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# Research on the effect of e-commerce adoption in improving farmers' income and welfare in the context of digital economy

Huimin Zhang

Anhui University of Finance and Economics, Bengbu, China

## Abstract

**In the era of digital economy, e-commerce, as an important economic model with the characteristics of the times, has a profound impact on the development of rural economy, and e-commerce of agricultural products has become a new driving force to promote agricultural industrialization, digitalization and increase farmers' income. Considering the sample selection bias and endogeneity, this paper uses multiple regression model to benchmark and two-stage regression to measure the effect of e-commerce participation on the improvement of farmers' business performance, and finds that the adoption of e-commerce of agricultural products is helpful to increase agricultural income, but it is not as significant as the impact of land area, and even less than the factors affecting income such as labor force and brand building. However, the positive impact of the adoption of e-commerce of agricultural products on farmers' income will increase with the deepening of their e-commerce adoption, especially in the later stage, and the network scale effect will be gradually released.**

## Keywords

**Digital economy, e-commerce adoption, income welfare effect.**

## 1. Introduction

In recent years, rapid advancements in information technology have propelled the digital economy forward. Among its various forms, e-commerce stands out as a widely recognized and influential component. Enabled by the Internet, mobile technology, and cloud computing, e-commerce facilitates faster and more efficient online transactions. In China, the e-commerce industry has achieved significant scale, particularly in rural areas, where it continues to hold immense growth potential.

Within the context of the digital economy, e-commerce has emerged as a powerful driver of rural economic development. Its penetration into rural markets has yielded positive outcomes, with e-commerce shopping becoming the new norm across most rural regions. Many areas have established robust logistics networks, and e-commerce exports are on the rise. For smallholder farmers, leveraging the Internet and e-commerce platforms provides access to real-time and accurate information, including agricultural policies, market conditions, and consumer demand. This knowledge empowers farmers to make informed decisions, optimize production, and expand their market reach beyond geographical boundaries.

As digital information technology continues to evolve and the rural revitalization strategy gains momentum, e-commerce remains a critical model within the digital economy. The adoption of e-commerce by rural households has become a focal point of academic research, carrying significant implications in the current economic landscape.

## 2. Literature review

With the rapid development and widespread application of digital technology in agriculture, the academic and practical circles have paid more and more attention to the innovation and

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evaluation of agricultural management models using digital tools such as Internet technology, e-commerce technology, and blockchain. Before the implementation of rural e-commerce, there was not much discussion in the academic community about what kind of "digital dividends" the adoption of e-commerce technology would bring to farmers. With the continuous in-depth discussion of "Internet", "informatization", "Taobao village" and other related issues, the government is vigorously implementing the rural revitalization strategy and putting the promotion of rural e-commerce in the first place. It has also strengthened its support for capacity-building. These measures highlight the impact of rural e-commerce on research.

With the advancement of rural revitalization, e-commerce has become an important means to effectively promote agricultural reform and development. However, due to various factors, people cannot fully share the benefits of digital (World Bank, 2016). As a result, countries, social strata, and social solidarity organizations face large differences in data penetration and technical proficiency. Due to the rapid growth and popularization of the digital economy, the gap in the first level of "access gap" has been eliminated, and the second level of "use gap" is manifested in the lack of technology, which has led to the emergence of the third level of "income gap", that is, the gap due to the impact of digitalization (Li Yi, 2021).

There are many common problems for "smallholders" in connecting to "big markets" (Markelova et al., 2009, Wiggins et al., 2010, Poulton et al., 2010). Two of the most prominent problems are information asymmetry and poor sales. Smallholder farmers find it difficult to keep up with market supply and demand and agricultural prices, and they often plan their current production plans based on the previous year's market conditions and their own rich experience, but this production plan is difficult to keep up with the actual market demand of the current year, resulting in "increased production but no income".or "forced to accept pricing", the time lag in farmers' access to market information leads to the inability of smallholder farmers to obtain effective information, which prevents them from selling their produce at the maximum level of efficiency in the local market, and even exceeds demand. Agricultural e-commerce relies on modern information technology and the Internet, which significantly improves the information receptivity of farmers in agricultural trade and contributes to market efficiency (Poole, 2001).

