

## Research Article

# Construction of Rural E-Commerce Logistics Service Quality Evaluation System and IoT Applications under the Background of New Retail

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How to build a quality evaluation system for local e-commerce logistics services has been studied against the backdrop of new retailers, and how to evaluate the quality of logistics services has been standardized by updating the quality control mode for local e-commerce logistics services will be done. An evaluation index and a nearby e-commerce logistics service quality evaluation system have been established. Finally, according to the survey, the proposed quality evaluation system for local e-commerce logistics services is highly practical, enabling faster logistics transportation while minimizing usage, and the quality of local e-commerce logistics services can be effectively improved.

## 1. Introduction

Rural e-commerce, as an emerging business form, has penetrated the entire process of the agricultural industry chain and gradually changed the development mode of China's rural economy and the way farmers produce and live, thanks to the influence of the rural revitalization strategy and targeted poverty alleviation policies. With the increasing growth of rural e-commerce, it is also confronted with rural logistics issues [1]. Rural e-commerce logistics face problems such as poor distribution paths, lack of professionals, few service outlets, and high costs, despite the government's constant proposals to vigorously build the infrastructure to promote the development of rural e-commerce. Faced with the characteristics of immense land, sparse populace, and scattered dispersion in rural areas, rural e-commerce logistics face problems like unfortunate dissemination way, absence of professionals, few service outlets, and significant expense. The problem with the "Last One Mile" so far is that express delivery is concentrated in the countryside, reducing the difficulty of e-commerce [2, 3]. In that case, investigating the quality of local e-commerce logistics services is theoretical

and feasible. This paper introduces the Kano model into research on the quality of local e-commerce logistics services, identifies the main influential variables of the quality level of local e-commerce logistics services, obtains sample information through research, and provides fact-finding tools. It is used to measure local electronic rating systems for the quality of logistics services in commerce and finally makes relevant suggestions to promote further improvements in the quality of logistics services in local e-commerce.

Mobile terminals, such as smartphones, have gotten more and more sophisticated and full as the Internet has grown and gained popularity. Based on the historical context of this time period, e-commerce has developed quickly and taken up a substantial portion of the market economy. The theoretical framework they present will assist businesses and individuals in better comprehending the elements that influence customer happiness. Based on the findings of research on domestic and international logistics service quality assessment indicators, they constructed logistics satisfaction evaluation indicators using relevant e-commerce enterprises as samples. After the Internet, the Internet of Things (IoT) is another emerging field of science and technology [4].

## 2. Evaluation System of Rural E-Commerce Logistics Service Quality

**2.1. Rural E-Commerce Logistics Service Quality Management Model.** A rural e-commerce logistics distribution model is built based on the characteristics and procedure of rural e-commerce logistics, as shown in Figure 1.

The process of the model mainly includes villagers log in to the online e-commerce platform, browse goods, and place orders with e-commerce sellers according to their preferences [5]. After the e-commerce sellers process the orders, they notify the third-party logistics or express companies to solicit goods. Third party logistics and express companies send goods to supermarket pick-up points, rural urban logistics centers, and local shuttle buses according to their own distribution network [6]. Villagers can pick up goods from designated supermarket pick-up points, or pick up goods from passenger shuttle bus parking points, or the dispatchers of each village pick up the goods at their own charge from the urban logistics center, and the village dispatchers will send them to the villagers' homes. This can not only improve the delivery efficiency but also save costs.

Many factors influence the quality of rural e-commerce logistics services, including national rules and regulations, the macro market environment, and the amount of industry development [7]. In addition, the quality of logistics services is directly influenced by the company and its clients. This article employs causal analysis to investigate the factors that influence the quality of rural e-commerce logistics services. The shape of the image is shown in Figure 2.

The figure shows that the logistics service quality of rural e-commerce is influenced by three key variables: logistics firms, e-commerce enterprises, and customers. The following is a detailed examination of these three variables [8]. This study builds a quality indexing system for local e-commerce logistics services based on the SERVQUAL scale and LSQ model dimensions and indexing framework, while the logistics service quality assessment dimensions come from different sectors and customer groups. On the one hand, when customers shop through the e-commerce platform, they can reach customers only through such links as buyers placing orders, sellers processing orders and entrusting orders to third-party logistics, logistics companies collecting goods, distribution, and buyers signing in [9]. To define the precise metrics and dimensions, the features, procedures, and outcomes of rural e-commerce logistics should be completely studied. Then again, there are numerous issues that influence the quality of rural e-commerce logistics service that should be evaluated not simply from the viewpoint of e-commerce businesses, yet according to the perspective of e-commerce businesses, logistics businesses, and customers as a whole.

