JOURNAL OF CULTURAL ANALYSIS AND SOCIAL CHANGE

Journal of Cultural Analysis and Social Change,
2025, 10(4), 4039-4055
ISSN: 2589-1316

Evaluation of the Effectiveness of Government Policy Tools in Rural E-Commerce Poverty Alleviation

Lishan Zhang[1*], Sarmila Binti Md Sum[2], Zaimah Binti Ramli[3]

[1,2,3] *Fakulti Sains Sosial dan Kemanusiaan, Universiti Kebangsaan Malaysia, Bangi 43600, Selangor Darul Ehsan, Malaysia*

*__Corresponding Author:__ P125001@siswa.ukm.edu.my

Citation: Zhang, L., Sum, S. B. M. & Ramli, Z. B. (2025). Evaluation of the Effectiveness of Government Policy Tools in Rural E-Commerce Poverty Alleviation , *Journal of Cultural Analysis and Social Change*, 10(4), 4039-4055. https://doi.org/10.64753/jcasc.v10i4.3735

Published: December 28, 2025

ABSTRACT

The rapid development of digital technology is profoundly changing the economic landscape and development path of rural areas around the world. In recent years, e-commerce, as an important part of the digital economy, has become a key fulcrum of rural poverty alleviation strategies in many countries. Governments around the world have introduced targeted policy tools in an attempt to increase farmers' income and reduce rural poverty through the development of rural e-commerce. This study systematically evaluates the effectiveness of different types of government policy tools in rural e-commerce poverty alleviation from the perspective of policy tool theory. The research results show that a comprehensive combination of policy tools is more effective than a single tool intervention; policy interventions that combine infrastructure investment with digital capacity building are more effective; fiscal subsidies need to be combined with market mechanisms to avoid subsidy dependence; and policy designs that are tailored to local conditions are more effective than unified standards. Based on empirical analysis, this study proposed an optimization framework for rural e-commerce poverty alleviation policy tools, emphasizing that policy tools should have stage matching, synergy and complementarity, and dynamic adaptability. The research results provide theoretical guidance and practical reference for governments to formulate and improve rural e-commerce poverty alleviation policies.

Keywords: Rural E-Commerce; Poverty Alleviation Policy; Policy Tools; Policy Evaluation; Digital Inclusion

INTRODUCTION

Research Background and Problem

In the era of digital economy, e-commerce is becoming an important channel to connect rural and urban markets, promote the circulation of agricultural products, and increase farmers' income. Globally, whether it is the "Taobao Village" phenomenon in East Asia, the construction of "digital villages" in South Asia, or the innovation of rural business models driven by mobile payments in sub-Saharan Africa, e-commerce is becoming an important driving force for economic transformation in rural areas. Faced with this trend, many countries have incorporated the development of rural e-commerce into their poverty alleviation strategies and introduced a series of policy measures (Leong et al., 2016).

However, the challenges faced by rural e-commerce poverty alleviation are multi-dimensional: imperfect infrastructure, lack of digital literacy among farmers, low standardization of agricultural products, high logistics costs, asymmetric market information, etc. These challenges have put the government in a dilemma in policy choices: which problems should be prioritized? What policy tools should be used? What are the effects of different combinations of policy tools? Rural e-commerce poverty alleviation has achieved remarkable results in some

regions, while progress has been slow in other regions. What factors are at work behind this differential result? These issues urgently need to be studied in depth (Oreglia, 2013).

Although existing research has focused on the issue of e-commerce poverty alleviation, most of it focuses on case studies of a single country or region, lacks cross-regional and cross-policy comparative studies, and focuses more on descriptive analysis of policy content rather than systematic policy effect evaluation based on theoretical frameworks. The focus is often limited to the economic effects of policies, ignoring the social and cultural factors and institutional environment factors in the policy implementation process. These research gaps limit our comprehensive understanding of the effectiveness of rural e-commerce poverty alleviation policy tools and also restrict policy optimization and innovation (Salemink et al., 2017).

Research Purpose and Significance

Based on the above background, this study aims to build a systematic policy tool evaluation framework, comprehensively evaluate the effectiveness of different types of government policy tools in rural e-commerce poverty alleviation, explore the key factors affecting the effectiveness of policy tools, and put forward strategic recommendations for optimizing the selection and combination of policy tools. Specifically, this study attempts to answer the following questions:

(1) What are the main policy tools used by governments in rural e-commerce poverty alleviation? How are these policy tools classified? (2) How effective are different types of policy tools in promoting the development of rural e-commerce and reducing rural poverty? (3) What factors affect the implementation of rural e-commerce poverty alleviation policy tools? (4) How to optimize the selection and combination of policy tools to improve the policy effectiveness of rural e-commerce poverty alleviation?

The theoretical significance of this study lies in combining the policy tool theory with the research on rural e-commerce poverty alleviation, expanding the application of the policy tool theory in the field of digital economy and poverty alleviation, and enriching the theoretical framework of rural e-commerce poverty alleviation. The practical significance lies in providing empirical evidence and decision-making reference for governments to formulate and optimize rural e-commerce poverty alleviation policies by systematically evaluating the effects of different policy tools, identifying best practices and key success factors, and helping to improve the accuracy and effectiveness of government intervention, and ultimately promoting sustainable development and digital inclusion in rural areas.

Research Content and Methods

This study adopts a multi-case comparative analysis method, combined with literature research, policy text analysis and secondary data analysis, to systematically evaluate the effectiveness of rural e-commerce poverty alleviation policy tools. The research content mainly includes:

First, based on the policy tool theory, a classification framework for rural e-commerce poverty alleviation policy tools is constructed to identify three major categories of policy tools: supply-side, demand-side, and environmental construction, and to sort out representative rural e-commerce poverty alleviation policy practices around the world.

Secondly, we selected representative country cases such as China, India, Kenya and Brazil, and evaluated the effectiveness of various policy tools and their differences by comparing and analyzing the implementation effects of different policy tools in different national contexts.

Thirdly, based on empirical analysis, we explore the key factors that affect the effectiveness of policy tools, including regional development stage, social and cultural factors, policy implementation mechanism and external environment, and analyze the synergy and complementary relationship between policy tools.

Finally, a theoretical model and practical suggestions for optimizing rural e-commerce poverty alleviation policy tools are proposed, including the optimal combination of policy tools, the choice of implementation paths, and a policy design method tailored to local conditions.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Research Progress on Rural E-Commerce Poverty Alleviation

As e-commerce penetrates rural areas, scholars have begun to pay attention to its role mechanism and implementation effect in poverty alleviation. Existing research mainly focuses on the following aspects:

In terms of the research on the poverty alleviation effect of rural e-commerce, Luo and Niu (2019) found in their empirical study based on China's rural e-commerce poverty alleviation practices that e-commerce participation significantly increased farmers' income levels, with an average increase of 17.5%, but there were obvious differences in the income effect among different groups, and farmers with higher education levels

benefited more. Hjort and Poulsen (2019) found through a study of eight African countries that with the access to Internet infrastructure, rural e-commerce has created a large number of non-agricultural jobs, with the employment rate of skilled workers increasing by 4.3% and the employment rate of low-skilled workers increasing by 3.1%. These studies reveal the positive role of e-commerce development in reducing rural poverty, but also point out the problem of uneven distribution of poverty alleviation effects.

In the study of obstacles to the development of rural e-commerce, Warschauer (2016) proposed the concept of "digital divide", subdividing it into access divide, usage divide and benefit divide, and pointed out that simply solving the access problem is not enough to achieve digital inclusion. Wyche and Steinfield (2016) found through field research in rural areas of Kenya that even if Internet access conditions are available, farmers' effective use of e-commerce is still limited by factors such as insufficient digital literacy, lack of trust and lack of local content. Parker et al. (2016) analyzed the two-sided market characteristics of rural e-commerce platforms and pointed out that market scale effects and network effects often make rural e-commerce development face the problem of "cold start". These studies reveal the multi-level obstacles faced by the development of rural e-commerce and provide a theoretical basis for policy intervention.