Previous studies have pointed out that the significant influencing factors on e-commerce adoption behavior are farmers' health status, education level, income structure, family and work status, etc. (Song Ying, 2021). In addition, e-commerce sales organically connect traditional smallholder farmers with modern big markets. This breaks the traditional trade model of agricultural products, and the adoption of e-commerce sales has a significant income impact on smallholder farmers (Wu Xiaoting, 2021). For large-scale agricultural professionals, expectation confirmation is an important intermediary in the process of forming digital business intentions and adopting e-commerce behaviors (Cai Bo, 2021). Therefore, the comparison of e-commerce adoption behaviors, especially the impact of specific e-commerce input factors on the income increase effect of rural households, is still a blind spot in academic research.

## 3. Theoretical analysis and research hypothesis

According to the theory of farmers' decision-making behavior, the motive of pursuing profits is the baton of farmers' e-commerce adoption behavior. Farmers will turn to e-commerce technology only if the expected utility of participating in e-commerce is better than the sales channels currently used by farmers, and when the relative benefits are more beneficial at trade-off, because e-commerce can create virtual markets that increase farmers' incomes by reducing costs, raising prices, and expanding markets.

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First of all, with the development of the economy, benefiting from the reduction of production and operating costs, the coverage of China's agricultural trade market has been expanded to the township levelThis makes it easy for farmers to travel from their production sites to nearby township or county-level markets to sell their products. However, due to the inconvenience of public transport and the fixed opening hours of the market, farmers have to pay more for transportation in order to reach the market as quickly as possible. With the development of e-commerce technology, many farmers no longer need to pay expensive market booth fees and market management fees to sell online, and they can operate independently through the online platform, so as to achieve direct communication with consumers, reduce the cost of market media, and improve farmers' income.

The second is to benefit from the price elasticity of agricultural products. Due to the convenient characteristics of current electronic information technology, China has established a comprehensive network system, which includes information, communication, marketing, logistics, customer service and other fields. In this way, it will no longer be necessary to rely on the past model to determine the price, that is, only rely on past experience or passively listen to the buyer's quotation. As a result of a more appropriate pricing model, farmers can more easily obtain higher incomes and more transparently obtain the prices of other competitors in the market, thus reducing the pressure of bidding, thus avoiding the loss of optimal profits due to low pricing due to opaque market conditions, and the poor sales due to pricing higher than the market level of the year, which will affect farmers' incomes.

With the continuous growth of the supply of agricultural products and the market demand, the economic income of farmers is also growing, and the marginal income of farmers has been significantly improved. However, due to the scarcity of natural resources and the complexity of the economic and social environment, as well as the limitations of farmers in terms of market development, the direct sale of agricultural products is often limited to the local area. The emergence of e-commerce platforms has effectively supplemented farmers' offline market sales channels, made farmers' trade behavior more free, and also made the information of agricultural products more accurately conveyed to the areas outside the local market circle, thus effectively filling the vacuum area of product marketing and greatly enhancing the cross-regional competitiveness of farmers.

Based on this, this paper proposes a research hypothesis: the adoption of e-commerce can increase the income of rural households.

## 4. Study design

At present, scholars generally believe that non-agricultural income and income brought by agricultural production and business activities are the most important and main sources of income for farmers. Some scholars have put forward the term "income change", and the academic research on the change pattern of Chinese farmers' income includes four mainstream change theories: the theory of slowing growth, the theory of lagging growth, the theory of disparity, the theory of distance expansion, and the theory of income fluctuation. The theory of diminishing growth emphasizes that peasants' income is affected by price and cost factors, and its growth will decline year by year. According to the theory of lagging growth, the growth of farmers' income lags behind economic growth, which further aggravates the lag of agricultural development. According to the theory of disparity, the income gap between urban and rural residents is gradually widening, and it is expected that the regional income gap will also widen. According to the income fluctuation theory, peasant incomes are usually uncertain and fluctuating. The contribution of e-commerce to revenue growth may exceed these four parameters, forming a corresponding revenue growth trend.

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## 4.1. Data Sources

The micro data of this study were obtained from a sample survey of 5 counties and cities in Anhui Province, China, with a total of 350 questionnaires distributed and 342 valid questionnaires received, all of which passed the reliability and validity test. Anhui Province, with its abundant agricultural resources, sufficient human resources, good technical conditions, and convenient transportation network system, has created a superior environment, enabling it to realize online trade of basic agricultural products. Although Anhui Province has made some progress, due to the current economic and social conditions, there are still certain difficulties in infrastructure construction in some areas, and compared with the traditional e-commerce provinces in the eastern coastal areas, Anhui Province is still relatively lagging behind in the development of some agricultural e-commerce.

