Research on the Influencing Factors of Agricultural Exhibition Development Based on Regression Analysis

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Abstract. The exhibition industry plays a strong role in promoting economic development. Agricultural exhibitions have the functions of promoting the production and marketing of agricultural products, displaying agricultural products, cultivating brands, and insight into agricultural development trend. Agricultural exhibitions play an important role in improving the scientific and technological level of agriculture and extending the agricultural industry chain. In the context of China's implementation of the rural revitalization strategy, local governments actively promote rural economic development and achieve rural revitalization by holding agricultural exhibitions. This paper conducts empirical analysis on the data of China Agricultural Exhibition held in the 10 years from 2012 to 2021, and conducts multiple regression analysis on the panel data of agricultural exhibitions held in various provinces of China in the 10 years by using Stata17 software to find out the factors that affect the development of agricultural exhibitions, so as to promote the high-quality and rapid development of agricultural exhibitions, thus promoting rural development and realizing rural revitalization.

Keywords: Multiple regression, Panel data, Agricultural Exhibition, correlation analysis.

1. Introduction

The exhibition industry plays a strong role in promoting economic development. In 1957, China held the first national agricultural exhibition, which was the first national agricultural exhibition held since 1949. Since then, agricultural exhibitions have developed rapidly. Agricultural exhibitions have the functions of promoting the sale of agricultural products, promoting the establishment of agricultural product brands, and extending the agricultural industry chain. Agricultural exhibitions play an important role in promoting rural economic development and rural revitalization.

In recent years, China's exhibition industry has developed rapidly, and agricultural exhibitions have flourished. However, in the process of development, the development trend of agricultural exhibitions in various provinces of China is different, showing regional imbalance. This paper analyzes the panel data of agricultural exhibitions held by Chinese provinces during the past 10 years, and studies the factors affecting the development of agricultural exhibitions by using Stata17 software and establishing a fixed effect model. In the context of China's implementation of the rural revitalization strategy, each province should combine its own superior resources to develop agricultural exhibitions in order to promote rural economic development and achieve rural revitalization through agricultural exhibitions.

2. Literature review

2.1 Research on Agricultural Exhibition Leading Industry Development

The exhibition industry is known as the wind vane and barometer of the industry development, and agricultural exhibitions lead the development of agriculture. Huang Yumei, Long Yuhua and Huang Yuxuan (2020) proposed that agricultural exhibitions are becoming the new trend of agricultural products trading; Agricultural exhibitions are conducive to promoting the sales of agricultural products, exchanging agricultural production factors, and serving as a vane for agricultural development (Liu Pingqing and Wang Di 2018). Bocchi Luna Abrano (2022), taking

the Sao Paulo Agricultural Exhibition held in 1930 as an example, proposed that the agricultural exhibition has an exhibition role, is conducive to the establishment of local, national and international contacts, and plays an important role in political, economic and cultural development. Li Tiecheng, Wu Namei and Liu Li (2022) believed that the exhibition industry has the functions of platform innovation, integration innovation and cultural innovation, which is the way to realize the innovative functions.

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Agricultural exhibitions can improve the level of agricultural science and technology, promote the sale of agricultural products, and promote the development of rural economy. Ren Qian and Chen Guoqing (2020) proposed that agricultural exhibitions and rural revitalization are inseparable. Zhao Haoran (2021) proposed that agricultural exhibitions have brought about three changes, agricultural exhibitions have innovated the sales mode of agricultural products; Agricultural exhibitions have promoted the development of rural tourism and the construction of rural infrastructure; Agricultural exhibitions have promoted farmers' self-development. Zhang Kou, Cui Jiali and Chen Guoqing (2021) proposed that agricultural development needs power, and the exhibition industry is an important source of power. Agricultural exhibition can solve the problem of agricultural development in the "three rural issues", and further promote the income increase of farmers and the development of rural economy. Zhang Lu (2021) put forward a new development concept of agricultural exhibition, and opened the agricultural product sales market by combining production, processing and packaging with exhibition sales.