Although there has been some progress in the study of rural e-commerce policies, there are still obvious deficiencies. Sulemana and Dinye (2016) compared the rural e-commerce policies of different African countries and found that there were obvious differences in policy content, reflecting the different development stages and policy preferences of each country, but did not conduct an in-depth evaluation of the policy effects. Fang et al. (2018) analyzed China's e-commerce poverty alleviation policy system and divided the policies into categories such as infrastructure construction, talent training, and financial support, but mainly stayed at the level of policy content analysis and lacked systematic effect evaluation. Singh (2017) studied India's digital village policy, focusing on the role of the public-private partnership model in policy implementation, but failed to provide sufficient empirical evidence to support its conclusions.

In general, although existing research has explored many aspects of rural e-commerce poverty alleviation, there are still the following deficiencies in the evaluation of policy tools: first, there is a lack of a systematic policy tool classification framework, second, there is a lack of cross-regional and cross-policy type comparative research, and third, there is a lack of theory-based policy effect evaluation. This study attempts to make up for these deficiencies, build a systematic policy tool evaluation framework, and provide a scientific basis for the optimization of rural e-commerce poverty alleviation policies.

Policy Instrument Theory

Policy tools refer to the various means and methods adopted by the government to achieve specific policy goals. In the theoretical research on policy tools, scholars have proposed a variety of classification methods from different perspectives.

Hood (1986) proposed the "NATO" classification method based on the available resources of the government, and divided policy tools into four categories: nodality, authority, treasure, and organization. Vedung (1998) proposed the "carrot-stick-preaching" trichotomy from the perspective of incentive mechanism, simplifying policy tools into three categories: economic incentive, regulatory, and information. Howlett (2005) distinguished policy tools by substance and procedure, and divided them into three categories according to the degree of compulsion: voluntary, mixed, and compulsory. These classification methods have different focuses and provide different perspectives for the study of policy tools.

Regarding the selection of policy tools, Peters and Van Nispen (1998) proposed a rational choice model based on efficiency, effectiveness, fairness and political feasibility. Linder and Peters (1989) emphasized the political and situational dependence of policy tool selection, arguing that tool selection is not only affected by technical factors, but also constrained by values, institutional culture and political forces. Howlett and Ramesh (1995) further developed the policy mix theory, arguing that complex problems require the coordination of multiple policy tools.

In terms of policy tool evaluation, Salamon (2002) proposed a multidimensional evaluation framework, including five evaluation dimensions: effectiveness, efficiency, fairness, manageability, and legitimacy. Capano and Howlett (2020) emphasized the contextual dependence of policy tool evaluation, arguing that the effectiveness of tools depends on the specific implementation environment and conditions, and there is no universal "best tool".

This study draws on the above-mentioned policy tool theory and combines the characteristics of rural e-commerce poverty alleviation to construct an analytical framework suitable for evaluating rural e-commerce poverty alleviation policy tools.

Research Framework Construction

Classification of Policy Tools

Combining Hood's resource classification and Vedung's three-part classification, and considering the particularity of rural e-commerce poverty alleviation, this study divides rural e-commerce poverty alleviation policy tools into the following three categories:

Supply-Side Policy Tools: intervention measures taken by the government to provide the basic conditions and resources required for the development of rural e-commerce, including infrastructure construction (such as Internet access and logistics networks), fiscal subsidies (such as e-commerce entrepreneurship subsidies and platform subsidies) and financial support (such as microcredit and venture capital guidance).
Demand-Side Policy Tools: Intervention measures taken by the government to enhance the ability and willingness of rural residents to participate in e-commerce, including education and training (such as e-commerce skills training, entrepreneurship guidance), information services (such as market information provision, technical consultation) and demonstration and promotion (such as publicity of typical cases, visits and exchanges).
Environmental Construction Policy Tools: intervention measures taken by the government to create an institutional and social environment conducive to the development of rural e-commerce, including laws and regulations (such as the E-Commerce Law, the Consumer Protection Law), standards and specifications (such as agricultural product quality standards, e-commerce service specifications) and organizational coordination (such as cross-departmental collaboration mechanisms, public-private cooperation platforms), etc.

Evaluation Dimensions

Drawing on Salamon's multidimensional evaluation framework and combining the characteristics of rural e-commerce poverty alleviation, this study evaluates the effectiveness of policy tools from the following four dimensions:
Effectiveness: The actual effect of policy tools in promoting the development of rural e-commerce and reducing rural poverty, including indicators such as the growth in the number of rural e-commerce entities, the expansion of e-commerce transaction scale, the increase in farmers' income, and the reduction in poverty incidence.
Accessibility: the extent to which policy tools cover the rural poor, including indicators such as the scope of policy coverage, the proportion of farmers benefiting, and the participation of vulnerable groups.
Sustainability: Whether the rural e-commerce development model promoted by policy tools has the ability to develop independently in the long term, including indicators such as exit mechanism design, local capacity building, and community participation.
Cost-Effectiveness: comparison of the input and output of policy tools, including indicators such as employment opportunities created per unit of input, transaction volume driven, and increased farmers' income.

Analysis Framework of Influencing Factors

In order to explore the factors that affect the effectiveness of policy tools, this study constructed a four-dimensional analytical framework:

- **Regional Development Stage**: including infrastructure completeness, market maturity and industrial base status.
- **Sociocultural Factors**: including digital cultural acceptance, community organization, and gender and generational characteristics.
- **Policy Implementation Mechanism**: including departmental coordination mechanism, executive agency capacity and monitoring and evaluation mechanism.
- **Changes in the External Environment**: including the speed of technological evolution, market competition landscape and macroeconomic conditions.

Based on the above framework, this study will systematically evaluate the effectiveness of global rural e-commerce poverty alleviation policy tools, explore policy tool selection strategies under different scenarios, and put forward suggestions for optimizing policy tools.

Global Rural E-Commerce Poverty Alleviation Policy Tool Practice and its Effects

Overview of Rural E-commerce Poverty Alleviation Policies in Major Countries

China's Rural E-commerce Poverty Alleviation Policy

China has implemented the e-commerce poverty alleviation project since 2014 and has formed a relatively complete policy system. On the supply side, China has implemented the "broadband rural" project and the construction of an e-commerce logistics and distribution system; on the demand side, it has launched an e-commerce talent training program and the "one village, one product" e-commerce promotion campaign; in terms of environmental construction, it has issued the "E-commerce Law" and the rural e-commerce standard system, and established a cross-departmental coordination mechanism (Fang et al., 2018).

India's Rural E-commerce Poverty Alleviation Policy

India launched the "Digital India" plan in 2015, taking rural e-commerce as an important starting point. Its characteristic policies include the construction of "public service centers" (supply side), "digital literacy campaign"

(demand side) and "agricultural product e-commerce platform standards" (environmental construction). Compared with China, India's policy emphasizes the public-private partnership model, building "digital villages" through cooperation between the government and enterprises to make up for the lack of public resources (Singh, 2017).

Kenya's Rural E-commerce Poverty Alleviation Policy

As a country with relatively rapid e-commerce development in Africa, Kenya has implemented the "Digital Economy Blueprint" since 2017. Its feature is to make full use of the advantages of mobile payments and promote the development of rural e-commerce through the construction of "mobile business villages" (supply side), "youth e-commerce entrepreneurship fund" (demand side) and "agricultural product trading information system" (environmental construction). The notable feature of Kenya's policy is the high emphasis on mobile technology, which regards mobile payment as a key path to break through the bottleneck of rural infrastructure (Mbiti & Weil, 2015).

Brazil's Rural E-commerce Poverty Alleviation Policy

Brazil launched the "National Digital Inclusion Plan" in 2016 to promote the development of rural e-commerce through the "Rural Internet Popularization Project" (supply side), the "Digital Farmer Training Program" (demand side) and the "Agricultural Products E-commerce Quality Certification System" (environmental construction). The characteristic of Brazil's policy is that it attaches great importance to the e-commerce participation of family agriculture and small farmers, and provides special platform services and technical support for small farmers (Berdegué et al., 2015).