## 4.2. Variable Selection

In the past, when scholars studied the factors influencing income changes, different main variables were selected according to different research objectives. Through induction, the mainstream of the academic community believes that the main factors related to the change of farmers' income are capital (land, labor, family, etc.), regional environment, and national policy support. According to the needs of the study, this study controls for the relevant variables that affect farmers' income, including the adoption of e-commerce of agricultural products, business characteristics, and household and regional environmental advantages.

Table 1 Variables

| Variable groups | The name of the variable | Measurement basis |
|---|---|---|
| Farmer e-commerce adoption | E-commerce spending ratio | Proportion of investment in the development of e-commerce of agricultural products in total productive expenditure |
| | Number of e-commerce employees | The number of people in an e-commerce business |
| Organizational characteristics | Total Labour Force | Annual fixed labor force number/number of people in the labor force |
| | Land per capita | The actual cultivated land use area, the number of acres/the number of fixed labor force per year |
| Characteristics of the operation | Type of business | Type of agricultural products: 1 = grain 2 = economic 3 = both 4 = other |
| | Funding base | I (the organization) have sufficient funds to sell agricultural products online:<br>1-5: Completely disagree—Completely agree |
| | Human capital base | I (a member of the organization) have good skills in selling agricultural products online:<br>1-5: Completely disagree—Completely agree |
| Characteristics of the operator (Farmer, Chairman of Cooperative) | age | Average age of operators:<br>1-5: Under 20 years old - over 50 years old, every 10 years old is a range |
| | educate | Operators are educated on average:<br>1 = primary school education 2 = junior high school education 3 = high school / technical secondary school / secondary vocational education<br>4 = college and higher vocational education 5 = bachelor degree or above |
| | gender | Gender of operator: 0 = female 1 = male |

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| | | |
|---|---|---|
| | Political identity | Whether the operator is a member of the Communist Party:<br>0 = no party or other party affiliation 1 = member of the Communist Party of China |
| | Years of farming | Years of experience in agricultural production: 1-5:<br>Within 5 years - more than 20 years, every 5 years is a range |
| Environmental characteristics | Traffic environment | Whether the transportation and logistics conditions are convenient in e-commerce operation:<br>1-5: Completely disagree—Completely agree |
| | Policy environment | The government has introduced relevant policies to provide subsidies and assistance for development:<br>1-5: Completely disagree—Completely agree |
| Branding | Agricultural product brands | Whether it operates under the condition of a distinctive brand: 0 = no 1 = yes |
| Income of rural households | Average annual income | Total income from the sale of agricultural products/number of people in the labor force |

## 4.3. Model construction

For e-commerce, we assume that the income determination equation affecting farmers' income has a semi-logarithmic form, and take the e-commerce adoption behavior of rural households as the explanatory variable, which is measured by the e-commerce expenditure ratio and the number of e-commerce employees, and the explanatory variable is the income of rural households. Its expression is as follows:

$$lnINC_{it} = \alpha_0 + \alpha_1 EC_{it} + \alpha_2 OS_{it} + \alpha_3 MS_{it} + \alpha_4 DS_{it} + \alpha_5 ES_{it} + \alpha_6 TE_{it} + \varepsilon_{it}$$

$i$It represents the interviewed farmers, the affiliated institutions, the logarithm of the annual average income, the adoption of agricultural product e-commerce, the characteristics of the institution, the characteristics of the operation, the characteristics of the managers, the characteristics of the environment, and the brand effect.$tlnINCECOSMSDSESTE$

## 4.4. Descriptive statistics of variables

To collect data on the above variables, participants distributed and filled out questionnaires. Then check the reliability and validity of the data. The descriptive statistics for the final sample are shown below.