The agricultural exhibition shows various production factors of agricultural investment, such as seed industry, agricultural machinery, agricultural fertilizer, etc., and various seminars and forums are held during the exhibition, which are conducive to improving the level of agricultural science and technology. Huang Yumei, Long Yuhua and Huang Yuxuan (2020) proposed to build an agricultural exhibition involving modern enterprises and agricultural production technology, and to build an information technology sharing and exchange platform for agricultural exhibitions; Ren Qian and Chen Guoqing (2020) proposed that the agricultural exhibition would transmit agricultural information through on-site exhibition, including not only the agricultural product promotion meeting, but also the agricultural machinery exhibition, pesticide meeting, seed meeting, fertilizer meeting, etc. Gong Jing (2014) proposed that the agricultural exhibition is conducive to strengthening intra industry exchanges and improving the level of agricultural internationalization.

2.3 Research on the influencing factors of agricultural exhibition development

The development of agricultural exhibitions is affected by some factors, such as the level of economic development, the status of exhibition infrastructure, the status of agricultural resources, and the number of agricultural population. Chen Shu and Chen Junhao (2020) found that the development of exhibition industry in different regions is different, which affects the development of agricultural exhibition; The external environment also affects the development of agricultural exhibitions (Zhao Mingming 2022).

To sum up, scholars have done more research on the functions of agricultural exhibitions, and conducted relevant research on agricultural exhibitions to promote the development of rural economy, but there is less research on the development status of agricultural exhibitions and the factors affecting the development of agricultural exhibitions.

3. Methodology

This paper adopts the following analysis methods: First, this paper uses empirical analysis methods to analyze the agricultural exhibition data of 30 provinces in China during the 10-year period; Secondly, the development of agricultural exhibitions is analyzed by using descriptive statistics; Finally, this paper constructs a multiple regression model to analyze the factors that affect the development of agricultural exhibitions.

In view of the regional imbalance in the development process of China's agricultural exhibitions, the main purpose of this paper is to find out the factors that affect the development of agricultural exhibitions, and put forward suggestions for the high-quality development of agricultural exhibitions. The development of agricultural exhibition is affected by many factors. This paper mainly selects exhibition hall, local economic development level, total agricultural output value, rural population, and crop planting area to analyze the influencing factors.

4. Analysis and results

4.1 Data collection

The data of agricultural exhibition used in this paper are from the annual report on China's exhibition economic development from 2012 to 2021 released by the China Council for the Promotion of International Trade. The exhibition data in the report are all exhibitions with a single exhibition area of more than 20000 square meters. On the basis of these data, the agricultural exhibition data for the 10 years from 2012 to 2021 are selected.

This paper selects the panel data of 30 provinces in China from 2012 to 2021 as the research object, and uses regression analysis to study the influencing factors of agricultural exhibition development. In addition, the data of GDP, gross agricultural output value, rural population and crop planting area of each province in this paper are from the website of the National Bureau of Statistics.

4.2 Model constructiont

Based on the above analysis of influencing factors, this paper constructs a multiple linear regression model as follows:

$$Y_{it} = \alpha + \beta_1 Num_{it} + \beta_2 Rentable_{it} + \beta_3 GDP_{it} + \beta_4 Pop_{it} + \beta_5 AOV_{it} + \beta_6 AOA_{it} + \delta_{it}$$

In this model, Y_{it} represents the development level of agricultural exhibitions in the i-th province in the t-th year, expressed by the area of agricultural exhibitions; Num_{it} represents the number of exhibition halls owned by the i-th province in the t-th year; $Rentable_{it}$ refers to the area that can be leased in the i-th province in the t-th year; GDP_{it} refers to the economic development level of the i-th province in the t-th year; Pop_{it} represents the rural population of the i-th province in the t-th year; AOV_{it} represents the total agricultural output value of the i-th province in the t-th year; AOA_{it} represents the total sown area of crops of the i-th province in the t-th year; α、β_1、β_2、β_3、β_4、β_5、β_6 are parameters to be estimated; δ_{it} is a random disturbance term.

