Research Article

Application of Big Data in Evaluation of Agricultural Products E-Commerce under the Background of Rural Revitalization

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The development of agricultural products e-commerce (APEC) plays an important role in the smooth progress of the rural revitalization strategy. This paper constructs the evaluation index system of the development level of APEC through literature induction, including rural residents, infrastructure conditions, policy support, the quality of APEC platform, operation effect, and social effect. Then, we use the analytic hierarchy process (AHP) to calculate the index weight and take Shanxi Province of China as the research object to evaluate and analyze the development level of APEC. The evaluation results show that the overall development of APEC in Shanxi Province is at a general level. Finally, we put forward some suggestions for the development of APEC, such as improving the standardization system of APEC.

1. Introduction

The implementation of rural revitalization strategy is conducive to alleviating the imbalance between urban and rural development and brings opportunities for the realization of agricultural modernization [1]. The traditional production and sales form of agricultural products in China is mainly the production and sales form of smallholder farmers with family as the unit. This traditional form has the characteristics of decentralized development, small scale, and low degree of organization [2]. However, there are structural and regional information asymmetry problems in the agricultural products, so traditional marketing methods are difficult to cope with the challenges brought by the development of modern agriculture [3]. The combination of agricultural products and e-commerce provides a new development idea for the production and operation of agricultural products [4]. Agricultural products e-commerce (APEC) refers to the combination of current advanced information network technology with agricultural production, primary processing, sales, and transportation. Then, enterprises and farmers collect, process, transmit, and publish agricultural production and sales information through e-commerce platforms and networks, so as to realize the agricultural production

and sales of information flow, capital flow, and other effective smooth [5]. APEC has constructed a communication channel across time and space constraints and effectively tracked logistics information relying on information network technology [6]. On the one hand, it can reduce transaction links and transaction costs, so it has a huge role in promoting agricultural enterprises and farmers' income and even agricultural development [7]. On the other hand, it has important strategic value for promoting agricultural supply-side structural reform and achieving the goal of rural revitalization at an early date [8].

Thanks to the strong support of government policies, the development of APEC has achieved considerable results. On the one hand, various regions have built a number of influential agricultural products trading platforms [9]. On the other hand, the government has created a number of popular websites to promote distinctive agricultural products and disseminate information on agricultural products [10]. The construction of these platforms and websites has played a positive role in promoting agricultural enterprises to develop the market and conduct online transactions, so as to lay a foundation for the development of APEC [11]. However, in the process of developing APEC, some regions are limited by factors such as economic development level and region,

resulting in low degree of informatization, late development, and low level of APEC. Therefore, the development differentiation of various regions is obvious at present [12–14]. The problems in APEC mainly include the following aspects: Firstly, the e-commerce awareness of agricultural practitioners is weak. Agricultural practitioners have low cultural quality and conservative ideological tradition. Farmers are more exposed to the network in daily leisure and entertainment and have less awareness of selling agricultural products through the network [15]. Secondly, the regional agricultural e-commerce talent is scarce. From the supply and demand situation of agricultural e-commerce talents, high-end talents with professional knowledge are extremely scarce and the brain drain is serious [16]. Finally, agricultural e-commerce enterprises lack brand awareness. At present, there are fewer brands of agricultural products and fewer brands that can reach national fame. Most agricultural e-commerce is still at the primary stage of price competition [17].

Therefore, it is necessary to deeply understand the development status, characteristics, and potential problems of APEC, which is of great significance for adjusting and optimizing the development strategies of agricultural e-commerce in various regions and improving the overall development level of APEC [18]. This paper first divides the evaluation indicators into six categories, namely, rural residents, infrastructure conditions, policy support, quality of APEC platforms, operation effects, and social effects. Then, we establish the corresponding evaluation system to scientifically measure and evaluate the stage and level of development of APEC. Then, we introduce the analytic hierarchy process (AHP) to give appropriate weight to the impact of the overall APEC development level evaluation results. Finally, we take Shanxi Province as an example to evaluate and analyze its APEC development level. The main contribution of this paper has two aspects. On the one hand, this paper constructs the APEC development level index system from six aspects. On the other hand, this paper puts forward a fuzzy comprehensive evaluation method using analytic hierarchy process to evaluate the development level of APEC.

2. Related Work

Scholars have designed many big data analysis methods for various industries, including smart city communication, data-driven collaboration in computing, and control [19]. Relying on these big data analysis methods, some scholars specifically study e-commerce of agricultural products, such as the development status and development model of e-commerce of agricultural products [20–22]. Some scholars have used different methods and models to study the factors affecting the efficiency of APEC and evaluate them from different perspectives and directions. Wen et al. [23] focused on the research perspective in China, using the DEA model and Tobit model, to analyze the three different factors affecting the efficiency of APEC, namely, comprehensive efficiency, scale efficiency, and pure technical efficiency and the influencing factors include the number of Internet users

in urban and rural areas, the quality of logistics related employees, and the level of national economic development. Xiu Na et al. [24] focused the research perspective on consumers' perception of price fairness, used the DEA model to analyze the APEC market efficiency in three different platforms, and selected the characteristics and prices of agricultural products as the evaluation indexes of analysis efficiency. The research results are conducive to providing ideas for APEC enterprises to optimize product prices. Ding et al. [25] established the index system of APEC by analyzing and combining the literature on APEC and evaluated the APEC in Hubei Province by using questionnaires and AHP. Chen et al. [26] found the importance of improving the quality of agricultural products after understanding the current problems in APEC. Therefore, this paper focuses on the sales quality and health safety of agricultural e-commerce and establishes the index system of APEC. And, the article proposed the future agricultural product electronic commerce development countermeasures and the suggestion in view of the present agricultural product electronic commerce in the quality and the health safety aspect existence insufficiency.