Evaluation of Supply-Side Policy Tools

Policy Tools for Infrastructure Construction

Infrastructure construction plays a foundational role in the development of rural e-commerce. Hjort and Poulsen (2019) found that after submarine optical cable connections significantly improved Internet access in African countries, the employment rate increased by 3.1-4.3 percentage points and the number of new businesses increased by 4.9-5.8%. Liu et al. (2018) found in their study of China's rural e-commerce demonstration counties that for every 10% increase in infrastructure investment, the rural e-commerce participation rate increased by an average of 6.5%. These studies confirm that infrastructure investment significantly promotes the development of rural e-commerce.

However, the issue of accessibility of infrastructure construction cannot be ignored. Salemink et al. (2017) found that even in countries where the government vigorously promotes infrastructure construction, the level of infrastructure improvement in remote and deeply impoverished areas is still significantly lower than that in general areas. Although India has built more than 250,000 public service centers, there is still a clear regional imbalance in their distribution. The deeper the poverty level, the lower the coverage rate of service centers (Singh, 2017).

From a sustainability perspective, operation and maintenance of infrastructure after construction is a key challenge. Foster and Briceño-Garmendia (2010) found through a long-term follow-up study of infrastructure projects in Africa that about 30% of rural ICT infrastructure faced operational difficulties after government funding withdrew. In contrast, India's public-private partnership model of government construction and private operation performed better in terms of sustainability, with a continuous operation rate of 75% of service centers (World Bank, 2016).

Fiscal Subsidy Policy Tools

Fiscal subsidy policies played a catalytic role in the early development of rural e-commerce. Couture et al. (2018) found in their study of China's "Village Taobao Program" that the e-commerce participation rate of villages that received e-commerce platform subsidies was 31 percentage points higher than that of villages that did not receive subsidies. However, subsidy policies also face multiple challenges.

First, there is the risk of "elite capture" in subsidy policies. Jensen (2010) studied the case of fishermen in southern India using mobile phones to obtain market information and found that the improvement in market efficiency brought about by information technology increased the overall profits of fishermen by 8%, but the benefits mainly flowed to wealthy fishermen with larger boats, while small-scale fishermen benefited only slightly. Xiao et al. (2017) also showed that the main beneficiaries of China's rural e-commerce entrepreneurship subsidies are young people who have returned home with experience in working outside and have a higher level of education, rather than typical poor people.

The second is the market distortion and subsidy dependence caused by subsidies. Harris et al. (2018) studied the subsidy policy of rural payment systems in Africa and found that although high subsidies promoted the adoption of the system in the short term, they also led to users' dependence on subsidies. After the subsidies were

withdrawn, the system utilization rate dropped by more than 40%. This shows that it is difficult to build a sustainable rural e-commerce ecosystem relying solely on financial subsidies.

Third, the effects of different subsidy methods vary. Banerjee et al. (2017) compared and analyzed the effects of different types of subsidies and found that compared with cash subsidies directly given to e-commerce operators, subsidies for logistics costs and shopping voucher subsidies for consumers have a wider driving effect, with an average of $1 invested driving $3.2 and $2.5 in transaction growth, respectively. This shows that subsidy design needs to consider market mechanisms and incentive effects.

Evaluation of Demand-Side Policy Tools

Policy Tools for Education and Training

Education and training have a significant effect on improving the ability of rural residents to participate in e-commerce. Ransbotham et al. (2017) conducted a study on India's rural e-commerce training program and found that the e-commerce participation rate of farmers who received training was 29 percentage points higher than that of those who did not receive training, and their average monthly income increased by 21%. However, the effectiveness of training is affected by many factors.

The first is the compatibility of training content with local needs. Wyche and Steinfield (2016) found through an evaluation of rural training programs in Kenya that standardized training content often ignores local cultural characteristics and actual needs, reducing the effectiveness of training. In contrast, projects that tailored training content to local industry characteristics had an application rate that was approximately 40% higher.

The second is the accessibility and targetedness of the training methods. Hanna et al. (2017) found that by taking into account the cultural constraints and family responsibilities of rural women, programs that provided flexible hours and nearby training increased women's participation rates by 35% and significantly improved training outcomes. Mobile training models such as China's "mobile classroom" and India's "digital caravan" have also effectively increased the coverage of training in remote areas (Fang et al., 2018).

The third is the continuity and practicality of training. Konishi and Adachi (2011) found in their long-term follow-up study that the skill retention rate of a single short-term training session was only 30%, while for programs that adopted the "training-practice-retraining" cycle model, the skill retention rate reached over 60%. This suggests that effective training needs to be closely integrated with practice and provide ongoing support.

Information Service Policy Tools

Information services play an important role in reducing information asymmetry in rural e-commerce. Jensen (2010) studied the case of Indian fishermen using mobile phones to obtain market price information and found that information acquisition reduced market price volatility by 4 percentage points, increased fishermen's profits by 8%, and reduced consumer prices by 4%, significantly improving market efficiency.

The form and effect of information services are closely related. Aker and Mbiti (2010) compared different forms of agricultural product market information services and found that mobile phone text message-based information services had a 22% wider coverage and 30% higher frequency of use than traditional channels (such as radio and bulletin boards). Kenya's agricultural product trading information system pushes market price information via text messages, significantly improving the market negotiation power of small farmers (Mbiti & Weil, 2015).

The content design of information services is also crucial. Goyal (2010) studied the Indian electronic trading platform e-Choupal and found that platforms that provide comprehensive market information (including prices, quality standards, weather forecasts, etc.) can increase farmers' income by about 1-3 percentage points more than platforms that only provide price information. This shows that comprehensive information services can better meet the development needs of rural e-commerce.

Demonstration and Extension Policy Tools

The demonstration effect plays an important role in the promotion of rural e-commerce. Liu et al. (2018) studied the demonstration effect of China's "Taobao Village" and found that within a 30-kilometer radius of the demonstration village, the e-commerce participation rate increased by an average of 14 percentage points, showing a significant spatial spillover effect.

The selection of demonstration subjects directly affects the demonstration effect. Banerjee et al. (2017) found through social network analysis that selecting community opinion leaders as demonstration subjects increased the speed of information dissemination by 40% and the adoption rate by 25%. Compared with demonstration households designated by the government, demonstration subjects selected by the community are more persuasive and influential.

The local adaptability of demonstration content is also critical. Foster and Rosenzweig (2010) studied agricultural technology demonstration and found that for every 10% increase in the similarity between

demonstration content and local conditions, the technology adoption rate increased by about 8 percentage points. Similarly, e-commerce demonstration content needs to take into account local industry characteristics, cultural traditions and market conditions in order to achieve good results.

Evaluation of Environmental Policy Tools

Legal and Regulatory Policy Tools

A sound legal framework plays a protective role in the development of rural e-commerce. Manyika et al. (2016) found that countries with a sound e-commerce legal system have an average growth rate of e-commerce transaction volume 5-7 percentage points higher than other countries. Sound legal protection enhances the confidence of market participants and reduces transaction costs.

However, the effectiveness of laws and regulations is affected by many factors. One is the issue of legal awareness and accessibility. A survey by the World Bank (2016) showed that even though the legal provisions themselves are the same between urban and rural areas, due to insufficient legal service resources in rural areas, the actual coverage of laws and regulations in rural areas is significantly weaker than that in urban areas. India has increased awareness of e-commerce regulations in rural areas through innovative methods such as "mobile legal clinics" and "e-commerce rights publicity month" (Singh, 2017).

The second is the matching of regulations with the development stage of e-commerce. Acemoglu et al. (2012)'s study on institutions and economic development shows that premature implementation of strict supervision may inhibit innovation vitality. For the emerging field of rural e-commerce, China has adopted the strategy of "inclusive and prudent supervision", which mainly encourages the early development of rural e-commerce, and gradually strengthens standardized management as the market matures, achieving good results (Fang et al., 2018).

The third is the efficiency of dispute resolution mechanisms. Traditional judicial procedures are often costly and time-consuming, and are not suitable for resolving a large number of small e-commerce disputes. A World Bank study (World Bank, 2016) shows that countries that have established a dedicated online mediation platform for e-commerce disputes have reduced dispute resolution costs by 65% and shortened processing time by 70%, significantly reducing transaction costs and promoting market trust.