**2.2. Evaluation Index of Rural E-Commerce Logistics Service.** Due to the different importance of each component, we use analytical hierarchies to assign different weights to each aspect while investigating the factors that affect the quality of logistics services in local e-commerce [10]. First, drivers are categorized into hierarchical groups based on primary,

secondary, and dependency. Experts assess the variables that determine the quality of rural e-commerce logistics service on a level battleground, based on their relative importance. The biggest eigenvalue and corresponding eigenvector of the judgement matrix are obtained when the judgement matrix is constructed using the scaling procedure of 19 and its reciprocal [11, 12]. After normalisation, it is the weight of an index of a level to a relevant index of the previous level. The weight of the primary index is recorded as  $a_{i1}, a_{i2}, \dots, a_{ij}$ , and the weight of the secondary index is recorded as follows:

$$A_i = E(a_{i1}, a_{i2}, \dots, a_{ij}), i, j = 1, 2, \dots, n, \quad (1)$$

where  $a$  is the order of the judgement matrix. Let the evaluation object evaluate according to the  $i$ -th factor  $u$  in the factor set  $u$ , and the membership degree of the  $j$ -th element  $i, j$  in the evaluation set  $E$  is  $R_i$ , then the evaluation result of  $u$  can be expressed by fuzzy set.  $r_{i1}, r_{i2}, \dots, r_{in}$  single factor fuzzy evaluation refines the evaluation unit to each factor  $u$  to reflect the impact of different levels of single factors on the evaluation object. Through the sorting and statistics of the survey results, the single factor fuzzy evaluation matrix is obtained

$$R_i = \begin{bmatrix} r_{i11} & r_{i12} & \dots & r_{i1n} \\ r_{i21} & r_{i22} & \dots & r_{i2n} \\ \dots & \dots & \dots & \dots \\ r_{im1} & r_{im2} & \dots & r_{imn} \end{bmatrix}, \quad (2)$$

where  $R_i$  is the number of elements in the evaluation index set and is the number of elements in the evaluation set  $S$ . The calculation formula of single factor fuzzy evaluation is as follows:

$$B_i = SA_i * R_i = S(a_{i1}, a_{i2}, \dots, a_{im}). \quad (3)$$

From the overall perspective, the comprehensive impact of various  $b$  factors on the overall evaluation object is considered. The comprehensive evaluation model is as follows:

$$B = SA * R = S(a_1, a_2, \dots, a_m) = B_i(b_1, b_2, \dots, b_n). \quad (4)$$

This paper means to improve and construct a pointer system for assessing the quality of neighborhood e-commerce logistics, with the relevant literature of existing studies on assessing the quality of logistics services and the characteristics of nearby e-commerce logistics services. Consider the influential factors uses the dimensional framework for services SERVQUAL and LSQ models from the consumer's point of view, convenience of service, service reliability, and distribution timeliness are the major indicators. The secondary indicators for customer care, service economy, and safety guarantee, as shown in table, contain 23 items such as convenient service station transportation, convenient payment method, convenient return and exchange, and convenient receipt method (Table 1).

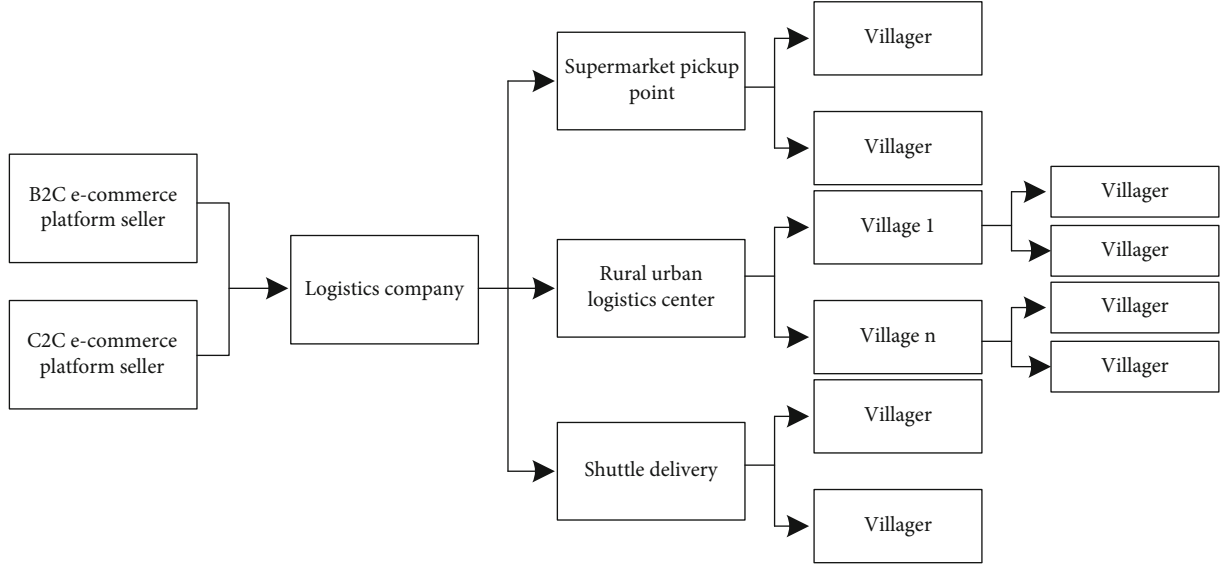


FIGURE 1: Rural e-commerce logistics distribution model.