3. Evaluation Index System of APEC Development Level

3.1. Basic Principles and Thoughts of Index System Construction. The development of APEC not only is related to a few simple factors but also involves a variety of complex factors. At present, there is no agreed evaluation standard. In order to construct a scientific and credible evaluation index system, this paper summarizes the influencing factors in a series of links of APEC, including agricultural production, transportation, and sales. Referring to the current research results related to the evaluation of the development level of APEC, it is found that the evaluation indexes are concentrated in the network and logistics infrastructure, participants, agricultural production and quality, policy support, e-commerce development status, e-commerce talents, enterprise and agricultural e-commerce platform construction, and quality. Therefore, based on the analysis of the current situation of APEC development, this paper establishes a set of evaluation index systems of APEC development level with wide coverage and strong pertinence and the index system follows some basic principles, including comprehensiveness, scientific system, hierarchy, operability, and independent comparability.

3.1.1. Comprehensiveness. The first principle of index selection is to require comprehensiveness. It is necessary to conduct a comprehensive analysis and summary based on the current situation of the research object and the research process, so as to ensure that the index is sufficiently comprehensive. APEC involves more nodes and subjects, so the selected indicators should be able to clearly summarize the overall evaluation index. Therefore, first of all, it is necessary to conduct a comprehensive analysis of the development status of APEC but also combine with the external
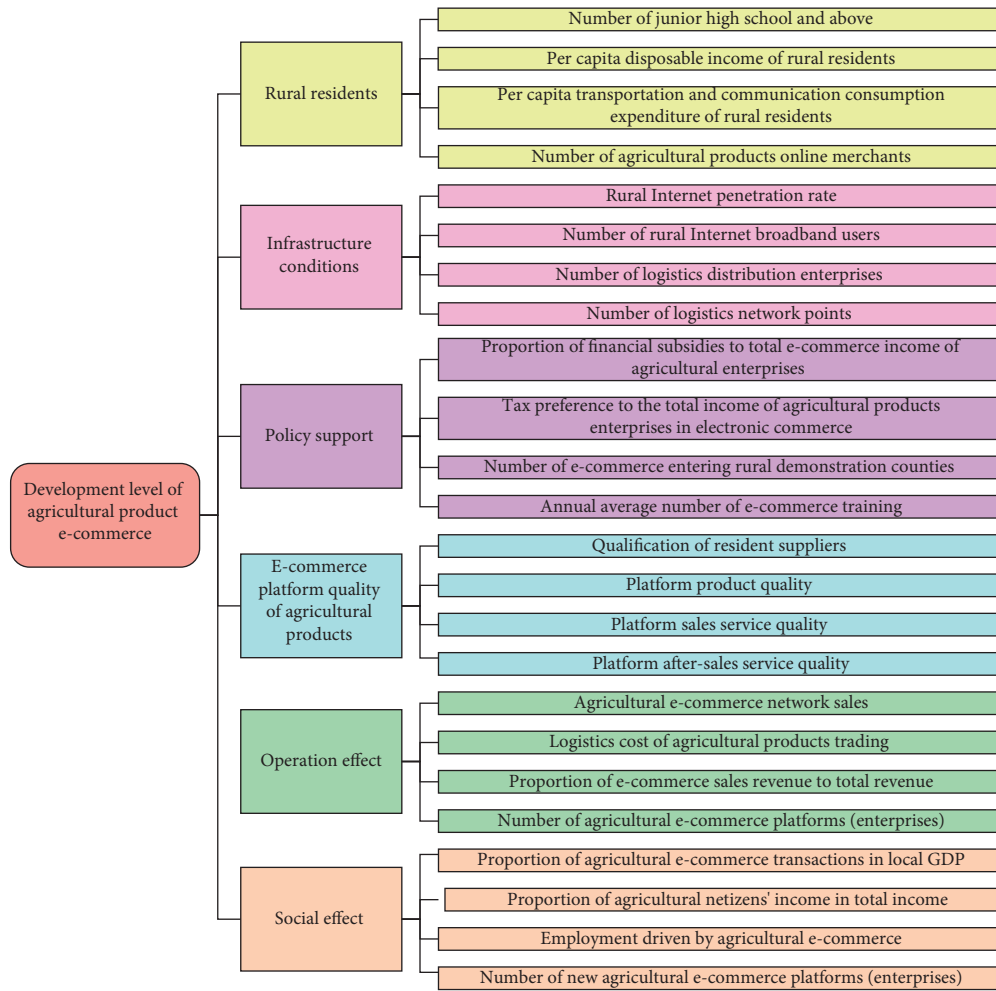
FIGURE 1: Evaluation index system of APEC development level.

environment and internal environment and then identify the selection of various indicators affecting agricultural e-commerce. At the same time, we should also consider various microfactors and macrofactors, so as to ensure that the selected indicators can fully reflect the development level of APEC.

3.1.2. Scientific System. The selection of evaluation indicators should pay attention to the essential measurement standards and should be based on objective and rigorous scientific attitude, so as to ensure that the selected factors and indicators are not cross and independent, and it is best to form a complementary relationship. The evaluation index should not only be concise and clear but also have profound connotation. In addition, the selection of indicators cannot be subjectively assumed, so as to ensure that the selected indicators can reflect the current level of development of APEC system comprehensively and the index evaluation system design is scientific and reasonable.