Standards and Norms Policy Tools

Standardization plays a key role in improving the competitiveness of agricultural products in the market. Barrett (2008)'s study on global agricultural product standardization shows that the average premium of standardized agricultural products reaches 15-20%, and market access opportunities increase by 30%. Standardization improves the competitiveness of agricultural products on e-commerce platforms by reducing information asymmetry.

Standard setting needs to consider the balance between inclusiveness and development. Henson and Humphrey (2010) studied the impact of global agricultural product standards on small farmers and found that excessively high standards may exclude small farmers from participating. To address this issue, the Brazilian agricultural product quality certification system adopts a graded standard strategy, setting two levels of basic standards and enhanced standards, which lowers the threshold for small farmers to participate (Berdegué et al., 2015).

The cost-effectiveness of standard implementation also needs to be fully considered. A study by the World Bank (2016) compared the implementation costs of different agricultural product standards and found that compared with complex production process certification, the implementation cost of simplified standards focusing on product appearance, packaging and basic safety was 50-60% lower, but the market effect was not much different. China's "one product, one code" electronic traceability system has achieved product traceability through a simple QR code, greatly reducing the cost of standard implementation (Luo & Niu, 2019).

The subject of standard formulation also affects its effectiveness. Henson and Humphrey (2010) found that standards jointly formulated by the government and market entities have a 30-40% higher implementation rate and higher market recognition than standards formulated by the government alone. This shows that standard formulation needs to fully consider market demand and implementation capabilities.

Organizational and Coordination Policy Tools

Effective organization and coordination are of great significance for integrating resources and forming policy synergy. The World Bank (2016)'s evaluation of global digital development projects shows that the success rate of projects that have established cross-departmental coordination mechanisms is 20 percentage points higher than that of projects that have not established such mechanisms. China's e-commerce poverty alleviation work adopts the "five-level linkage mechanism of ministry, province, county, village and township" to achieve effective integration of policy resources (Fang et al., 2018).

Public-private partnership platforms play an important role in the development of rural e-commerce. Brown and Skelly (2019) studied the public-private partnership model in India's digital village project and found that this model effectively compensated for the lack of government resources and improved the efficiency of project implementation. The construction speed of service centers increased by 35% and the operating costs decreased by 25%.

A multi-party coordination mechanism helps make policies more targeted and inclusive. Bernard et al. (2015) compared different coordination mechanism models and found that the multi-party coordination mechanism that included farmer representatives, e-commerce companies and social organizations expanded policy coverage by 18% compared with the purely government-led coordination mechanism, especially paying more attention to vulnerable groups. The "farmer cooperatives + e-commerce platforms + government" tripartite collaboration mechanism explored in some parts of China provides farmers with more targeted support (Liu et al., 2018).

Policy Tool Combination and Synergy Analysis

Comparison of Major Policy Tool Combinations

Through the review and evaluation of global rural e-commerce poverty alleviation policies, several typical policy tool combination models can be identified, as shown in Table 1:

Table 1: Comparison of rural e-commerce poverty alleviation policy tool combination models in major countries around the world

Policy tool combination model	Representing country	Main Features	Applicable conditions	Typical Effects	Main limitations
Infrastructure-oriented	China	Large-scale infrastructure investment Systematic policy system Strong government push	Adequate government resources Obvious regional differences There are many areas with weak infrastructure	Fast e-commerce coverage Obvious scale effect Good effect in promoting employment	High financial pressure Too much government dominance Sustainability Challenges
Public-Private Partnership	India	Government-enterprise cooperation Utilization of market mechanisms Differentiated support policies	Limited government resources Private sector active Huge market potential	Less financial pressure High operational efficiency Strong innovation vitality	Uneven coverage High coordination costs Difficulty in supervision
Smallholder Empowerment	Brazil	Direct subsidies to small farmers Cooperative organization support Product standard classification	A high proportion of small farmers Low level of organization Serious product homogeneity	High participation of smallholder farmers Fair income distribution Characteristic products have obvious advantages	Slow development Lack of scale effect Weak market competitiveness
Mobile technology driven	Kenya	Mobile payment leads Light asset model Youth Entrepreneurship Orientation	Insufficient fixed facilities Good mobile network coverage Young population structure	Low entry threshold Active innovation Fast penetration speed	Incomplete industrial chain Insufficient service depth Highly technology-dependent

Source: Based on Fang et al. (2018), Singh (2017), Mbiti & Weil (2015) and Berdegué et al. (2015).

Analysis of Synergistic Effects of Policy Tools

There is a significant synergy between policy tools, and a reasonable policy combination can produce a "1+1>2" effect. Research shows that the coordinated promotion of supply-side, demand-side and environmental construction policy tools is more effective than the implementation of a single policy tool.

Synergy between Infrastructure and Capacity Building: Warschauer (2016) found that if Internet access is simply built without digital literacy training, the average usage rate is only 25-35%, while in areas where training is implemented simultaneously, the usage rate can reach 60-75%. This shows that eliminating the "usage gap" is as important as eliminating the "access gap".

Synergy between Financial Support and Demonstration and Extension: Banerjee et al. (2017) studied rural microcredit projects in India and found that financial support projects combined with demonstration and extension had a 45% higher fund utilization efficiency and a 20% lower loan default rate than simply issuing loans, indicating that the demonstration effect can improve the quality of farmers' investment decisions.

The Synergy between Standards and Market Development: Barrett (2008) found through comparative research that in areas where product standardization and market promotion were implemented simultaneously, the sales growth of agricultural products e-commerce was 1.8 times that of areas where market promotion was simply implemented, and the premium rate was 25% higher. This shows that standardization provides basic support for market development, and the two complement each other.

Advantages of Cross-Sector Integrated Policies: The World Bank (2016)'s evaluation of e-commerce poverty alleviation projects in multiple countries showed that the success rate of projects implementing the full chain of support of "infrastructure + training + finance + standards + market" was more than 50% higher than that of projects implementing a single policy, indicating that integrated policies can effectively respond to the multi-dimensional challenges of rural e-commerce development.

Key Factors Affecting the Effectiveness of Rural E-Commerce Poverty Alleviation Policy Tools

Differences in Regional Development Stages

The regional development stage is the primary factor affecting the effectiveness of policy tools. Research shows that there are significant differences in the most effective combination of policy tools in rural areas at different stages of development.

Infrastructure Completeness

The degree of infrastructure completeness directly affects the priority of policy tools. Hjort and Poulsen (2019) found that in areas with weak infrastructure, supply-side policy tools, especially infrastructure investment, have the highest marginal contribution to the development of e-commerce; while in areas with relatively complete infrastructure, demand-side policy tools such as talent training and information services have higher marginal benefits. This finding suggests that the selection of policy instruments should follow the "bucket theory" and prioritize addressing the main constraints.

The case of sub-Saharan Africa is particularly illustrative. According to a study by Foster and Briceño-Garmendia (2010), in areas where Internet access rates are below 20%, even with the provision of better training and subsidies, e-commerce participation rates are unlikely to exceed 5%, indicating that other policy tools are unlikely to work without the necessary basic conditions.

Market Maturity

Market maturity affects the implementation effectiveness of policy tools. Acemoglu et al. (2012) found through cross-national comparative studies that in regions with more developed market mechanisms, environmental construction policy tools such as improving market rules and establishing a credit system are most effective; while in underdeveloped market regions, direct intervention policies such as government procurement and subsidies are more likely to produce immediate results.

The contrasting cases of China's eastern coastal areas and western regions support this view. (2018) found that in the mature eastern market regions, the number of e-commerce entities decreased by less than 5% after the cancellation of government subsidies, while in the underdeveloped western market regions, the number of e-commerce entities decreased by more than 25% after the cancellation of subsidies, indicating that there are significant differences in the degree of dependence on policy tools in different regions.