Data consistency, timeliness, integrity, and accuracy are all terms used to characterize data consistency, timeliness, integrity, and accuracy. Because B2C e-commerce is conducted entirely online, assuring information quality is the most crucial and fundamental requirement. In this study, the term “information quality” refers to supplying customers with complete, accurate, reliable, real-time, and timely logistics data. Merchants collaborate with logistics providers during the return procedure. The B2C platform allows customers to apply for a refund online [13]. Consumers can choose to return the goods personally, or logistics service professionals can collect them from their homes. Consumers can use the website platform to get additional information about logistics and the location of their purchases, as well as to assess the return process. As a result, for return reverse logistics service [14], data is basic. In this article, the LSQ model’s data quality component is kept, and four signs are listed: completeness of logistics data, reliability of logistics data, timeliness of logistics data, and timeliness of refund data. Table 2 shows a description of informative markers.

Index weight refers to the importance of the measured index in the whole. The whole is regarded as 1. The weight of the index is quantified according to the proportion, expressed in decimal, which is called “weight coefficient” [15, 16]. Expert scoring method and analytic hierarchy process are common weight measurement methods, but these methods are highly subjective. The methods to determine the weight using data include factor analysis [6] and linear regression. In this chapter, the weight is computed using the confirmatory factor analysis approach in a structural equation model. As per the primary equation model, the consider load the reverse logistics service quality evaluation model represents the relationship between each dimension and service quality. A large burden coefficient indicates that this variable generally affects service quality. As a result, by normalising the factor load, the index weight in the structural equation model can be derived. Table 3 shows the index weight after normalisation.

The weight of communication quality index is shown in Table 4.

At present, the widely used service quality evaluation models mainly include perceived service quality model, PZB ERV qual evaluation model, and server evaluation model. In this paper, SERVPERF evaluation model  $S_{is}$  is used to evaluate the service quality, and the indexes are weighted. SERVPERF evaluation model can directly take the consumer perception data as the reference, that is, the consumer score as the reference basis to evaluate [17].  $T$  is divided into  $N$  dimensions to measure the perceived service quality of reverse logistics. The service perception performance score of consumers on several dimensions determines the service quality of each dimension. The score of each dimension can be calculated by using SERVPERF evaluation model according to the formula.

$$E_d = \frac{1}{\alpha} - \text{Te} \sum_{m=1}^j S_{is} B_i, \quad (5)$$

where  $\alpha$  is the number of indicators in the dimension,  $e$  is the average perceived reverse logistics service performance of each indicator  $M=1, 2 \dots, n$ . In the dimension, and the calculation formula is as follows:

$$S_{ty} = \frac{1}{E_d s_n} (M_1 + M_2 + \dots + M_n), \quad (6)$$

where  $E_d$  is the score of the  $n$ -th sample and  $s_n$  is the number of samples. Due to the different importance of different indicators contained in each dimension, the importance of dimensions is also different [18]. Therefore, when analyzing the service quality,  $\mathcal{W}_{ts}$  is necessary to weight the perceived score value of reverse logistics, set it as the weight of  $J$  indicator in indicator  $I$  and  $S_{tz}$  as the weight of the  $t$  dimension.