3.1.3. Hierarchy. The index composition of the development level of APEC is not logical but has a certain level. The

selection of APEC development level indicators should pay attention to the hierarchy of APEC. For example, the composition of the development level of APEC includes multiple dimensions such as individuals, enterprises, governments, and society.

3.1.4. Operability. When selecting indicators for the development level of APEC, it is necessary to ensure that each indicator factor is easy to judge and measure. At the same time, it is necessary to modify and revise the indicators according to the suggestions of professionals under the conditions permitted in order to ensure that the selected indicators will not be improperly operated due to differences in understanding, so that the conclusions are more referential.

3.1.5. Independent Comparability. The principle of independent comparability is to ensure that indicators are independent of each other, while there are some conditions to distinguish between indicators, so as to ensure that there are comparable conditions between indicators. The selected index factors are independent and can be compared with
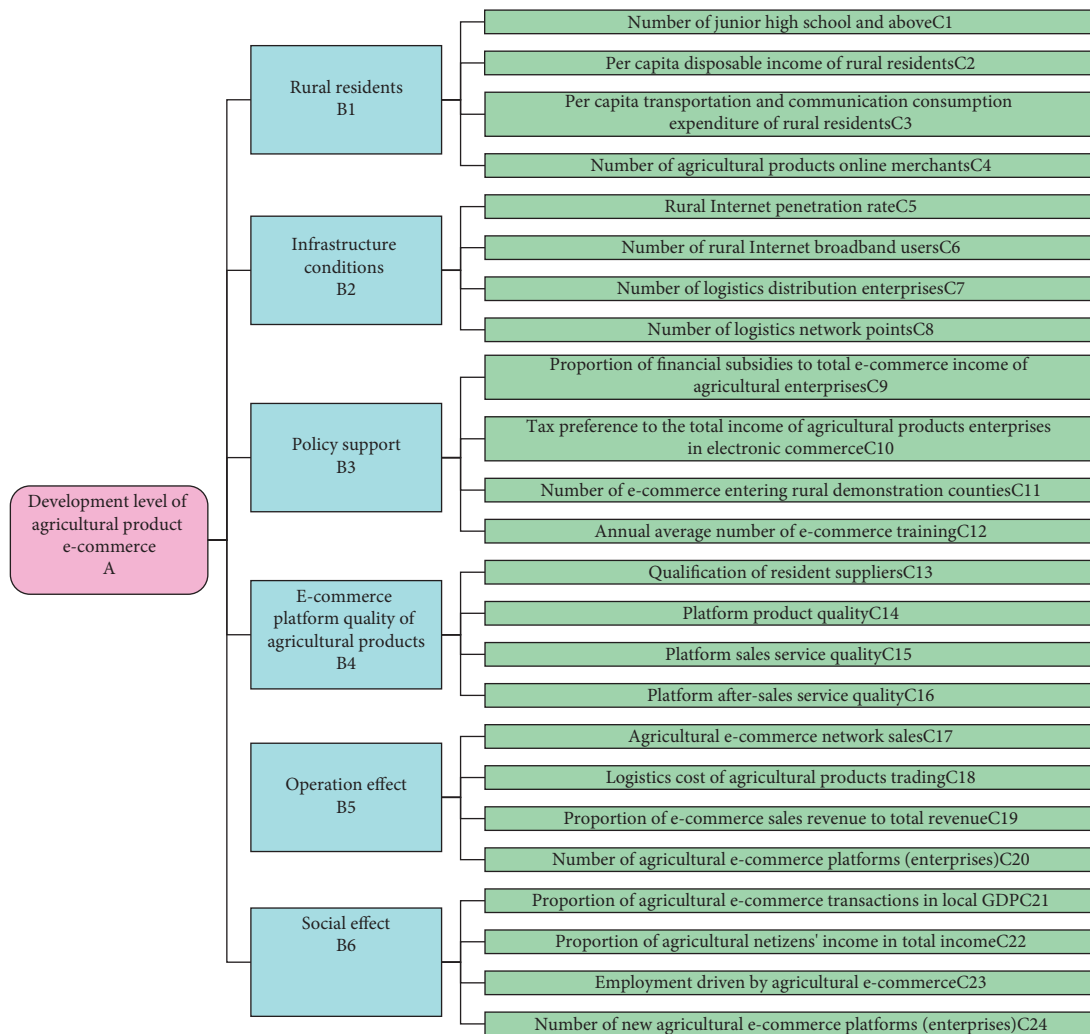
Figure 2: Hierarchical structure model.

each other, so that they can be compared scientifically by using models or mathematical methods in the following text, so as to obtain more accurate results and put forward targeted preventive measures.

3.2. Construction of the Evaluation Index System of APEC Development Level. Based on the research results of relevant scholars, we consider various variables in the development process of APEC and construct the evaluation index system of APEC development level, as shown in Figure 1.

4. Evaluation of APEC

4.1. Method Selection. After constructing the evaluation index system of APEC development level, it is necessary to further determine the weight of each evaluation index. In order to ensure the objective fairness of index weight setting, this paper uses the AHP proposed by American operational researchers and then combines it with historical data, expert opinions, and practical experience to determine the weight of each index through repeated trial and error and test judgment matrix consistency [27]. Because it can unify

qualitative index and quantitative index in a model, it can carry out both qualitative evaluation and quantitative analysis. At the same time, it can make the complex problems become very simple and each influencing factor can be evaluated in detail. Therefore, this paper selects AHP to determine the weight of agricultural e-commerce development level evaluation index. The principle of determining the index weight by AHP is as follows: Firstly, the decision-maker sorts out the basic nature and the total goal of the multiobjective decision-making problem and then decomposes it according to the nature and the total goal of the problem, thus forming a clear hierarchical structure. Secondly, experts get the relative importance of each factor by comparing the index data and their own practical experience. Finally, decision makers calculate the weight of each index by formula [28].