4.3 Empirical analysis

4.3.1 descriptive statistics

In order to have an overall understanding of agricultural exhibitions, This paper makes a statistical description of the number of agricultural exhibitions held by various provinces in China from 2012 to 2021. The statistical results are shown in the following table:

Table 1. Descriptive statistics of agricultural exhibitions

Variable	N	Mean	SD	Min	Max
Y	290	74361.29	1.10E+05	0	9.40E+05
Num	302	6.38	6.41	1	40
AOV	310	1907.01	1378.53	52.23	6564.83
Pop	310	1827.02	1279.83	208	5530
AOA	310	5351.85	3961.18	88.55	15065.03
GDP	310	26161.77	22401.24	710.2	1.20E+05
Rentable	302	3.20E+05	3.70E+05	13630	2.40E+06

The statistical results show that the development of agricultural exhibitions in various provinces of China is unbalanced. The maximum total exhibition area of annual agricultural exhibitions is about 940000 square meters, which is Shandong Province. Shandong Province ranks first in terms of the number and area of agricultural exhibitions. Some provinces did not hold agricultural exhibitions in the year.

4.3.2 correlation analysis

In this paper, the person correlation coefficient is used to analyze the correlation between variables. it is used to measure whether the two data sets are on a line. It is used to measure the linear relationship between fixed distance variables. The calculation formula is as follows:

$$r = \frac{N \sum x_i y_i - \sum x_i \sum y_i}{\sqrt{N \sum x_i^2 - (\sum x_i)^2} \sqrt{N \sum y_i^2 - (\sum y_i)^2}}$$

This part uses Stata17 software to analyze the relationship between the number of agricultural exhibitions and various factors. The analysis results are as follows:

Table 2. Correlation coefficient table

	Y	Num	AOV		Pop	AOA	GDP	Rentable
Y	1							
Num	0.336*** a	1						
AOV	0.377***	0.293***	1					
Pop	0.205***	0.345***	0.815***		1			
AOA	0.274***	0.105*	0.839***		0.733***	1		
GDP	0.300***	0.650***	0.614***		0.552***	0.281***	1	
Rentable	0.341***	0.818***	0.291***		0.341***	0.025	0.751***	1

a: ***, p<0.01

The results showed that there was a significant positive correlation between the number of agricultural exhibitions and the influencing factors.

4.3.3 Multicollinearity test

By analyzing the variance inflation factor (VIF) of variables in the model, we can identify whether there is multicollinearity of variables. Table 3 shows that the maximum variance expansion factor of model variables is 7.17, and the average variance expansion factor is 4.43. It is generally believed that if the maximum VIF of each variable is not greater than 10, the model is considered to have no serious multicollinearity. According to this judgment method, it can be found that there is no serious problem of multicollinearity among the variables in this paper, so the accuracy of model estimation will not be affected.

Table 3. variance inflation factor test

Variable	VIF	1/VIF
AOV	7.170	0.139
AOA	4.840	0.207
Rentable	4.340	0.231
GDP	4.190	0.239
Num	3.060	0.326

Pop	2.980	0.336
Mean VIF	4.430	

4.3.4 Regression analysis

At present, panel data is used in most of the literature on the influencing factors of exhibition development. Compared with time series data section data, panel data has the following advantages: First, it takes both cross section and time dimension into account to weaken the impact of unobservable variables on the model; Second, the sample size is large and contains more individual information, which can improve the accuracy of estimation. Based on the above advantages, this paper selects panel data for research. Because the factors that affect the development of the exhibition are diverse, multiple linear regression model is adopted for research.

Table 4. multiple linear regression

Y	Coefficient	t	P>t	[95%conf.	interval]
Num	2662.638	1.76	0.079	-314.7128	5639.989
AOV	50.72101	4.55	0.000	28.76421	72.67782
Pop	-33.22049	-4.32	0.000	-48.36506	-18.0759
AOA	2.241555	0.71	0.480	-4.002026	8.485136
GDP	-1.191345	-2.31	0.021	-2.204363	-0.17833
Rentable	0.1026055	3.34	0.001	0.042099	0.163112
_cons	4760.827	0.41	0.684	-18201.89	27723.54

The development of agricultural exhibitions has a positive impact on the local gross agricultural output value and crop planting area; The local economic development level has a negative impact on the development of agricultural exhibitions. This is mainly because with the economic development, the proportion of the primary industry decreases, while the proportion of the secondary and tertiary industries increases. The development of agricultural exhibitions needs to rely on agriculture.