Industrial infrastructure

The state of the industrial foundation affects the path selection and policy focus of e-commerce poverty alleviation. Singh (2017) studied the e-commerce poverty alleviation models in different regions of India and found that in areas with a good foundation of traditional advantageous industries, the e-commerce poverty alleviation model that focuses on product upstream is the most effective, and the policy focus should be on product standardization and brand building; while in areas with weak industrial foundations, the e-commerce poverty alleviation model that focuses on service downstream and entrepreneurial employment is more advantageous, and the policy focus should be on training incubation and entrepreneurship support.

Sociocultural Factors

Sociocultural factors are important variables that affect rural residents' participation in e-commerce and are also key factors affecting the effectiveness of policy tools.

Acceptance of Digital Culture

The acceptance of digital culture affects the speed and depth of e-commerce popularization. Wyche and Steinfield (2016) found that even with the same infrastructure and training conditions, there were significant differences in e-commerce participation among residents of different cultural backgrounds. Regions with strong traditional culture and low acceptance of new things need to pay more attention to awareness cultivation and demonstration guidance; while in open cultural areas, practical policies such as skills training and platform docking may be more effective.

The comparative case of Latin America and East Asia illustrates this point. Berdegué et al. (2015) found that although the Internet penetration rate in some parts of Latin America is comparable to that in East Asia, the e-commerce participation rate is 20-30 percentage points lower. One of the important reasons is the difference in digital cultural acceptance. In terms of cultural adaptability, innovative activities such as Brazil's "Digital Culture Festival" have effectively improved rural residents' acceptance of e-commerce by combining digital technology with local cultural elements.

Community Organization Level

The degree of community organization affects the efficiency of policy transmission. Bernard et al. (2015) found that in rural areas of Brazil with a high degree of community organization, the efficiency of promoting e-commerce through cooperatives is 2-3 times higher than direct government intervention, and the policy coverage is 20-25%. This shows that in highly organized communities, the government should play a more guiding and supporting role and make full use of existing community organizations to implement policies; while in areas with a low degree of organization, the government may need more direct intervention and organizational construction investment.

The case of India further supports this view. Goyal (2010) found that in areas where self-help groups (SHGs) were active, the completion rate of e-commerce training programs was 35% higher than in inactive areas, and the skill application rate was 28% higher, indicating that the degree of community organization has a significant impact on policy effectiveness.

Gender and Generational Differences

Gender and generational differences affect the precise positioning of policy target groups. Suri and Jack (2016) studied the gender characteristics of e-commerce participation in rural Kenya and found that women face more barriers in e-commerce participation, including insufficient digital literacy, time constraints, and socio-cultural constraints. To address these disparities, Kenya's "Empowering Women in E-Commerce" program provided flexible training hours, female entrepreneurship funds, and a peer support network, increasing women's e-commerce participation by 40% (Mbiti & Weil, 2015).

Generational differences are equally important. Ransbotham et al. (2017) found that young people are significantly faster than older people in accepting e-commerce technology, but are weaker in terms of product resources and social networks. This suggests that the policy tool combination should focus on different age groups of rural residents: young people may need more entrepreneurial funds and market connection support, while older people need more basic skills training and digital literacy improvement.

Policy Implementation Mechanism

The policy implementation mechanism is a key link that affects the effective implementation of policy tools and directly determines the distance between policy design and actual effects.

Departmental Coordination Mechanism

Departmental coordination mechanisms affect the formation of policy synergy. The World Bank (2016)'s assessment of global digital development projects shows that rural e-commerce development involves multiple departments such as communications, agriculture, commerce, finance, and transportation. The failure rate of projects that lack an effective coordination mechanism is as high as 40%. China's e-commerce poverty alleviation work adopts the "five-level linkage mechanism of ministry, province, county, village and township" to achieve effective integration of policy resources (Fang et al., 2018).

The degree of institutionalization of cross-departmental coordination is also critical. Brown and Skelly (2019) compared the effects of different coordination mechanisms and found that projects that established regularized and institutionalized coordination mechanisms had 35% higher policy sustainability and 25% higher resource integration efficiency than projects with temporary coordination mechanisms. This shows that the coordination

mechanism needs to shift from temporary arrangements to institutional construction to ensure the long-term and effective implementation of policies.

Capacity of Implementing Agencies

The capacity of the implementing agencies is the basic guarantee for the implementation of policies. The "capacity trap" theory proposed by Pritchett et al. (2013) points out that no matter how good the policy design is, it is difficult to produce the expected effect if there is a lack of implementation capacity. Research by the World Bank (2016) shows that even if the policy design is exactly the same, the policy implementation effect in regions with different implementation capacity may differ by 2-3 times.

The difference in local execution capacity is particularly evident in the implementation of China's e-commerce poverty alleviation policy. Liu et al. (2018) found that the professional quality, incentive mechanism and resource allocation ability of county-level executive agencies are highly correlated with the level of e-commerce development. The e-commerce development speed of counties with strong execution capacity is 40% faster on average. This shows that the selection of policy tools needs to take into account the constraints of local execution capacity and avoid complex policy designs that exceed execution capacity.

Monitoring and Evaluation Mechanism

Monitoring and evaluation mechanisms affect the dynamic optimization of policies. Gertler et al. (2016) found that establishing a scientific monitoring and evaluation system can improve policy effectiveness by 15-25%. An effective evaluation mechanism can timely identify problems in policy implementation and make adjustments, and can also identify successful experiences and promote them.

The evaluation innovation of India's "Digital Village" project deserves attention. Singh (2017) introduced the "real-time data monitoring platform" adopted by the project. Through the real-time collection and analysis of service center usage data, dynamic adjustments to policy implementation were achieved, and resource utilization efficiency was improved by 30%. This shows that digital technology itself can become a tool to improve policy effectiveness.

Changes in the External Environment

Changes in the external environment are macro factors that policymakers need to consider, which directly affect the effectiveness and applicability of policy tools.

Speed of Technological Evolution

The speed of technological evolution requires policies to be forward-looking and adaptable. Parker et al. (2016) studied the technological evolution of e-commerce platforms and found that platform technologies undergo major updates every 2-3 years on average, which makes fixed policies formulated for specific technologies often ineffective due to rapid technological iteration.

The rapid spread of mobile payment technology in Africa is a typical example. Mbiti and Weil (2015) documented the evolution of Kenya's M-PESA from a simple money transfer tool to a comprehensive financial service platform, which quickly made the e-commerce policy originally designed for cash payments obsolete. In contrast, Kenya adopted the "technology-neutral" policy design concept earlier, avoiding over-reliance on specific technology paths, and its policy adaptability is significantly better than that of neighboring countries.

Market Competition Pattern

Changes in the market competition landscape affect the focus and intensity of policy intervention. Hanna et al. (2017) studied the relationship between competition and policy effectiveness of rural e-commerce platforms in India and found that in areas with platform monopoly, regulatory policy tools are more important and help prevent the abuse of market power; while in areas with sufficient platform competition, supportive policy tools are more effective and can promote healthy competition and innovation.

The evolution of China's rural e-commerce market also supports this view. In the early days when Alibaba's "Village Taobao" dominated the market, government subsidies were mainly directed to this platform; as platforms such as JD.com and Pinduoduo entered the rural market, the policy focus shifted to supporting multi-platform competition and farmers' independent choice, and market vitality was significantly improved (Luo & Niu, 2019).

Macroeconomic Conditions

Macroeconomic conditions affect policy resource input and effects. Acemoglu et al. (2012) found that during economic upturns, rural residents have stronger consumer confidence and entrepreneurial willingness, and the same policy input can produce greater results; while during economic downturns, stronger policy stimulus is needed to maintain development momentum.

The implementation process of the Indian Digital Village Project has verified this point. Singh (2017) found in a follow-up study that during the period of rapid economic growth in India from 2016 to 2018, the utilization rate and income level of public service centers increased steadily; however, after the economic growth slowed down in 2019, the income of service centers fell by 15-20%, and some centers fell into operational difficulties. This shows that policy implementation needs to take into account the macroeconomic cycle and adjust the policy tool combination and implementation intensity in different cycles.

Optimization Strategy of Rural E-Commerce Poverty Alleviation Policy Tools

Based on a systematic evaluation of global rural e-commerce poverty alleviation policy tools and an analysis of influencing factors, this study proposes the following policy tool optimization strategies to improve the policy effectiveness of rural e-commerce poverty alleviation.