4.2. Determination of the Evaluation Index Weight of APEC Development Level. In this paper, AHP is used to determine the weight of the evaluation index of APEC development level. The specific calculation steps are as follows.

TABLE 1: 1–9 valuation meaning.

Valuation	Importance comparison
1	a_i and a_j are equally important
3	a_i is a little more important than a_j
5	a_i is more important than a_j
7	a_i is very more important than a_j
9	a_i is extremely more important than a_j
2, 4 ,6, and 8	The intermediate value of the above adjacent judgment
1/3	a_i is less important than a_j
1/5	a_i is not more important than a_j
1/7	a_i is not much more important than a_j
1/9	a_i is not extremely more important than a_j

FIGURE 3: Value of RI.

4.2.1. Building a Hierarchical Structure Model.
According to the evaluation index system of APEC development level, we can build a hierarchical structure model, as shown in Figure 2.

4.2.2. Constructing the Judgment Matrix.
According to the comprehensive analysis of the development level of APEC and the research requirements of the evaluation of the development level of APEC, this paper invited eight experts to carry out the research work of the evaluation of the development level of APEC. Our invited experts include experts in the agricultural industry, experts and scholars in the field of e-commerce, and elite backbone of e-commerce companies. The experts construct a judgment matrix from the top to bottom layer by layer with their own practical experience. Each layer factor is based on the adjacent upper layer factor as the criterion, and then, experts compare the relative importance of each index according to the 1–9 scale method, so as to construct the judgment matrix A of the criterion layer and the index layer. The scoring criteria of 1–9 scale methods are shown in Table 1.

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}, \qquad (1)$$

$$a_{ij} = \frac{a_i}{a_j}, \qquad (2)$$

where A is the judgment matrix. a_i and a_j represent the elements in the hierarchy. a_{ij} represents the relative importance of the right.

4.2.3. Index Weight Calculation and Consistency Test.
After experts establish multiple judgment matrixes of the criterion layer and index layer, we need to check the calculation results of the index weight to determine whether it is reasonable. Therefore, we use formulas (3) and (4) to test the consistency of the established judgment matrix. Among
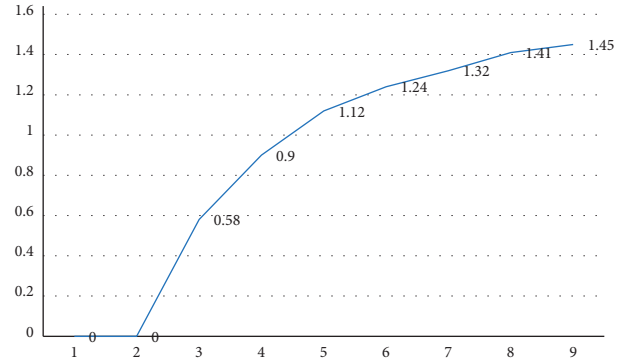
TABLE 2: Index weight of the criterion layer.

U	B_1	B_2	B_3	B_4	B_5	B_6	W_i
B_1	1	1/4	1/2	1	1/7	1/5	0.046
B_2	4	1	2	4	1/4	1/2	0.174
B_3	2	1/2	1	2	1/5	1/3	0.089
B_4	1	1/4	1/2	1	1/7	1/6	0.045
B_5	7	4	5	7	1	2	0.386
B_6	5	2	3	6	1/2	1	0.260
			Total				1
λ max = 6.364, CI = 0.037, CR = 0.030							

them, RI is confirmed by looking up the table; the specific value is shown in Figure 3.

When carrying out the AHP, it is necessary to analyze the consistency of the matrix and understand the specific value of the maximum feature root, so that the judgment matrix is logically reasonable. The steps for consistency checking are as follows:

$$CI = \frac{\lambda_{\max} - n}{n - 1}, \qquad (3)$$

$$CR = \frac{CI}{RI}, \qquad (4)$$

where CI is the consistency index, CR is the consistency proportion index, and RI is the average random consistency index.

Specifically, the consistency test is to analyze the calculation results of CR. If CR is less than 0.1, it means that the judgment matrix meets the consistency test requirements, that is, the index weight calculated by the judgment matrix is reasonable and practical. If CR is greater than 0.1, it means the judgment matrix does not meet the requirements; that is, experts must recorrect the judgment matrix until the consistency test is passed.

Based on the actual situation of APEC industry, this paper calculates and tests the judgment matrix for many times and finally obtains the weight value and consistency test results of each index, as shown in Tables 2 to 8. It can be seen that these judgment matrices pass the one-time test, indicating that the weight value of the evaluation index of the development level of APEC calculated by us is of practical significance.

Table 3: Weight of the rural residents index.

B_1	C_1	C_2	C_3	C_4	W_i
C_1	1	1/2	3	1/4	0.182
C_2	2	1	4	1/2	0.288
C_3	1/3	1/4	1	1/5	0.069
C_4	4	2	5	1	0.461
		Total			1
λ max = 4.127, CI = 0.042, CR = 0.047					

Table 4: Weight of the infrastructure conditions index.

B_2	C_5	C_6	C_7	C_8	W_i
C_5	1	3	6	5	0.519
C_6	1/3	1	5	2	0.288
C_7	1/6	1/5	1	1/2	0.065
C_8	1/5	1/2	2	1	0.128
		Total			1
λ max = 4.143, CI = 0.048, CR = 0.053					

Table 5: Weight of the policy support index.