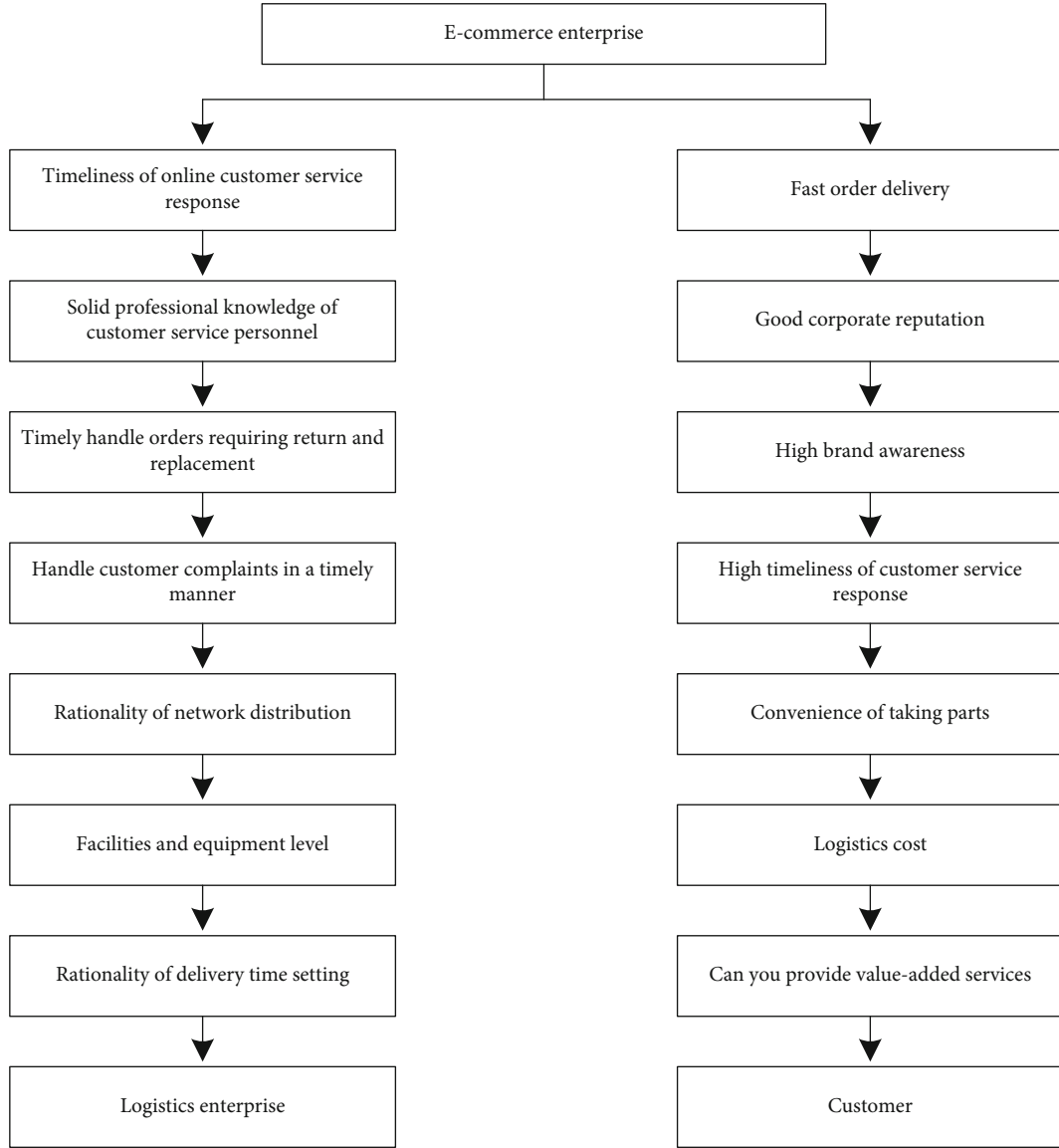


FIGURE 2: Causal analysis of rural e-commerce logistics service quality.

The score of each dimension is as follows:

$$B_1^1 = \sum_{m=1}^{f=1} S_{tz} S_{ty} = \mathcal{W}_{ts}. \quad (7)$$

In the LSQ model, according to the indicators of “personnel communication quality” in the ordering process of the first stage, indicators such as “employee service attitude,” “timeliness of response of online customer service personnel,” “customer service personnel actively inquire about customer needs,” and “uniform and formal dress of service personnel” can be set. According to the “order release quality” indicator, you can set the “order delivery timeliness” indicator [19]. According to the “information quality” indicators, indicators such as “logistics information query convenience” and “online displayed logistics information is accurate” can be set. In the LSQ model, according to the

“timeliness” index in the receiving process of the second stage, the “order response time (from placing an order to confirming receipt time)” index can be set. For the order accuracy indicator, you can set the arrival accuracy indicator. The “goods integrity” indicator can be set up for the “goods integrity” indicator [20]. Indicators such as “goods damage and loss handling speed” and “timeliness of customer complaint processing” can be configured according to the “error handling” index. Finally, according to the meaning of the index in the LSQ model, the characteristics of rural e-commerce logistics service quality, the materialness of the process and results, suitable for the evaluation of rural e-commerce logistics service quality, including “employee service attitude,” the process and results are suitable for the evaluation of rural e-commerce logistics service quality, including “employee service attitude.” “Timely response of online customer service personnel” and “actively inquire about customer needs” 12 markers, including the

TABLE 1: Rural e-commerce logistics service index system.

Target	Primary index	Secondary index
Rural e-commerce logistics service quality	Service convenience	Convenient transportation
		Convenient payment method
		Convenience of return and exchange
	Service reliability	Cargo integrity
		Packaging and distribution of goods in a proper logistical manner
		Delivery information that is accurate
		Correctness of arrival
	Delivery timeliness	Order processing in time
		Update logistics tracking information timely
		Customer service answered promptly
	Customer care	Timely handling of return and replacement
		Service attitude of distribution personnel
		Arrival call or SMS reminder
	Service economy	Proactively remind inspection
		Reasonable distribution charges
		The cost of return and replacement is reasonable
	Security assurance	Clear logistics distribution charges
		Personal privacy protection
		Consignee identity verification

TABLE 2: Description of informative indicators.

Dimension	Index	Indicator description
Information quality	Availability of logistics information	Consumers can directly query the return logistics information from B2C shopping websites without querying through third-party channels
	Logistics information reliability	The return logistics information provided by B2C platform is accurate
	Timeliness of logistics information	Consumers can view the logistics status of returned and exchanged goods through the website. The real-time logistics information reflects the good data connection between B2C enterprises and cooperative logistics enterprises
	Timeliness of refund information	The merchant shall timely feedback the goods information to the consumer

TABLE 3: Weight of five dimensions.