4.4 Countermeasures and suggestions

4.4.1 Develop agricultural exhibitions in combination with local agricultural resources

The holding of agricultural exhibitions is affected by the situation of local agricultural resources. Therefore, all regions hold agricultural exhibitions in combination with local resource conditions. The specific measures are as follows: First, make full use of the characteristics of agricultural products to hold exhibitions. For example, Hainan Province has made full use of local characteristics to hold tropical agricultural products exhibitions, which has achieved good results; Second, the exhibition is held based on local agricultural resources. If agriculture accounts for a large proportion in the local area, more agricultural exhibitions should be held; Third, we should deeply explore the local regional culture, realize the integration and development of exhibition and culture, and realize the uniqueness of exhibition activities.

4.4.2 Combination of indoor exhibition and outdoor exhibition

The area and number of exhibition halls affect the development of agricultural exhibitions. Considering that some agricultural exhibitions are held near agricultural production areas and the exhibition halls are limited in resources, in view of this, agricultural exhibitions can adopt the combination of indoor and outdoor exhibitions. In addition to holding exhibition activities in exhibition halls, some exhibition activities can be held in agricultural manors and agricultural sightseeing parks in the form of experience, sightseeing, folk entertainment, etc. Innovate the development mode of agricultural exhibition, dig deeply into exhibition activities, and realize the integrated development of agricultural exhibition and rural tourism, regional culture, festivals and events, etc. At the same time, strengthen the design and management of on-site activities of agricultural exhibitions.

4.4.3 Avoid low-level repeated competition in agricultural exhibitions

Judging from the current situation of the development of agricultural exhibitions, the number and area of agricultural exhibitions have continued to increase in the past 10 years. Agricultural exhibitions are generally held in a large scale. If agricultural exhibitions are held in a relatively short time schedule, close locations and the same range of exhibits, low-level repeated competition will be caused, which is not conducive to the high-quality development of agricultural exhibitions. The following suggestions are made in this paper: First, the approval system should be implemented for large-scale agricultural exhibitions to enter the market. At present, most large-scale agricultural exhibitions are dominated by the government. The implementation of the approval system can avoid repeated competition caused by too many similar agricultural exhibitions, and is also conducive to concentrating advantageous resources to build brand exhibitions. Second, for small-scale agricultural exhibitions, we should adopt a market-oriented operation mode and encourage agricultural exhibitions to be held in combination with local agricultural and cultural characteristics. Third, all localities should combine the current development of agricultural exhibitions to subdivide the market, find the right market position, and avoid low-level repeated competition in agricultural exhibitions.

4.4.4 Promote the upgrading of agricultural industrial structure

The level of regional economic development has a negative impact on agricultural exhibitions. This analysis result is in line with the law of industrial structure evolution and is consistent with Petty Clark theorem. That is to say, with the development of the national economy, the proportion of the primary industry decreases, while the proportion of the secondary and tertiary industries increases. However, economic development is an inevitable trend. In view of this, suggestions for the development of agricultural exhibitions are as follows: First, in economically developed regions, agricultural science and technology exhibitions should be held. Second, hold trade oriented agricultural exhibitions to promote the export of agricultural products. Third, hold agricultural exhibitions from the perspective of extending the agricultural industry chain to promote the deep processing and fine processing of agricultural products. To sum up, agricultural exhibitions will be held to promote the upgrading of agricultural industrial structure, promote rural economic development and achieve rural revitalization.

5.Conclusion

This paper argues that agricultural exhibitions promote the development of rural economy and contribute to rural revitalization. This paper analyzes the data of agricultural exhibitions held in 30 provinces in the past 10 years, and finds out the factors that affect the development of agricultural exhibitions, including the level of economic development, the status of agricultural resources, and the number of agricultural population. Based on the results of the study, some suggestions are put forward for the high-quality development of agricultural exhibitions: agricultural exhibitions should be held in combination with local agricultural resources, and large agricultural exhibitions should build barriers to entry in order to avoid low-level repeated exhibitions; Innovate the mode of agricultural exhibition and break the restriction of exhibition venues; Promote the upgrading of agricultural industrial structure by holding agricultural exhibitions.

At present, although agricultural exhibitions are still affected by COVID-19, in the long run, we believe that the development of the exhibition industry and agricultural exhibitions will be good for a long time.

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