B_3	C_9	C_{10}	C_{11}	C_{12}	W_i
C_9	1	1/2	5	3	0.340
C_{10}	2	1	6	4	0.465
C_{11}	1/5	1/6	1	1/2	0.067
C_{12}	1/3	1/4	2	1	0.128
		Total			1
λ max = 4.066, CI = 0.022, CR = 0.024					

Table 6: Weight of e-commerce platform quality of the agricultural products index.

B_4	C_{13}	C_{14}	C_{15}	C_{16}	W_i
C_{13}	1	1/5	1/3	2	0.073
C_{14}	5	1	3	6	0.538
C_{15}	3	1/3	1	3	0.263
C_{16}	1/2	1/6	1/3	1	0.126
		Total			1
λ max = 4.200, CI = 0.067, CR = 0.074					

Table 7: Weight of the operation effect index.

B_5	C_{17}	C_{18}	C_{19}	C_{20}	W_i
C_{17}	1	2	1/2	4	0.309
C_{18}	1/2	1	1/3	2	0.158
C_{19}	2	3	1	5	0.453
C_{20}	1/4	1/2	1/5	1	0.080
		Total			1
λ max = 4.040, CI = 0.013, CR = 0.015					

Table 8: Weight of the social effect index.

B_6	C_{21}	C_{22}	C_{23}	C_{24}	W_i
C_{21}	1	2	5	6	0.516
C_{22}	1/2	1	2	4	0.277
C_{23}	1/5	1/2	1	2	0.136
C_{24}	1/6	1/4	1/2	1	0.071
		Total			1
λ max = 4.051, CI = 0.017, CR = 0.019					

Table 9: Evaluation standard of APEC development level.

Number	Fraction	Result
1	90–100	Excellent
2	80–90	Good
3	70–80	General
4	60–70	Qualified
5	<60	Unqualified

of Shanxi Province, and the statistical report of China's Internet development, which is authoritative and accessible.

4.3.2. Comprehensive Evaluation Score of APEC Development Level in Shanxi Province. First of all, we calculate the mean after the scoring statistics of experts. Then, we put all scores into formula (5) to calculate the weighted scores of each index. Finally, we add the weighted scores of all indicators to get the final score of the comprehensive evaluation of the development level of APEC in Shanxi Province. The specific results are shown in Table 10.

$$P = C_1 \times W_1 + C_2 \times W_2 + \cdots + C_{25} \times W_{25}. \quad (5)$$

Among them, P is the final score of the comprehensive evaluation of the development level of agricultural e-commerce in Shanxi Province. C is the score of each index in Shanxi Province. W is the comprehensive weight of each index.

4.4. Analysis on Comprehensive Evaluation Results of APEC Development Level in Shanxi Province. It can be seen from Table 10 that the sum of the weights of operating effect, social effect, and infrastructure conditions in the first-level indicators is 82%, while the sum of the weights of policy support, rural residents, and the quality of agricultural e-commerce platform is only 18%. It shows that when evaluating the development level of APEC, business and social effects are more important, followed by infrastructure

4.3. Comprehensive Evaluation on the Development Level of APEC. Taking Shanxi Province of China as an example, this paper uses the index weight value calculated above to comprehensively evaluate the development level of APEC. The specific calculation process is as follows.

4.3.1. Determining Evaluation Criteria for Different Indicators of APEC Development Level. First of all, we let the invited expert group set up a comment set according to the actual development level of the APEC industry, as shown in Table 9. Then, according to the specific data of each index in Shanxi Province, experts score the development level of APEC. The data of expert scoring for the evaluation index mainly come from the Shanxi Statistical Yearbook 2021, the national economic development and social statistics bulletin

TABLE 10: Weights and scores of the evaluation system of APEC development level in Shanxi Province.

| First-level indicator	Weights	Second-level indicator	Weight	Total weight	Scores	Weighted scores
B1	0.046	C_1	0.182	0.008	75	0.63
		C_2	0.288	0.013	79	1.04
		C_3	0.069	0.003	72	0.23
		C_4	0.461	0.021	76	1.61
B2	0.174	C_5	0.519	0.090	80	7.23
		C_6	0.288	0.050	73	3.67
		C_7	0.065	0.011	75	0.84
		C_8	0.128	0.022	77	1.72
B3	0.089	C_9	0.340	0.030	72	2.19
		C_{10}	0.465	0.042	69	2.87
		C_{11}	0.067	0.006	68	0.41
		C_{12}	0.128	0.011	71	0.81
B4	0.045	C_{13}	0.073	0.003	81	0.27
		C_{14}	0.538	0.024	83	2.03
		C_{15}	0.263	0.012	79	0.94
		C_{16}	0.126	0.006	77	0.44
B5	0.386	C_{17}	0.309	0.119	78	9.29
		C_{18}	0.158	0.061	79	4.81
		C_{19}	0.453	0.175	80	13.97
		C_{20}	0.080	0.031	75	2.32
B6	0.260	C_{21}	0.516	0.134	73	9.78
		C_{22}	0.277	0.072	72	5.17
		C_{23}	0.136	0.035	74	2.62
		C_{24}	0.071	0.018	76	1.39
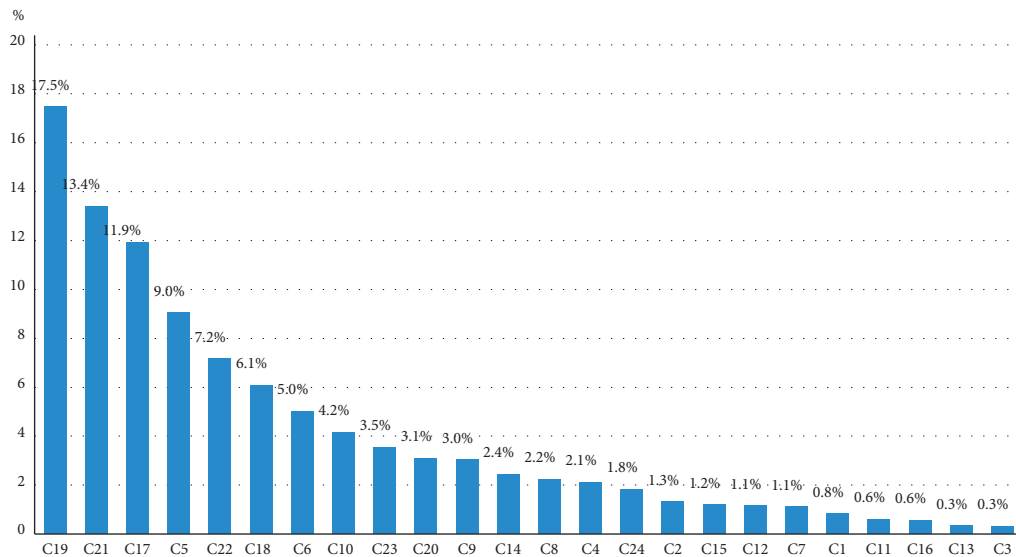
FIGURE 4: Total ranking of evaluation index weights of APEC development level.