Dimension	Factor load	Weight
Communication quality	0.76	0.205
Informative	0.79	0.231
Return processing quality	0.83	0.197
Convenience	0.68	0.175
Empathy quality	0.75	0.192
The sum	3.81	1.000

TABLE 4: Weight of communication quality indicators.

Dimension	Factor load	Weight
PQ1	0.89	0.189
PQ2	0.92	0.205
PQ3	0.90	0.198
PQ4	0.90	0.205
PQ5	0.91	0.203
The sum	4.52	1.000

implication, logistics appropriation model, characteristics, and effect of rural e-commerce logistics service quality. As a result, the relevant indicators of rural e-commerce logistics service quality developed in this work should be used in tandem with the theoretical research as described [15, 21–23]. According to the rural e-commerce logistics distribution network's somewhat defective qualities, as well as if there

are village level service stations or centralised service stations in rural areas. Indicators such as “distribution network distribution” and “ease of goods return and exchange” can be used to determine whether a community has a village level service network. According to the characteristics of backward rural consumption concept and doubts about online shopping, indicators such as “helping rural residents buy

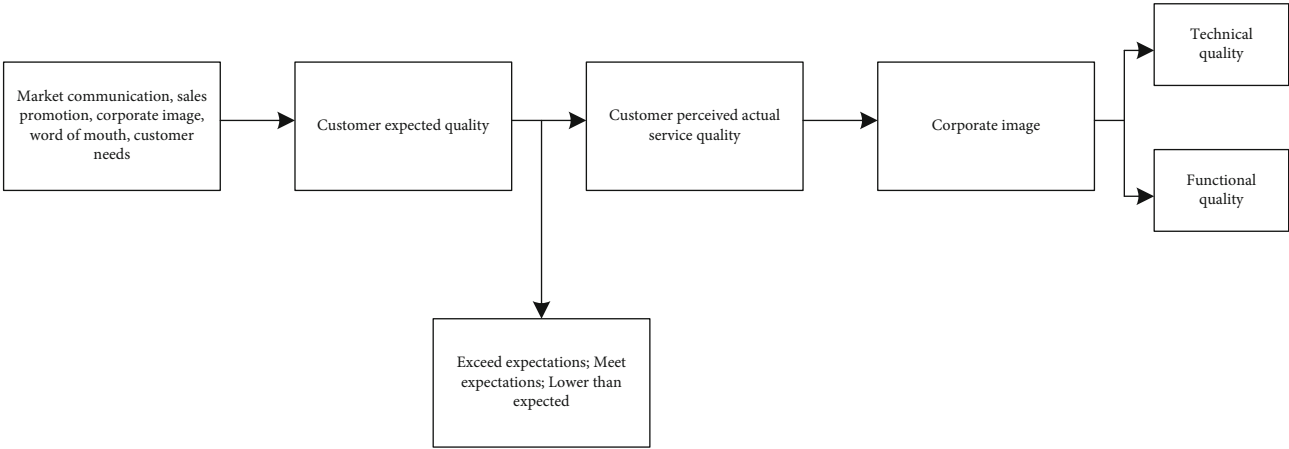


FIGURE 3: Customer perceived service quality model.

TABLE 5: Relationship between relevant theories of rural e-commerce logistics and evaluation indicators in this paper.

Dimension	Index
Service convenience	Cash on delivery, convenience of return and exchange, reasonable delivery time, and convenient distribution mode
Service responsiveness	---
Service reliability	---
Service care	After arrival, the customer shall pick up the goods in time and take the initiative to remind the consumer to inspect the goods first
Service economy	Help rural residents buy and sell value-added services online, express logistics service prices to rural areas, and reasonable transportation modes from logistics to rural areas

TABLE 6: Initial evaluation index system of service quality of county-level rural e-commerce public service centers.

Dimension	Index	Specific description of indicators
Convenience	Service coverage	The functional services provided can be popularized to township and village levels
	Timely provision of services	Timely provision of functional services
	Degree of convenience	Convenience of service location
	Resource integration capability	Training, platform, marketing, and other services to achieve effective docking in logistics and finance
	Availability of information	It can provide relevant information on policy and industry market changes, and there are many ways to obtain information
Reliability	Training effectiveness	Training services help to cultivate talents for corresponding posts
	Origin and effectiveness of agricultural products	Effectiveness of quality inspection of local agricultural products
	Technical support	Provide a variety of mobile systems to enhance the user experience
	Policy guidance	Provide detailed guidance on government policies
Applicability	Applicability of service content	Focus on providing functional services for operators with different needs
	Applicability of service mode	Acceptability and comprehensibility of service provision
Guarantee	Service care	Pay attention to the interests and future development of service objects
	Punctuality	Provide services on time as promised
	Perceived trust of services	Service object's trust in the accepted
Quality of service personnel	Service personnel image	The service personnel dress appropriately and have a good image
	Service attitude	The service room has a good attitude and patiently solves emergencies
	Interaction of service process	Good two-way interaction



TABLE 7: Explanation of B2C e-commerce logistics service quality evaluation dimensions.