Table 2 Descriptive statistical results

| Variable groups | The name of the variable | mean | standard deviation |
|---|---|---|---|
| Adoption of e-commerce for farmers | E-commerce spending percentage | 1.706 | 3.492 |
| | Number of e-commerce employees | 2.951 | 1.228 |
| Organizational characteristics | Total working population | 1.386 | 1.625 |
| | Land per capita | 1.649 | 1.347 |
| Business characteristics | Business type | 2.271 | 1.379 |
| | Funding base | 3.640 | 1.732 |

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| | | | |
|---|---|---|---|
| | Human capital base | 3.301 | 1.656 |
| Decision-maker characteristics | age | 2.639 | 0.703 |
| | educate | 3.010 | 0.811 |
| | sex | 0.822 | 0.476 |
| | Political identity | 0.140 | 0.483 |
| | Years of farming | 2.018 | 2.022 |
| Environmental characteristics | Infrastructure environment | 3.291 | 1.842 |
| | Policy Environment | 2.215 | 2.102 |
| Branding | Agricultural product brands | 0.192 | 0.394 |
| Income of rural households | Average annual household income | 5.328 | 3.566 |

## 5. Empirical results and analysis

### 5.1. Baseline Regression

The following table shows the regression analysis performed using data obtained from practice. The regression results of regression 1 are the reference of the benchmark equation, and the regression results of regression 2 are obtained after the introduction $EC$ of variables as e-commerce for farmers.

Table 3 Regression analysis results

| Variable groups | The name of the variable | Regression 1 | | Regression 2 | |
|---|---|---|---|---|---|
| | | Estimated parameters | standard deviation | Estimated parameters | standard deviation |
| Adoption of e-commerce by farmers | E-commerce spending percentage | - | - | 0.168** | 0.021 |
| | Number of e-commerce employees | - | - | 0.232*** | 0.026 |
| Organizational characteristics | Total working population | 0.424*** | 0.107 | 0.400*** | 0.109 |
| | Land per capita | 0.486*** | 0.038 | 0.481*** | 0.035 |
| Business characteristics | Business type | 0.184** | 0.012 | 0.163* | 0.014 |
| | Funding base | 0.251*** | 0.056 | 0.239*** | 0.066 |
| | Human capital base | 0.241*** | 0.083 | 0.240*** | 0.085 |
| Decision-maker characteristics | age | -0.007 | 0.004 | -0.003 | 0.004 |
| | educate | 0.106* | 0.030 | 0.127* | 0.041 |
| | sex | 0.009 | 0.035 | 0.070 | 0.036 |
| | Political identity | 0.197** | 0.059 | 0.202** | 0.066 |

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| | | | | | |
|---|---|---|---|---|---|
| | Years of farming | 0.170** | 0.040 | 0.172** | 0.044 |
| Environmental characteristics | Infrastructure environment | 0.145* | 0.051 | 0.160* | 0.063 |
| | Policy Environment | 0.399*** | 0.103 | 0.394*** | 0.101 |
| Branding | Agricultural product brands | 0.272*** | 0.079 | 0.301*** | 0.082 |
| F | | 19.897*** | | 24.365*** | |
| $R^2$ | | 0.331 | | 0.410 | |
| Sample size | | 342 | | 342 | |

Note: ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

From the regression results, the direction of the estimation coefficient is not significantly different from the significance level of other variables after adding the hypothetical variable of agricultural e-commerce in model 2. An increase of 0.08 indicates that agricultural e-commerce has a significant positive impact on the income change of the overall sample. All variables were statistically significant, except for the age and gender of the decision-makers, which had no statistically significant effect on income. $R^2$Analyzing the effect of manpower investment and brand building, it is not difficult to find that the labor level and the income increase effect of agricultural product brands are relatively higher than those of e-commerce adoption. Both indicators are statistically significant and consistent with pre-survey projections. In addition, focusing on the two major indicators of e-commerce business behavior, the effect of e-commerce labor investment is more considerable than that of capital investment, and it can be said that talent is a more important factor in the adoption of e-commerce. In both models, political identity and non-farm work experience were statistically significant, the party membership and rich non-farm work experience of agricultural business decision-makers had a positive impact on income changes, and variable agricultural brands also showed positive importance in both models, indicating that branded or GI agricultural products are always the main competitive factors in increasing sales and income, whether in offline or online trade。