conditions, and policy support, rural residents, and the quality of APEC platform are not key factors compared with other indicators. We rank the final weights of the secondary indexes in the order from high to low and get their total ranking weights, as shown in Figure 4. From the graph, it can be seen that in the secondary indicators of the development level of APEC, the highest proportion of weight is the proportion of e-commerce sales revenue in the total income of enterprises, followed by the proportion of APEC transactions in local GDP and APEC network sales. However, the impact of some factors is relatively weak, particularly per capita transport and communications spending by rural residents and the qualification of suppliers, with a weight of only 0.3 percent. It shows that in the development process of APEC, e-commerce companies should pay more attention to sales and improve the attention to product cost and profit.

According to formula (5), we calculate the comprehensive score of development level of APEC in Shanxi Province and the result is 76.28 points. We compare the calculation results with the evaluation standard values of APEC development level in Table 10 and find that 76.28 points are at the general level of expert evaluation. The score results show that the development level of APEC in Shanxi Province is at a medium level and some of the electronic commerce activities of agricultural products have achieved good results, such as the penetration rate of rural Internet, the qualification of suppliers, the quality of APEC platform, and the sales revenue of electronic commerce. However, the preferential tax policies of government on APEC and the policy of electronic commerce entering rural demonstration counties have not yet reached the ideal goal.

To sum up, the comprehensive evaluation process of the development level of APEC in Shanxi Province is shown in Figure 5.

4.5. Suggestions on Optimizing the Development of APEC

4.5.1. Perfecting the Standardization System of APEC. There are many contents of electronic commerce in agricultural enterprises, including the production of agricultural products or raw material procurement, processing, packaging, brand building and promotion, product pricing, network channel expansion, and new media promotion. However, there is no perfect standardization system of APEC. The domestic standardization system of APEC is mainly based on recommended standards, and there are few mandatory standards. With the development of APEC market, the lack of standardization will inevitably become a major obstacle to its development. So, it is necessary to improve the APEC standardization system of enterprises and increase government supervision. Specifically, the government should improve the construction standardization of APEC and establish a trinity system.

4.5.2. Strengthening Policy Support. The development of APEC is basically based on small- and medium-sized e-commerce enterprises, which is objectively inseparable from policy support and infrastructure protection. From the level of governments at all levels, each region should be combined with local characteristics and give more special funds to support the slow development of areas, including tax relief, financial subsidies, interest rate incentives, and a series of measures, so as to encourage and promote agricultural enterprises to take the first step of e-commerce. Besides, the government provides policy and financial support to enterprises interested in APEC and encourages more agricultural practitioners to carry out e-commerce innovation and entrepreneurship. In view of the weak supporting infrastructure for the development of APEC and remote areas, the government should focus on improving the logistics transportation and distribution system in addition to strengthening the infrastructure construction such as railways, highways, and base stations, especially the construction and technological upgrading of special storage
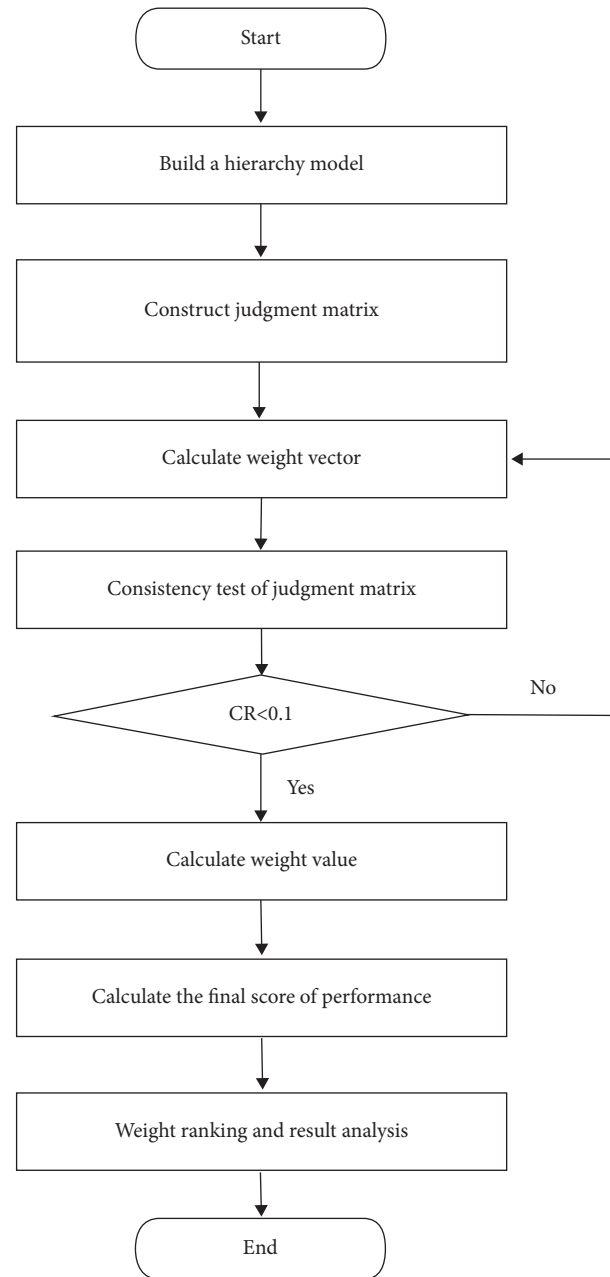

