08, which is the same magnitude as operating costs, so they cannot be avoided when observing company performance.

To observe supplier and customer selection, the Herfindahl index is calculated using the percentage of sales customers and suppliers in the top five. In the table, the HHIs are particularly prominent, indicating the concentrated nature of procurement in agricultural enterprises, which provides a more intuitive picture of customer concentration and supplier concentration from a quantitative perspective. Similarly, supplier concentration can be expressed simply as the proportion of purchases to total annual purchases. Suppliers, customers and the agribusiness itself form the completed business chain. This in turn allows

for the creation of supply chain volume indicators. It is at the heart of the study to examine supply chain concentration.

The remaining control variables were chosen to describe the characteristics of the agribusiness itself: firstly, to study the financial situation of the agribusiness, for example, the current ratio represents the cash flow position of the business, and the average value of the current ratio in the table is 2.979, proving that the agribusiness has its own industry characteristics - strong solvency. Secondly, the top three shareholding ratios of shareholders can reflect the share issuance of the agricultural enterprise. The average value of HHI3 can reach 0.103, which shows that the equity concentration of the real name agricultural enterprise is still relatively high. Finally, the characteristics of the agricultural enterprise itself can be judged by the number of years of establishment to determine whether the enterprise is a long-term operation; the registered capital to determine the initial scale of operation, where the largest registered amount can reach ¥1.317e+09.

Table2: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
OI	1.143e+09	8.497e+08	60753142	3.580e+09
OC	7.569e+08	5.377e+08	55387675	2.021e+09
OH	1.082e+08	82504073	11760240	3.552e+08
HHIc	1.704	2.856	0.026	13.705
HHIs	4.862	8.827	0.026	61.229
SCC	25.844	13.735	3.47	62.9
TS5	1.854e+08	1.689e+08	16098355	7.279e+08
SC	32.028	17.204	3.47	74.79
HHI3	0.103	0.094	0.015	0.289
Ratio	2.979	4.265	0.06	28.177
EY	15.696	3.495	8	23
RC	5.517e+08	4.143e+08	1.167e+08	1.317e+09

4. Model and Empirical Analysis

The regression model with two-component error decomposition of panel data is selected to select an econometric model for the selected variables due to their characteristics

as time-series data. A study of the inter-correlation among the variables over a period of the same period is conducted using the original fixed correlation coefficients as random variables. The regression model for the Two-component Error Decomposition of Panel Data is expressed in the following equation form.

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \sum_{j=1}^n \alpha_{ji} CV_{jit} + u_i + v_t + w_{it} \quad (4.1)$$

u_i denotes the individual random error component; v_t denotes the temporal random error component; and w_{it} denotes the individual temporal random error component, all obeying a normal distribution. Y is the explanatory variable, X is the explanatory variable, and CV is the control variable. Due to the large amount of variables, the measurement process may produce problems of magnitude, so the larger number of variables are taken as logarithmic values before the regression operation.

In order to investigate how supplier concentration upstream of agribusiness has an impact on agribusiness performance, Model-1 was set; OC was chosen as the explanatory variable; HHIs was the explanatory variable; HHI3, Ratio, EY and RC were the control variables and the regression results are shown in Table3.

$$OC_{it} = \beta_0 + \beta_1 HHIs_{it} + \alpha_{1i} HHI3_{it} + \alpha_{2i} Ratio_{it} + \alpha_{3i} EY_{it} + \alpha_{4i} RC_{it} + u_i + v_t + w_{it} \quad (4.2)$$

The empirical results of Model-1 show that the explanatory variable HHIs is significantly and negatively correlated with the explanatory variable OC, which means that Supplier Concentration Herfindahl index and Operating Costs are negatively correlated and have mutual influence; the higher the concentration of suppliers in agricultural enterprises, the lower the operating costs, which is in line with the economic logic.

To investigate how customer concentration downstream of agribusiness has an impact on agribusiness performance, Model-2 was set and OI was chosen as the explanatory variable; HHIC as the explanatory variable.

$$OI_{it} = \beta_0 + \beta_1 HHIC_{it} + \alpha_{1i} HHI3_{it} + \alpha_{2i} Ratio_{it} + \alpha_{3i} EY_{it} + \alpha_{4i} RC_{it} + u_i + v_t + w_{it} \quad (4.3)$$

The empirical results of Model-2 show that the explanatory variable HHIC is significantly and positively related to the explanatory variable OI, in other words Customer Concentration Herfindahl Index is positively related to Operating Income. The higher the customer concentration of agricultural enterprises, the more operating income, in line with the hypothesis in the previous chapters.