## 5.2. Robustness test

There may be two endogenous problems in this study: one is that some variables may be omitted in the model setting or due to database limitations, resulting in estimation bias, and the other is a mutual causal problem, in which farmers' income will not only be affected by e-commerce adoption behavior, but may also react to e-commerce adoption behavior, that is, under high income, farmers will be more inclined to choose e-commerce. Therefore, this paper will use the instrumental variable method to perform the endogeneity test of two-stage regression, referring to the similar treatment methods of Fang Guanfu (2020) and Luo Qianfeng (2022), and taking the Internet penetration of the province where the farmers are located and the e-commerce participation of other farmers in the villages where the farmers are located as instrumental variables. On the one hand, the Internet penetration rate of the province where the farmer is located will have a positive impact on the digital thinking of the farmer households to a certain extent, and the higher the Internet penetration rate, the greater the incentive for the farmers to choose to try e-commerce, and the e-commerce participation of other rural households in the village where the farmer is located also represents the positive atmosphere of e-commerce and digital operation around the farmer, and the e-commerce adoption behavior of the individual farmer will be affected, that is, the tool variable is highly related to the explanatory variable; on the other hand, the provincial Internet penetration rate and the e-commerce participation of other rural households in the village have basically no impact on the income of the individual farmer, that is, the instrumental variable is exogenous and unrelated

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to the explanatory variableTherefore, it is reasonable to choose the Internet penetration of the province where the farmers are located as the instrumental variable. Table 4 shows the empirical results of the endogeneity test, which is the result of using two-stage regression, and the F-value of instrumental variable regression in the first stage is 197.23, which exceeds the critical value of 10, that is, there is no weak instrumental variable problem, which once again confirms the effect of rural households' e-commerce adoption on income increase. Columns (2) and (3) are the test results of the L IML method and the GMM method, respectively, which are consistent with the coefficients of the first column and have the same significance, which once again verifies the robustness and reliability of the results and conclusions.

Table 4 Endogeneity test results

| variable | | (1) 2SLS revenue | (2) LIML revenue | (3) GMM revenue |
|---|---|---|---|---|
| Adoption of e-commerce for farmers | (1) | 0.181** | 0.181** | 0.181** |
| | (2) | 0.312*** | 0.312*** | 0.312*** |
| Constant terms | | 3.921*** | 3.921*** | 3.921*** |
| DWH test P value | | 0.050 | — | — |
| Stage 1 F-Score | | 197.23 | — | — |
| Control variables | | control | control | control |
| Sample size | | 342 | 342 | 342 |

## 6. Conclusions and Recommendations

### 6.1. Main conclusions

Based on the empirical analysis of whether the introduction of agricultural e-commerce by farmers brings income growth, the following conclusions are drawn:

Conclusion 1: There is a positive correlation between e-commerce adoption behavior and rural household income.

The statistically significant results of both the baseline regression and the two-stage regression show that agricultural e-commerce has a positive impact on farmers' income, i.e., income growth. After surveying the sample areas, we found that the income of farmers after adopting e-commerce was significantly higher than that of relying solely on traditional channels to sell their produce. In addition, for those poor villages that have lifted the entire village out of poverty, the role of e-commerce in agricultural products is more obvious, which can be said to be an effective way of economic growth. However, although the development of agricultural e-commerce will help increase income, compared with the total amount of labor, per capita land, agricultural product brands and other factor inputs, the effect of e-commerce on agricultural products is not as high as expected.

Conclusion 2: The impact of human capital investment in agricultural e-commerce on income growth is greater than that of capital investment.

The empirical results show that increasing the investment in agricultural e-commerce talents has the greatest positive impact on income, which is more than twice as high as the income increase effect of increasing the investment in e-commerce. With the development of the network economy, e-commerce talents have an increasing influence on the development of rural households' e-commerce. A good rural e-commerce talent not only needs good data and information quality, but also has good communication and coordination skills, as well as proficient network technology, to meet the growing market demand, so as to effectively improve agricultural productivity.

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The development of e-commerce of agricultural products is conducive to the income growth of agricultural business entities, especially the investment in human capital of e-commerce, and the impact on increasing income is greater than that of capital investment in e-commerce. According to the empirical results, the effect of e-commerce investment on increasing income far exceeds that of investment based on factors such as cultivated land size, brand effect, and labor level. The root cause is that with the development of e-commerce, the increase of initial input costs and the delay of input and output have weakened the advantages of "high input and low return", which has led to certain restrictions on the e-commerce of agricultural products.