FIGURE 5: Comprehensive evaluation flow chart of development level of APEC in Shanxi Province.

and cold chain logistics related to the transportation of fresh agricultural products (APs). Each region can establish a professional AP logistics company and improve the efficiency of AP collection, so as to minimize the loss of AP in the transportation process.

4.5.3. Training Professional APEC Talents. At present, there are some problems in the development of APEC, including the small number of APEC enterprises, the low proportion of APEC income in the total income of enterprises, and the weak awareness of network brand building. We dig deep into the causes of the above problems and find that largely due to

the lack of professional e-commerce talents for e-commerce innovation and entrepreneurship. Specifically, there are three ways to solve the problem of APEC talents. First, the government should increase the publicity and education of agricultural enterprises and agricultural practitioners. Second, the government should create a strong teaching staff engaged in rural education, such as professional and technical training courses and farmers' night school, so as to provide conditions and convenience for agricultural practitioners to improve e-commerce technology and skills. Third, each region should establish specialized agricultural e-commerce training institutions and encourage cooperation between training institutions and scientific research institutions such as universities.

5. Conclusions

The combination of agricultural products and e-commerce can help agricultural products to achieve rapid circulation from rural to urban and help rural residents with self-employment and create jobs. It is conducive to promoting rural economic development and narrowing the income gap between rural and urban areas. Due to the rapid development of APEC in recent years, it has attracted the attention of many scholars. Different scholars have established different evaluation systems of agricultural e-commerce through qualitative or quantitative methods. Based on this, this paper sets up different levels of evaluation indicators for the development level of APEC, taking into account the rural residents, infrastructure conditions, policy support, the quality of agricultural e-commerce platform, operating results and social effects, and other factors, using AHP to evaluate the overall development of APEC. And, we take Shanxi Province as an example to explore the key constraints of APEC development in order to provide some reference and guidance for the government to develop APEC countermeasures and improve the APEC ability of enterprises. The specific research conclusions are as follows.

First, on the basis of consulting and analyzing a large number of literature works, we construct an evaluation index system of APEC development level composed of 24 influencing factors.

Second, we construct the evaluation model of APEC development level in Shanxi Province, and the comprehensive score calculation results are 76.28 points, indicating that the overall level of APEC development in Shanxi Province is at a medium level.

Third, we put forward the optimization strategy for the future development of APEC, including perfecting the standardization system of APEC, strengthening policy support, and training professional APEC talents.

However, since the theoretical knowledge and practical experience of this paper are not perfect, it is necessary to construct the evaluation index system of the development level of APEC from more aspects in the future and determine the combined weight by using the weight calculation method combining qualitative and quantitative methods, so as to find problems in practical application more scientifically.

Data Availability

The data used to support the findings of this study are available from the author upon request.

Conflicts of Interest

The author declares no conflicts of interest.

Acknowledgments

References

[1] B. Bai, F. Chen, and G. Zhou, "Functions of village classification based on POI data and social practice in rural revitalization," *Arabian Journal of Geosciences*, vol. 14, no. 17, p. 1690, 2021.

[2] X. Liu, "Empirical study on B2C e-commerce logistics network optimisation of agricultural products," *Acta Agriculturae Scandinavica Section B Soil and Plant Science*, vol. 71, no. 2, pp. 1–17, 2021.

[3] E. Cristobal-Fransi, Y. Montegut-Salla, B. Ferrer-Rosell, and N. Daries, "Rural cooperatives in the digital age: an analysis of the Internet presence and degree of maturity of agri-food cooperatives' e-commerce," *Journal of Rural Studies*, vol. 74, pp. 55–66, 2020.

[4] Z. Chen, W. Shu, H. Guo, and C. Pan, "The spatial characteristics of sustainable development for agricultural products E-commerce at county-level: based on the empirical analysis of China," *Sustainability*, vol. 13, no. 12, p. 6557, 2021.

[5] Z. Zhu, Y. Bai, W. Dai, and D. Y. Liu, "Quality of e-commerce agricultural products and the safety of the ecological environment of the origin based on 5G Internet of Things technology," *Environmental Technology & Innovation*, vol. 22, no. 2, Article ID 101462, 2021.