Evaluating indicator	Meaning
Economy	Is the charge for providing logistics services to customers reasonable
Empathy	Whether it can provide personalized service for customers and whether the process and results of providing personalized service for customers meet customer requirements
Reliability	Whether the goods are intact and the quantity is correct in the process of providing logistics services to customers
Timeliness	Can customers choose the receiving method according to their own design needs, and whether the commodity distribution is timely
Convenience	Can customers choose the receiving method according to their own design needs
Interactivity	Whether logistics data is visible, and whether clients can receive commodity logistics data in a timely, accurate, and detailed manner.

TABLE 8: Evaluation index system and test methods.

Inspection target	Using SPSS functions	Objective
Frequency analysis	Frequencies	Frequency distribution of effective samples
Correlation analysis	Vicaffeix	Correlation of judgement indicators
Factor analysis	Factor	Judge the fitting degree of data and index system
Half reliability	Reliability	Analysis index stability and reliability
Validity analysis	Reliability	Verify the accuracy and reliability of the system
Regression analysis	Regression	Determine dimensions and indicator weights

TABLE 9: Logistics convenience Cronbach's before purification  $\alpha$  coefficient table.

Cronbach's alpha	Reliability statistics	Number of items
	Cronbach's alpha based on standardized terms	
.920	.908	8

and sell value-added services online" and "cash on delivery" can be designed. According to the characteristics of rural residents' life and irregular work and rest time, the following can be designed: "Rationality of pickup and delivery time setting." According to the indicators, logistics personnel are required to confirm whether the villagers are at home and what time they are at home before delivery. According to rural areas, many towns and villages have express outlets, but not all express companies have outlets in each town and village. Only round express service outlets, only Zhongtong express service outlets, and only postal services are available in some villages. It is critical to give rural e-commerce customers with alternate express delivery options due to the unique characteristics of rural areas. The indicator of "convenience of distribution mode" is designed. According to the characteristics of many villagers in rural areas who have low education, cannot read text messages, are older, and cannot read words clearly, the indicators of "notify customers to pick up the goods after arrival" and "actively remind consumers to check the goods first" and other indicators because the return and exchange time in rural areas is relatively long, such as trying on clothes first, fitting them, and signing in after they like them, which greatly improves

the service satisfaction of rural e-commerce consumers. In rural areas, the oral communication effect is quite strong, which effectively boosts the reputation and reputation of rural firms, which is the foundation for ongoing development in rural areas.

**2.3. Optimization of Rural E-Commerce Logistics Service Evaluation System.** This work brings the quality of service of local e-commerce logistics to various dimensions by proposing a SERVQUAL scale and LSQ model based on a PZB mixture that fully describes the characteristics, processes, and results of local e-commerce, and thoroughly investigate from the level, logistics is integrated. The gap model of customer perception evaluates service quality by comparing the difference between customer perception and customer expectation. Use  $p$  to represent customer expectation and  $e$  to represent customer perception. When  $p < e$ , it is the service quality that surprises customers. When  $p = e$ , it is the service quality that makes customers satisfied. When  $p > e$ , it is the service quality that disappoints customers. The gap model has an important impact. It conducts an in-depth investigation of the service quality process, recommending that businesses pay attention not just to service results but also to the manner in which services are delivered. Figure 3 depicts a customer-perceived service quality model.

The process affecting logistics service quality is divided into three parts, as shown in the diagram: ordering, receiving, and subjective satisfaction with logistics service quality. The first stage is when clients place their orders online. This stage does not include customers' perceptions of product quality, but rather customer perceptions of service quality, such as professional knowledge, service attitude, and online response timeliness of e-commerce sellers' customer service

TABLE 10: Overall correlation coefficient of logistics convenience before purification.

Result index	Scale mean of deleted items	Item total statistics			Cronbach's alpha value for deleted items
		Scale variance for deleted items	Corrected item total correlation	Square of multiple correlations	
Reasonable distribution of logistics distribution outlets	16.77	9.985	.568	.465	.765
Convenient payment method	15.65	6.988	.658	.598	.698
Convenient logistics information tracking and query	15.65	8.685	.698	.698	.698
Convenience of return and exchange	16.52	8.658	.598	.598	.699
The pick-up and delivery time is set reasonably	15.32	9.985	.165	.236	.799
The delivery method is convenient	15.85	7.625	.698	.7695	.698

TABLE 11: Emotional analysis results of B2C e-commerce logistics service quality.