The focus of the article is to analyse the relationship between the supply chain of agricultural enterprises and corporate performance. Since it has been proved by Model-1 and

Model-2 that both upstream and downstream of the supply chain have different effects on the relevant performance indicators within the enterprise, it is possible to further investigate how the upstream and downstream supply chain concentration of agricultural enterprises has an impact on the performance of agricultural enterprises by setting Model-3 and choosing OH as the explanatory variable; SCC as the explanatory variable ; control variables as above and the regression results are shown in Table.

$$OH_{it} = \beta_0 + \beta_1 SCC_{it} + \alpha_1 HHI3_{it} + \alpha_2 Ratio_{it} + \alpha_3 EY_{it} + \alpha_4 RC_{it} + u_i + v_t + w_{it} \quad (4.4)$$

The empirical results of Model-3 show that the explanatory variable SCC is significantly and negatively related to the explanatory variable OH. The indicator of supply chain concentration encompasses the characteristics of upstream and downstream production and operation activities of agribusinesses. It is an indicator of group economic behaviour that can respond to the entire production and operation activities centred on agribusiness. A negative correlation has been found between the degree of supply chain concentration and agricultural enterprise overhead costs, which means that the higher the concentration of the supply chain, the lower the overhead costs of the enterprise. In turn, this leads to its long-term growth.

Table 3: Empirical results

Model-1		Model-2		Model-3	
	OC		OI		OH
HHIs	-0.0294** (0.0119)	HHIc	0.0927*** (0.0321)	SCC	-0.0243*** (0.00527)
HHI3	1.543 (1.331)	HHI3	0.896 (2.753)	HHI3	2.893*** (0.996)
Ratio	-0.0697*** (0.0248)	Ratio	-0.0249 (0.0227)	Ratio	-0.0336** (0.0145)
EY	0.0610* (0.0311)	EY	0.0822*** (0.0307)	EY	0.0313* (0.0190)
RC	0.112 (0.171)	RC	0.250 (0.379)	RC	0.458*** (0.126)
Constant	17.23*** (3.456)	Constant	14.05* (7.577)	Constant	9.100*** (2.586)

5. Model Test

As for the robustness of the analytical results of the above three panel data, there are three main ways in which the robustness can be evaluated:

(1) Changing the measurement method and measurement model.

(2) Replacing the explanatory variables with indicators which has similar economic meanings.

(3) Removing or adding control variables.

The core explanatory variable was changed from HHIs to Supplier Concentration (SC), which has the same economic meaning, except that the Herfindahl index is a little more complicated to calculate. Ratio was removed from the control variables. The model setting is named Model-4, the formula is as follows and the results are detailed in Table3.

$$OC_i = \beta_0 + \beta_i SC_i + \alpha_{1i} HHI3_i + \alpha_{2i} EY_i + \alpha_{3i} RC_i + \varepsilon_i \quad (4.5)$$

ε_i denotes the random disturbance term. In the changed model, supply chain concentration and operating costs are significantly negatively correlated, i.e. the higher the supply chain concentration the lower the operating costs, which is the same as the judgement in Model-1.

For the test of Model-2, we chose to change the econometric model by not using panel data, not considering time series characteristics, and using linear regression analysis for calculation. At the same time, we changed the explanatory variables and used the Top Five Customer Sales (TS5) instead of the Herfindahl index of Customer Concentration. The changed model becomes Model-5.

$$OI_i = \beta_0 + \beta_i TS5_i + \alpha_{1i} HHI3_i + \alpha_{2i} EY_i + \alpha_{3i} RC_i + \varepsilon_i \quad (4.6)$$

The empirical results of Model-5 show that the top five customers' sales and operating income have a positive relationship in the linear regression model, with the larger the sales of the top five customers, the higher the operating income. The results of Model-5 can verify that Model-2 is robust.

For Model-3, as supply chain concentration is the focus of the study and is a comprehensive indicator, no replacement of supply chain concentration is made, and only the measurement method is changed to exclude the control variable of Current Ratio, which is recorded as Model-6.

$$OH_i = \beta_0 + \beta_i SCC_i + \alpha_{1i} HHI3_i + \alpha_{2i} EY_i + \alpha_{3i} RC_i + \varepsilon_i \quad (4.7)$$

The results of Model-6 show that the correlation between the explanatory variable SCC and the explanatory variable OH did not change after changing the measurement method and control variables, indicating that Model-3 can pass the robustness test and is feasible and correct for the study of supply chain and agribusiness performance.