## 6.2. Policy Recommendations

Based on the above conclusions, in order to maximize the benefits of e-commerce and benefit farmers, this study puts forward the following policy recommendations.

First of all, we should use talent and financial assistance as a lever to create a policy environment that supports the development of rural e-commerce economy. First, talent policy is the most important part, farmers are often difficult to take the first step from zero to one because of the lack of professional e-commerce knowledge and means, although the scale of China's e-commerce industry and the number of related practitioners are considerable, but the main e-commerce technology and marketing talents are gathered in the city's secondary and tertiary industries, and it is necessary to create appropriate talent assistance policies to help e-commerce talents be willing to go to the countryside and be able to go to the countryside, and break through the most important professional barriers for the digitization and e-commerce of agricultural product trade. Second, fiscal policy support should focus on supporting subsidies for the cultivation of characteristic industries, carrying out e-commerce training, adopting e-commerce technology, and providing financial loans, which will create a sustainable and favorable macro financial environment for farmers to integrate into the e-commerce supply chain. Third, financial policy support is crucial, and it is recommended to connect all subjects in the e-commerce supply chain through agricultural supply chain finance to establish a close community of interests and promote common development.

Secondly, by strengthening the social support and promotion of rural e-commerce, we should actively give full play to the advantages and experience of China's digital economy development so far, including but not limited to county-level e-commerce public service centers, industry associations, colleges and universities, expert teams, emerging agricultural enterprises, financial institutions, investors, media agencies, network media, financial platforms, financial information platforms, financial technology platforms, financial resource libraries, etc. In particular, technical training is provided to farmers who originally have no e-commerce knowledge reserves, and the content and time settings of e-commerce training are dynamically optimized through the joint construction of the main resource library of e-commerce technical training, and the supply and demand matching of e-commerce training is refined to improve training efficiency.

Finally, brand building is also a major focus of today's e-commerce. As online transactions have greatly simplified the transaction process, the information gap between the two parties of the transaction has increased, especially for consumers, the virtuality of digitalization makes it impossible for them to fully know the quality of the product before receiving the goods, prompting them to ignore the risks of online transactions and then e-commerce shopping A major reason must come from the trust in the credibility of the sales store. Among them, an influential brand product will make the greatest endorsement for the quality of e-commerce trade. For farmers, building an e-commerce or agricultural product brand with a good reputation, continuously enhancing its influence in the process of e-commerce operation, creating product characteristics in a number of e-commerce agricultural products on the

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Internet, and maximizing brand advantages will be more beneficial to the growth and development of e-commerce economic benefits.

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## References:

[1] World Bank. Digital Dividends. Washington,D. C. ,2016
[2] Li Yi, Ke Jiesheng.The three-level digital divide: income growth and income distribution effect of rural digital economy.Agricultural Technology Economics,2021(8):119~132
[3] Markelova, H.; Meinzen-Dick, R.; Hellin, J. and Dohrn, S.: Collective Action for Smallholder Market Access, Food Policy, 34(1): 1-7, 2009
[4] Wiggins, S.; Kirsten,J. and Llambí, L.: The Future of Small Farms, World Development, 38(10): 1341-1348, 20
[5] Poulton, C.; Dorward, A. and Kydd, J.: The Future of Small Farms: New Directions for Services, Institutions, and Intermediation, World Development, 38(10): 1413-1428
[6] Poole, B.: How Will Agricultural E-markets Evolve? paper presented at the USDA Outlook Forum, Washington D.C., February 22-23
[7] Song Ying, Wu WenyuResearch on the influencing factors of farmers' adoption of agricultural product e-commerce: Based on the Logit-ISM model. Journal of Chongqing Technology and Business University(Social Science Edition) ISSN 1672-0598,CN 50-1154/C
[8] Wu Xiaoting.Integration of Traditional Smallholder Farmers into the Big Market: The Income Effect of E-commerce Adoption: A Micro Empirical Study of Citrus Growers in Sichuan ProvinceRural Economy. F307.12,A,10037470(2021)0110(08)
[9] Cai BoTechnology Adoption Behavior and Heterogeneity Analysis of Agricultural Products E-commerce of Rural Professional Large Households: Based on Integrated Technology Adoption Model Journal of Agro-Forestry Economics and Management. 2021,20(05):621-629.