Emotional label dimension	E	D	C	B	A	Total
Economy	3658	215	109	49	269	4300
Empathy	116528	1168	358	150	3025	121229
Reliability	38655	1325	623	285	1855	42743
Timeliness	195826	6589	3568	958	5682	212623
Convenience	136586	1824	505	218	1058	140191
Interactivity	3954	65	80	39	650	4788

personnel, ordering information quality, and order delivery timeliness. The second stage is the goods receiving stage. At this stage, customers will perceive whether the goods received are accurate and intact, and the length of time they receive the goods. The second stage is the customer's perception of the logistics service quality related to product quality, timeliness, and product integrity in the first two stages and the remedial ability after errors, which determines the customer's satisfaction level with the logistics service quality of the enterprise. Due to the unique characteristics of rural logistics, it is critical for third-party logistics businesses and express companies to make full use of rural idle logistical resources in order to lower the cost of express delivery to rural areas. In rural locations, logistics organizations can construct a county rural integrated logistics distribution network by using passenger buses, village convenience stores, and postal service outlets, which can significantly cut logistics costs. As a result, an index was created that "logistics of local transportation method is appropriate." In summary, there are 10 indicators based on the importance, characteristics, and influencing factors of logistics service quality in local e-commerce, such as "Cash on Delivery," "Distribution on Distribution Networks," and "Convenience of Returns and Exchanges," it will be created. The relationship between indicators and dimensions is shown in Table 5.

It can be seen from the table that rural e-commerce consumers care about service economy, service convenience, and service care, which shows that it is also a bad place for

e-commerce and logistics enterprises. Service responsiveness and service reliability are the most basic services of e-commerce logistics services, which are relatively mature. Therefore, the constructed dimensions and indicators are in line with the current situation. Based on previous research on the dimensions and contents of service quality evaluation in e-commerce, public services, and other industries, as well as the characteristics of region level rural e-commerce public service centers and the requirements of area level rural e-commerce public services, this paper summarizes five dimensions of service quality evaluation of district level rural e-commerce public service centers, top notch service personnel. Then, as shown in Table 6, 21 specific indicators are proposed, which together form the initial evaluation index system for the service quality of county-level rural e-commerce public service centers, based on the specific requirements of the Ministry of Commerce documents rural e-commerce service specifications (Trial) and rural e-commerce work guidelines (Trial).

The information quality index in LSQ model and the tangible index in SERVQUAL model are combined into the "interactivity" evaluation index. Interactivity refers to the information interaction between merchants and customers, that is, after customers buy goods on B2C e-commerce website, they can query the corresponding logistics information on the platform to understand the whole distribution process of goods accurately, in detail and in real time. For special situations in the process of logistics distribution, they can also be immediately transmitted to customers and coordinate communication to put forward solutions. Customers can also communicate with merchants to adjust distribution plans according to their own special situations. The real-time sharing of logistics information not only provides customers with the opportunity to supervise the whole distribution process but also improves customers' trust in the enterprise to a great extent. The dimensions of B2C e-commerce logistics service quality evaluation are shown in Table 7.

With the evolution of the times, although there are problems in rural logistics, the situation needs to be improved compared with the past. First of all, the popularity of