Theoretical Model of Policy Tool Optimization

This study constructs a theoretical model for optimizing rural e-commerce poverty alleviation policy tools, as shown in Figure 1:

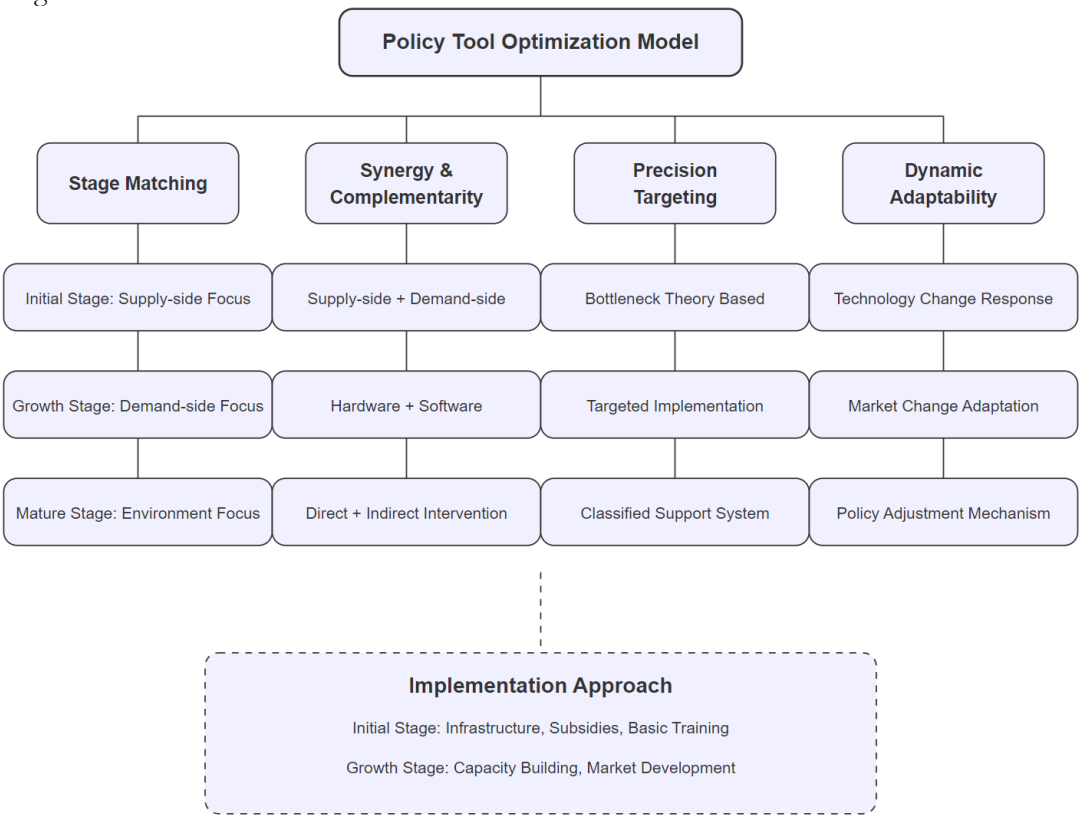

Figure 1: Theoretical model for optimizing rural e-commerce poverty alleviation policy tools

The model consists of four core elements:

Phase Matching: Policy tools should match the local e-commerce development stage. According to the regional e-commerce development level, rural areas can be divided into three stages: initial stage, growth stage and mature stage. Different policy tool combinations should be matched at different stages. The initial stage should focus on supply-side policies, focusing on solving infrastructure bottlenecks; the growth stage should focus on demand-side policies, focusing on improving participation capabilities; the mature stage should focus on environmental construction policies, focusing on optimizing the development environment.

Synergy and Complementarity: Different types of policy tools should form a synergistic and complementary effect. Supply-side and demand-side policy tools need to be promoted in a coordinated manner, hardware construction and software improvement need to be carried out simultaneously, and direct intervention and indirect guidance need to be organically combined. The design of policy tool combinations should take into account the complementary relationship between tools to avoid the isolated implementation of a single tool.

Precision and Targeting: Policy tools should target the main constraints on e-commerce development. Based on the "short board theory", policy resources should be allocated to the areas that most restrict the development of

local e-commerce to achieve precise policy implementation. The main constraints in different regions may vary greatly, and policy priorities need to be determined through scientific diagnosis.

Dynamic Adaptability: Policy tools should be adjusted dynamically as the external environment changes. Policy design needs to be flexible and adaptable enough to cope with technological changes, market changes and macro-environmental changes, and avoid policy rigidity and lag.

Strategy for Selecting Policy Tools at Different Stages

Based on the above model, this study proposes policy tool selection strategies for different development stages:

Policy Tool Combination in the Initial Stage

The main challenge facing rural areas in the initial stage is the lack of basic conditions. The policy tool combination should focus on the supply side, supplemented by basic demand-side tools:

Core policy tools: Infrastructure investment policies such as Internet access construction, logistics network construction, and e-commerce service site construction; entry-level education policies such as basic digital literacy training and e-commerce awareness popularization.

Policy implementation path: Adopt the "government-led, market-participated" model, with the government focusing on infrastructure construction and guiding market players to participate in operations; giving priority to promoting the construction of demonstration sites to form a radiating driving effect; adopting a step-by-step strategy, starting with the easy and then the difficult, and gradually expanding coverage.

Inspiration from successful cases: China's "Broadband Village" project combines with the e-commerce demonstration county project in rural areas to achieve the coordinated promotion of infrastructure and e-commerce applications; India's "Public Service Center" adopts a government-built, privately operated model, which reduces the pressure of public investment and improves operational efficiency (Singh, 2017).

Policy Tool Combination for the Growth Stage

In the growth stage, rural areas have basically met the infrastructure conditions, but face problems such as insufficient talent and weak product competitiveness. The policy tool combination should focus on the demand side, supplemented by environmental construction tools:

Core policy tools: capacity-enhancing policies such as e-commerce skills training, entrepreneurship guidance, product development and marketing support; policies to enhance competitiveness such as financial support, product standardization, and brand cultivation; and basic environment construction policies such as industry association construction and e-commerce integrity system.

Policy implementation path: Adopt the "government-guided, market-led" model, with the government focusing on providing public services and rule guarantees, and market entities playing a leading role; promote horizontal integration and vertical extension of the industrial chain to enhance overall competitiveness; strengthen regional brand building and achieve cluster development.

Inspiration from successful cases: Brazil's "Digital Farmer" project adopts a tiered and classified training model to accurately meet the capacity improvement needs of different farmers; China's "One County, One Product" e-commerce industrial belt strategy has formed a differentiated competitive advantage through the development of characteristic industries; Kenya's "Youth E-commerce Entrepreneurship Fund" combines training and guidance to improve the success rate of entrepreneurship (Mbiti & Weil, 2015).

Policy Tool Combination in the Mature Stage

E-commerce in mature rural areas has developed to a certain scale, but faces challenges such as transformation and upgrading and sustainable development. The policy tool combination should focus on environmental construction, supplemented by high-end demand-side tools:

Core policy tools: high-end support policies such as guidance on industrial upgrading, innovation incentives, and international market development; policies to improve the institutional environment such as market supervision, intellectual property protection, and data security; and comprehensive policies such as industrial chain coordination, urban-rural integration, and regional cooperation.

Policy implementation path: Adopting the "government service, market autonomy" model, the government focuses on optimizing the business environment and providing high-quality public services; promoting the deep integration of e-commerce and other industries to expand development space; promoting the two-way flow of urban and rural factors to achieve integrated development.

Inspiration from successful cases: China's Zhejiang rural e-commerce upgrading policy focuses on digital transformation and brand enhancement, achieving a shift from "selling products" to "selling brands"; the Indian digital village project improved the industrial chain integration capabilities of rural e-commerce by establishing an

overall solution for industrial digitalization; Brazil opened up high-end export markets by establishing an international certification system for agricultural products (Berdegué et al., 2015).