[6] J. Wang and Y. Tao, "Reverse integration and optimisation of APEC omnichannel supply chain under Internet technology," *Acta Agriculturae Scandinavica Section B Soil and Plant Science*, vol. 45, no. 13, pp. 1–9, 2021.

[7] T. Su, "Route planning method for cross-border e-commerce logistics of agricultural products based on recurrent neural network," *Soft Computing*, vol. 25, no. 18, pp. 1–10, 2021.

[8] Y.-J. Wan and Z.-C. Yu, "Exploring the development of E-commerce for fresh agricultural products under the background of E-commerce law," *The Journal of Internet Electronic Commerce Resarch*, vol. 20, no. 6, pp. 135–163, 2020.

[9] X. Yang, X. Chen, Y. Jiang, and F. Jia, "Adoption of e-commerce by the agri-food sector in China: the case of Minyu e-commerce company," *The International Food and Agribusiness Management Review*, vol. 23, no. 1, pp. 157–171, 2020.

[10] Y. Zhong, I. K. W. Lai, F. Guo, and H. Tang, "Research on government subsidy strategies for the development of agricultural products E-commerce," *Agriculture*, vol. 11, no. 11, p. 1152, 2021.

[11] A. Abudureheman and A. Nilupaer, "Research on consumer trust measurement model for agricultural products e-commerce based on D-S evidence theory," *Acta Agriculturae Scandinavica Section B Soil and Plant Science*, vol. 71, no. 4, pp. 273–283, 2021.

[12] H. Hao, J. Guo, Z. Xin, and J. Qiao, "Research on e-commerce distribution optimization of rice agricultural products based on consumer satisfaction," *IEEE Access*, vol. 9, pp. 135304–135315, 2021.

[13] L. Ming, Z. Guohua, and W. Wei, "Study of the game model of E-commerce information sharing in an agricultural product supply chain based on fuzzy big data and LSGDM," *Technological Forecasting and Social Change*, vol. 172121017 pages, 2021.

[14] S. Liu and W. Zhang, "Application of the fuzzy neural network algorithm in the exploration of the agricultural products E-commerce path," *Intelligent Automation & Soft Computing*, vol. 26, no. 3, pp. 569–575, 2020.

[15] C. Y. Lin, "An empirical study on decision factors affecting fresh e-commerce purchasing geographical indications agricultural products," *Acta Agriculturae Scandinavica Section B Soil and Plant Science*, vol. 16, no. 1, pp. 1–11, 2020.

[16] L. Bai, X. Liu, and Y. Yu, "Research on spatial spillover effect of E-commerce information system in China's agricultural industry," *Information Systems and E-Business Management*, vol. 18, no. 4, pp. 931–943, 2020.

[17] S.-y. Hu, S.-y. Piao, Z.-r. Li, and Y. Sun, "Research on factors influencing Chinese consumers' intention to buy agricultural fresh products online—evidence from Tangshan city," *Journal of the Korean Society of International Agricultue*, vol. 32, no. 4, pp. 309–314, 2020.

[18] C. Lv, "Current situation and countermeasures of APEC development in heyuan city," *4th international conference on financial innovation and economic development (ICFIED)*, vol. 76, pp. 118–122, 2019.

[19] M. Atiquzzaman, N. Yen, and Z. Xu, *Big Data Analytics for Cyber-Physical System in Smart City*, Springer, Singapore, 2020.

[20] H. Ma and L. Yang, "On the development and mode of E-commerce of agricultural products in gansu Province," *2017 7th international conference on social network, communication and education*, vol. 82, pp. 367–371, 2017.

[21] X. Chen, "An investigation of the cross-border E-commerce export trade of agricultural products in shandong Province," *Korea International Trade Research Institute*, vol. 15, no. 1, pp. 141–151, 2019.

[22] J. Xu and Jianhong, "The current situation of E-commerce development of agricultural products in fujian and its countermeasures," in *Proceedings of the 2017 international conference on education science and economic management*, vol. 106, pp. 161–163, Xiamen, China, 2017.

[23] Y. Wen, L. Kong, and G. Liu, "Big data analysis of e-commerce efficiency and its influencing factors of agricultural products in China," *Mobile Information Systems*, vol. 2021, no. 1, pp. 1–8, Article ID 5708829, 2021.

[24] B. Xiu Na, G. Chung, and K. Hyung-Ho, "A study on the analysis of market efficiency of agricultural products in E-commerce B2C platform-based on the consumers' price fairness perceptions-," *Journal of the Korea Convergence Society*, vol. 11, no. 6, pp. 237–248, 2020.

[25] J. Ding, L. Dan, and Y. Zhang, "Research on index system construction of agricultural E-commerce of Hubei Province," *IOP Conference Series: Earth and Environmental Science*, vol. 186, no. 6, Article ID 012045, 2018.

[26] M. Chen, D. Wang, Z. Hu, and Z. Li, "Considerations of constructing quality, health and safety management system for agricultural products sold via e-commerce," *International Journal of Agricultural and Biological Engineering*, vol. 11, no. 1, pp. 31–39, 2018.

[27] K. K. Naji, K. F. Al-Salahi, and M. Gunduz, "Evaluation of the critical success factors (CSFs) in selecting building contractors using pareto analysis and the analytical hierarchy process," *Journal of Engineering Research*, vol. 8, no. 4, pp. 1–15, 2020.

[28] M. Benbachir, M. Cherrared, and D. Chenaf, "Managing sewerage networks using both failure modes, effects and criticality analysis (FMECA) and analytic hierarchy process (AHP) methods," *Canadian Journal of Civil Engineering*, vol. 48, no. 12, pp. 1683–1693, 2021.