Table 4: Test results

Model-4		Model-5		Model-6	
	OC		OI		OH
SC	-0.0376***	TS5	0.811***	SCC	-0.0338***

	(0.00470)		(0.0940)		(0.00432)
HHI3	1.897*	HHI3	2.375**	HHI3	3.074***
	(0.946)		(0.969)		(0.674)
EY	0.0345	EY	0.0306	EY	0.0377**
	(0.0237)		(0.0238)		(0.0166)
RC	0.111	RC	0.598***	RC	0.458***
	(0.122)		(0.131)		(0.0931)
Constant	18.46***	Constant	-7.281**	Constant	9.145***
	(2.479)		(3.430)		(1.931)

6. Discussion and Conclusion

6.1. Discussion

The Chinese agricultural cooperative is a type of mutual agricultural economic organisation where producers and operators of similar agricultural products voluntarily cooperate and share management based on a system of household joint production contracts. Agricultural cooperatives provide their members with services such as purchasing production materials, selling, processing, transporting and storing agricultural products. In the supply chain study mentioned above, agricultural cooperatives can unite retail farmers to form a small-scale "agribusiness", which can save costs in the production process. In the marketing process, they can increase prices by joining together as a community of interest. Agricultural cooperatives are also a significant economic player in the agricultural supply chain.

In practical terms, the study of upstream and downstream agribusiness supply chains and agribusiness performance can also be studied in terms of geographical distance. The study in the empirical results section only looks at the impact of supply chains on firm performance from the perspective of economic concentration. If one considers the geographical distance between upstream suppliers and downstream customers and the intermediate agribusinesses respectively, the performance indicators of the firms are then changed to take into account transport costs, as well as the 'contractual costs' and remuneration for negotiating, buying and selling. Along with these measures of who is responsible for transporting the product and risk compensation, agribusiness' main objective is, after all, bulk food commodities, which can only be transported physically, not virtually. So when looking at the geospatial concentration of supply chains and agribusinesses, the issues become more complex and the findings may be different.

6.2. Conclusion

(1) Concentrated suppliers facilitate the reduction of operating costs in agribusiness. From an economic concentration perspective, the concentration of suppliers has a positive impact on the performance of agribusinesses. Explained by realistic economic logic it can be argued that concentrated mass purchasing from suppliers can reduce the price costs and supply chain risks of agribusinesses in finding alternative suppliers on the market. In addition, by entering into long-term purchase contracts with regular suppliers who have the ability to supply on a consistent basis, agribusinesses are able to protect themselves against supply chain risks from outside the agricultural industry and increase their ability to grow in the long term.

(2) Concentrated customers help agribusinesses to increase their operating income. Although the type of customers to whom one sells one's produce is market random, agribusinesses can develop their own marketing strategies. They can choose to sell in large concentrations or to make offers to retail households. From the empirical results, it appears that Chinese agribusinesses should currently choose a concentrated customer sales strategy. The reason for this is that the profitability of agricultural products in China is basically low compared to the cost, and if retail orders are used, it is difficult for the agribusiness itself to bear the large transportation costs, as well as the loss of produce during transportation and the subsequent after-sales and contractual expenses. In this stage, a centralized customer sales strategy is more conducive to improving business performance.

(3) Supply chain concentration helps agribusinesses to reduce overheads. Input-output chains of agricultural products can be observed when supply chains and customers are viewed together. The operation of collective purchasing and centralised sales in the supply chain can directly decrease the overheads of agricultural enterprises. This can indirectly improve the business performance of enterprises. From the perspective of the operation of enterprises in reality, agricultural products are bulk commodities and there is serious homogenisation between commodities. Therefore, centralised purchasing and selling can reduce the possibility of price pressures on separate sales on the one hand. In addition, it can reduce business risks from both market demand and supply chain vulnerability on the other. Based on all of the above analysis, the Chinese agricultural industry should select a centralised supplier and a centralised sales customer based on the product characteristics of agricultural products in a free competitive market economy; and improve the business performance of agronomic enterprises by increasing the overall concentration of the supply chain.

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