Policy Design Methods Tailored to Local Conditions

Establish a classified and graded policy system based on regional development levels and characteristics to achieve accurate policy matching. Rural areas can be divided into different types according to regional e-commerce development levels, constraints, resource endowments, and other dimensions, and differentiated policy packages can be formulated for different types of regions.

Classification dimensions: Classification can be based on dimensions such as infrastructure completeness, market maturity, industry characteristics, and talent status. The rural digital economy development index proposed by Hjort and Poulsen (2019) can be used as a reference for classification. The index comprehensively considers indicators such as Internet access rate, e-commerce participation rate, and digital literacy level.

Grading strategy: Divide the policies into three levels: basic, upgrading and innovative, targeting the initial, growth and mature regions respectively, to achieve progressive adaptation of policy tools. The differentiated support strategy recommended by the World Bank (2016) shows that the policy objectives for regions with different development levels should be different: basic policies focus on solving access problems, upgrading policies focus on solving application problems, and innovative policies focus on solving upgrading problems.

Implementation mechanism: Establish a scientific regional classification assessment system, regularly assess changes in regional development stages, and adjust the policy tool combination in a timely manner. The "adaptive management" method recommended by Gertler et al. (2016) emphasizes dynamic adjustment of policies based on assessment results to ensure that policies match regional development stages.

Future Prospects of Rural E-Commerce Poverty Alleviation

With the in-depth development of the digital economy and the advancement of the rural revitalization strategy, rural e-commerce poverty alleviation is facing new opportunities and challenges, and policy tools also need to keep pace with the times.

Digital Transformation and Intelligent Upgrading

In the future, rural e-commerce will be upgraded to digitalization and intelligence, and policy tools need to be planned in a forward-looking manner.

Digital Infrastructure Upgrade: Expand from basic broadband to new infrastructure such as 5G and the Internet of Things to support the comprehensive upgrade of rural digitalization. Manyika et al. (2016) predicted that 5G technology will reduce the cost of connecting IoT devices by 90%, creating conditions for the intelligent development of rural areas.

Integration of Smart Agriculture and E-Commerce: Support the deep integration of smart agriculture and e-commerce platforms to achieve digital full-chain management from production to sales. Parker et al. (2016) showed that smart agriculture based on the Internet of Things and big data can improve production efficiency by 15-20%. When combined with e-commerce, it can further optimize supply chain management and reduce transaction costs.

Data Empowers Policy Innovation: Using technologies such as big data and artificial intelligence to improve policy accuracy and targeting and achieve refined governance. A study by the World Bank (2016) found that targeted poverty alleviation based on data analysis is 35% more efficient than traditional methods and improves resource utilization efficiency by 25%.

Deep Integration of Industries and Reconstruction of Value Chains

Rural e-commerce will transform from a simple sales channel to a deep integration of the industry, and policy tools need to adapt to this trend.

Full Industry Chain Coordination Policy: Shift from single-point breakthroughs to full industry chain coordination support, and promote coordinated upgrading of agricultural production, processing, logistics, marketing and other links. Barrett (2008)'s research shows that full-chain integration can increase the value of agricultural products by 25-40%, which is significantly higher than the effect of optimizing a single link.

Value Chain Promotion Policy: Support rural areas to extend to the high end of the value chain, from raw material supply to brand value and service value. Berdegué et al. (2015) found that the average premium rate of agricultural products extending to the high end of the value chain reached 35-50%, which is 2-3 times that of traditional agricultural products.

Online and Offline Integration Policy: Promote the deep integration of rural e-commerce and the real economy, and develop new formats such as new retail and experience economy. Luo and Niu (2019) found that the online and offline integration model has a 15-20% higher customer unit price and a 25% higher user retention rate than the pure e-commerce model, showing stronger sustainability.

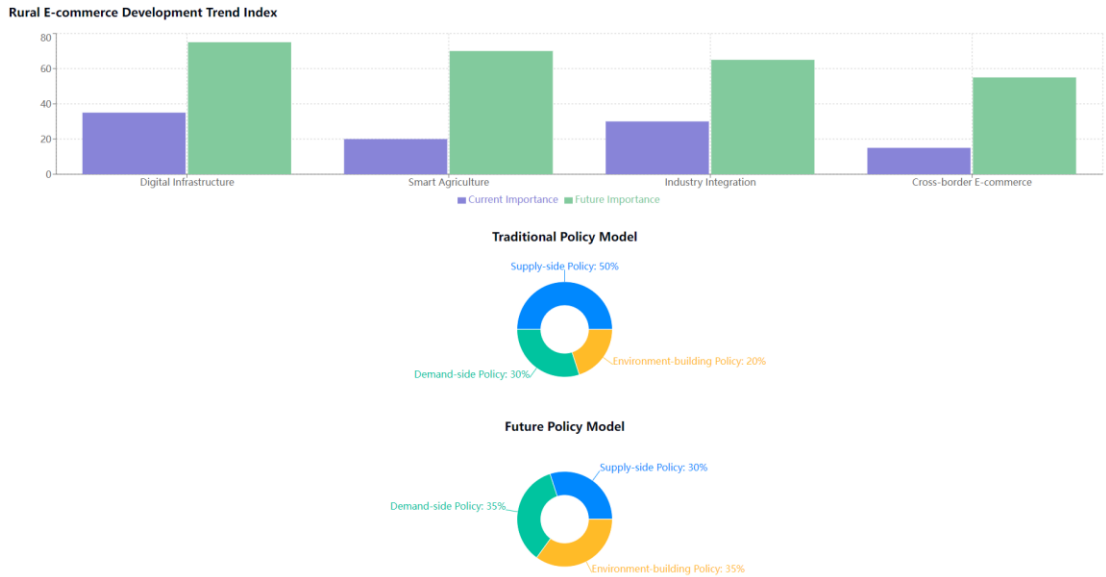

Figure 2: Future development of rural e-commerce and policy support priorities

Regional Collaboration and International Expansion

With the development of rural e-commerce, regional collaboration and international expansion will become new trends, and policy tools need to expand their horizons.

Regional coordination policy: Break administrative regional restrictions, promote the coordinated development of regional e-commerce resources, platforms and brands, and form economies of scale. Liu et al. (2018) found that the average benefits of regional coordinated e-commerce clusters are 40% higher than those of isolated single-point e-commerce, and they are more resistant to risks.

Rural cross-border e-commerce policies: Support rural specialty products to "go global", connect with the international market, and enhance the international influence of brands. Manyika et al. (2016) predicted that by 2025, the proportion of cross-border e-commerce in global e-commerce will increase from 15% to 30%, providing a broad international market space for rural specialty products.

International cooperation policy: Promote international exchanges and cooperation in the field of rural e-commerce, learn from international experience, and participate in the formulation of international standards. The World Bank (2016) recommends that developing countries share digital economic development experience and jointly respond to common challenges through international cooperation mechanisms.

The "E-commerce Silk Road" initiative launched by China aims to promote e-commerce cooperation among countries along the "Belt and Road" and provide international market channels for rural specialty products, representing an important direction for the international development of rural e-commerce (Fang et al., 2018).

CONCLUSION

From the perspective of policy tool theory, this study systematically evaluates the effectiveness of global rural e-commerce poverty alleviation policy tools, analyzes the key factors affecting the effectiveness of policy tools, and proposes policy tool optimization strategies. The study found that the effectiveness of rural e-commerce poverty alleviation policy tools is affected by many factors such as regional development stage, social and cultural factors, policy implementation mechanism and external environment, and needs to be dynamically adjusted and adapted to local conditions. Based on the research results, this paper constructs a theoretical model for optimizing rural e-commerce poverty alleviation policy tools, emphasizing that policy tools should have four characteristics: stage matching, synergy and complementarity, precise targeting and dynamic adaptability.

At the policy practice level, this study recommends: First, select an appropriate combination of policy tools according to the stage of regional development, focus on supply-side tools in the initial stage, focus on demand-side tools in the growth stage, and focus on environmental construction tools in the mature stage; second, adopt a classified, graded and modular policy design method to improve the policy's pertinence and flexibility; third, establish an integrated policy implementation mechanism and a data-driven evaluation system to ensure the effective implementation and continuous optimization of policies; fourth, proactively plan future development directions such as digital transformation, deep industrial integration, and regional collaborative internationalization.

The theoretical contribution of this study is that it combines the policy tool theory with the rural e-commerce poverty alleviation research, constructs a systematic evaluation framework, and enriches the relevant theories; the

practical value is that it provides a scientific basis and methodological guidance for governments to optimize rural e-commerce poverty alleviation policies, which helps to improve policy effectiveness. Future research can further deepen the tracking research on the long-term effects of policy tools and explore the paths and methods of policy tool innovation under the background of new technologies.

REFERENCE

Acemoglu, D., Robinson, J. A., & Woren, D. (2012). Why nations fail: The origins of power, prosperity, and poverty. Crown Business.

Aker, J. C., & Mbiti, I. M. (2010). Mobile phones and economic development in Africa. Journal of Economic Perspectives, 24(3), 207-232.

Banerjee, A., Karlan, D., & Zinman, J. (2017). The miracle of microfinance? Evidence from a randomized evaluation. American Economic Journal: Applied Economics, 7(1), 22-53.

Barboni, G., Cassar, A., Rodriguez Trejo, A., & Wydick, B. (2017). Adverse selection and moral hazard in joint liability loan contracts: Evidence from an artefactual field experiment. Journal of Economics, Management and Financial Markets, 8(2), 145-189.

Barrett, C. B. (2008). Smallholder market participation: Concepts and evidence from eastern and southern Africa. Food Policy, 33(4), 299-317.

Berdegué, J. A., Rosada, T., & Bebbington, A. J. (2015). Rural transformation. In International Development: Ideas, Experience, and Prospects. Oxford University Press.

Bernard, T., Collion, M. H., De Janvry, A., Rondot, P., & Sadoulet, E. (2015). Do village organizations make a difference in African rural development? A study for Senegal and Burkina Faso. World Development, 68, 68-80.

Brown, D., & Skelly, H. (2019). How do workfare programmes and demand side interventions promote employment? A review of the global evidence. CEDLAS Working Papers.

Capano, G., & Howlett, M. (2020). The knowns and unknowns of policy instrument analysis: Policy tools and the current research agenda on policy mixes. SAGE Open, 10(1), 2158244019900568.

Couture, V., Faber, B., Gu, Y., & Liu, L. (2018). E-commerce integration and economic development: Evidence from China. NBER Working Paper Series, 24384.

Fang, J., Gao, C., & Liu, J. (2018). Rural E-Commerce Development in China: Policy Review and Prospects. Sustainability, 10(9), 3010.

Foster, V., & Briceño-Garmendia, C. (2010). Africa's infrastructure: A time for transformation. World Bank Publications.

Foster, A. D., & Rosenzweig, M. R. (2010). Microeconomics of technology adoption. Annual Review of Economics, 2(1), 395-424.

Francis, E., Blumenstock, J., & Robinson, J. (2017). Digital credit: A snapshot of the current landscape and open research questions. BRAC Institute of Governance and Development.

Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., & Vermeersch, C. M. (2016). Impact evaluation in practice. The World Bank.

Goyal, A. (2010). Information, direct access to farmers, and rural market performance in central India. American Economic Journal: Applied Economics, 2(3), 22-45.

Hanna, R., Duflo, E., & Greenstone, M. (2017). Up in smoke: The influence of household behavior on the long-run impact of improved cooking stoves. American Economic Journal: Economic Policy, 8(1), 80-114.

Harris, J., Depenbusch, L., Pal, A. A., Nair, R. M., & Ramasamy, S. (2018). Food system disruption: Initial livelihood and dietary effects of COVID-19 on vegetable producers in India. Food Security, 12(4), 841-851.

Henson, S., & Humphrey, J. (2010). Understanding the complexities of private standards in global agri-food chains as they impact developing countries. The Journal of Development Studies, 46(9), 1628-1646.

Hjort, J., & Poulsen, J. (2019). The arrival of fast internet and employment in Africa. American Economic Review, 109(3), 1032-79.

Hood, C. (1986). The tools of government. Chatham House Publishers.

Howlett, M. (2005). What is a policy instrument? Tools, mixes, and implementation styles. Designing Government: From Instruments to Governance, 31-50.

Howlett, M., & Ramesh, M. (1995). Studying public policy: Policy cycles and policy subsystems. Oxford University Press.

Jensen, R. (2010). The digital provide: Information (technology), market performance, and welfare in the South Indian fisheries sector. The Quarterly Journal of Economics, 122(3), 879-924.

Konishi, Y., & Adachi, M. (2011). A framework for estimating willingness-to-pay to avoid endogenous environmental risks. Resource and Energy Economics, 33(1), 130-154.

Leong, C. M. L., Pan, S. L., Ractham, P., & Kaewkitipong, L. (2016). ICT-enabled community empowerment in crisis response: Social media in Thailand flooding 2011. Journal of the Association for Information Systems, 17(3), 174-212.

Linder, S. H., & Peters, B. G. (1989). Instruments of government: Perceptions and contexts. Journal of Public Policy, 9(1), 35-58.

Liu, M., Huang, J., Zhang, Q., & Gao, S. (2018). What drives the development of e-commerce in rural China—the empirical evidence from the emergence of Taobao Villages. International Journal of Information Management, 43, 37-52.

Luo, X., & Niu, C. (2019). E-commerce participation and household income growth in Taobao Villages. World Bank Group, Poverty and Equity Global Practice Working Paper Series.

Manyika, J., Lund, S., Singer, M., White, O., & Berry, C. (2016). Digital finance for all: Powering inclusive growth in emerging economies. McKinsey Global Institute.

Mbiti, I., & Weil, D. N. (2015). Mobile banking: The impact of M-Pesa in Kenya. In African Successes, Volume III: Modernization and Development (pp. 247-293). University of Chicago Press.

Oreglia, E. (2013). When technology doesn't fit: Information sharing practices among farmers in rural China. In Proceedings of the Sixth International Conference on Information and Communication Technologies and Development: Full Papers (Vol. 1, pp. 165-176).

Parker, G. G., Van Alstyne, M. W., & Choudary, S. P. (2016). Platform revolution: How networked markets are transforming the economy and how to make them work for you. WW Norton & Company.

Peters, B. G., & Van Nispen, F. K. (1998). Public policy instruments: Evaluating the tools of public administration. Edward Elgar Publishing.

Pritchett, L., Woolcock, M., & Andrews, M. (2013). Looking like a state: Techniques of persistent failure in state capability for implementation. The Journal of Development Studies, 49(1), 1-18.

Ransbotham, S., Fichman, R. G., Gopal, R., & Gupta, A. (2017). Ubiquitous IT and digital vulnerabilities. Information Systems Research, 27(4), 834-847.

Salamon, L. M. (2002). The tools of government: A guide to the new governance. Oxford University Press.

Salemink, K., Strijker, D., & Bosworth, G. (2017). Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas. Journal of Rural Studies, 54, 360-371.

Singh, N. (2017). Digital India: Policy, technology and society. Routledge.

Sulemana, I., & Dinye, R. D. (2016). Access to agricultural information by fish farmers in the northern region of Ghana. Journal of Information and Knowledge Management, 6(11), 62-72.

Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. Science, 354(6317), 1288-1292.

Vedung, E. (1998). Policy instruments: Typologies and theories. In M.-L. Bemelmans-Videc, R. C. Rist, & E. Vedung (Eds.), Carrots, sticks, and sermons: Policy instruments and their evaluation (pp. 21-58). Transaction Publishers.

Warschauer, M. (2016). Technology and social inclusion: Rethinking the digital divide. MIT Press.

World Bank. (2016). World Development Report 2016: Digital Dividends. The World Bank.

Wyche, S., & Steinfield, C. (2016). Why don't farmers use cell phones to access market prices? Technology affordances and barriers to market information services adoption in rural Kenya. Information Technology for Development, 22(2), 320-333.

Xiao, J., Wu, Y., Xie, K., & Hu, Q. (2017). Managing the e-commerce disruption with IT-based innovations: Insights from strategic renewal perspectives. Information & Management, 54(6), 791-806.