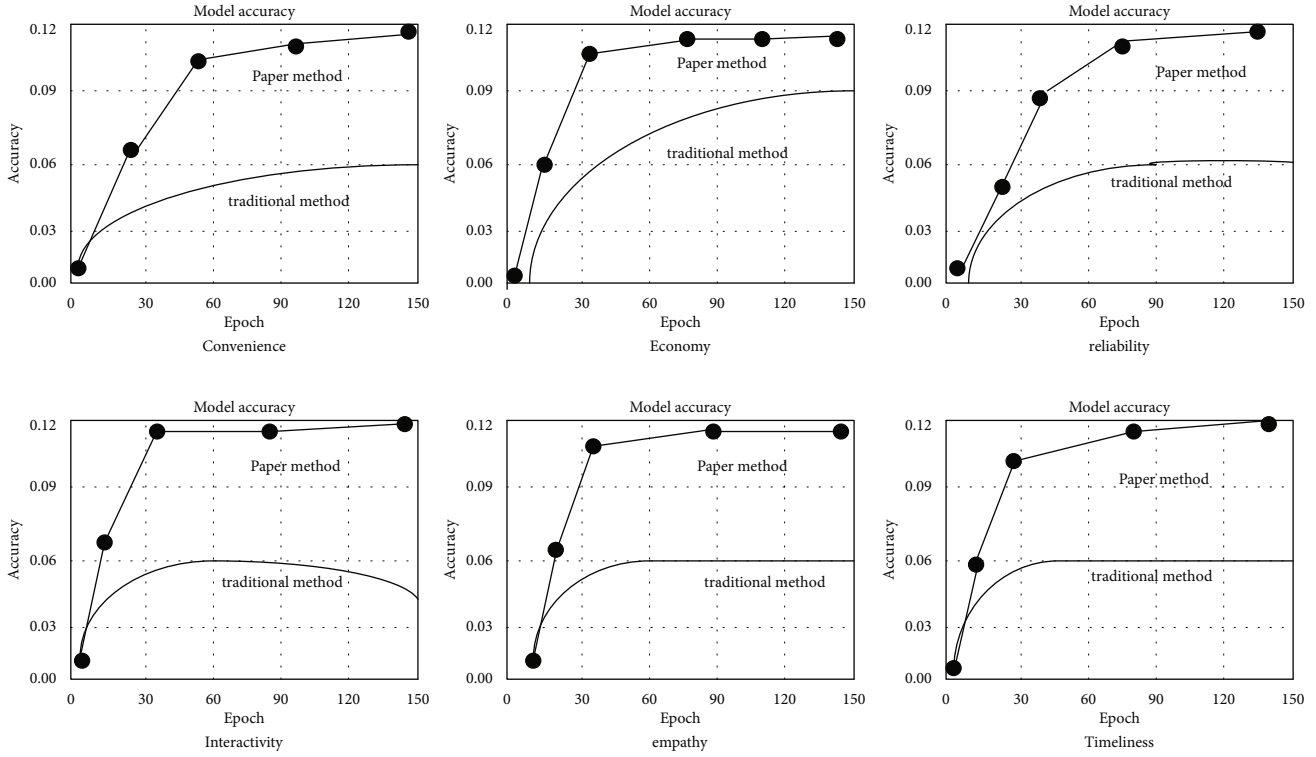


FIGURE 4: Comparison of test results.

intelligent machines has made the Internet popular. Under this background, people will gradually become interested in online shopping. At the same time, because the majority of rural families are in their late 1980s and early 1990s, their education levels are quite high, and they have a good ability to adopt new things, e-commerce has some room for growth in rural areas. The second is the national development of rural areas. For the needs of promoting the process of urbanization, many rural areas are not only roads but also other infrastructure has been further improved. Simultaneously, the growth of the logistics business and the popularity of online shopping have gradually raised the logistics industry's earnings. The original migratory workers will gradually shift their mindset from going out to work to looking for work locally in this situation. On the one hand, it strengthens the logistics ability, on the other hand, it also increases the local purchasing power, forming a virtuous circle. Finally, it is about the price of e-commerce. Many rural economies have a poor foundation. When buying, they will naturally prefer relatively cheap goods. In this aspect, e-commerce fully meets people's requirements, and low-cost consumer goods can help to raise local people's living standards and, to some extent, raise local living standards.

### 3. Analysis of Experimental Results

The preliminarily designed rural e-commerce logistics service quality index system 63 is tested using descriptive statistical analysis, overall project correlation analysis, reliability analysis, validity analysis, and regression analysis on the effective data. The inspection methods of the index system

are listed in the table. Table 8 shows the evaluation index system and test procedures.

Service convenience includes distribution network distribution, payment method convenience, logistics information tracking and query convenience, and return and exchange convenience. The correlation analysis of sample statistical data is carried out by software SPSS. The results are shown in Tables 9 and 10.

The Cronbach's  $\alpha$  coefficient of convenience is 0.810, except that the overall correlation coefficient of the index of rationality of pick-up and delivery time is less than 0.4. The overall correlation coefficient of the other five indicators is greater than 0.4. Therefore, A5 with correlation coefficient less than 0.4 is deleted according to the steps of indicator purification (the setting of pick-up and delivery time is reasonable). At the same time, reanalyze the correlation of other indicators after deleting this indicator. Cronbach's  $\alpha$  of service convenience is 0.858, which has increased, and the correlation coefficients of other indicators are greater than 0.4, so the purification process of service convenience can stop here.

The useful text of commodity comments is extracted, and the emotion classification experiment is carried out. Analyze the experimental results. The emotion classification results of each dimension of logistics comments are shown in Table 11.

It can be seen from the above results that the most concerned dimension of customers is timeliness, followed by convenience, empathy, and reliability. E-commerce platform shopping is different from physical shopping. Customers are very concerned about the length of time from placing an

order to the arrival of goods at the distribution location. Timeliness has become one of the most competitive dimensions among e-commerce enterprises. Through a series of work such as national self-built warehouses and optimizing network layout, the distance from the goods delivery point to the distribution point has been shortened to a great extent. The timeliness of goods in logistics distribution is improved, and on this basis, personalized services such as “today’s arrival” and “next day’s arrival” are proposed to improve customer satisfaction. Because the experimental data in this paper contains a large number of evaluation data of electrical products, compared with other products, the loading, unloading, and handling of electronic products need to be more cautious. At the same time, the installation process is also very complex. Customers will hope that logistics enterprises can truly deliver to the door. Therefore, customers pay more attention to the convenience and reliability of this kind of products. The accuracy curves of each evaluation dimension in the iterative process are further counted, as shown in Figure 4.

The accuracy value of each iteration result of the model in each dimension increases steadily until it reaches the maximum value and then tends to be flat without a noticeable fall point, as seen in the figure. Based on the aforementioned comparison test findings, it is easy to see that, when compared to previous techniques, the e-commerce logistics quality evaluation system suggested in this work has high practicability in practical application and fully fits the research objectives.

#### 4. Conclusion

E-commerce development in China is far from complete, particularly in rural areas. The state’s efforts to promote rural communities are expanding these days, resulting in a reduction of the gap between rural and urban areas. Under such a background, e-commerce logistics in rural areas must achieve quality service, take the free ride of policies and fully cover the rural market share. Only in this way can we deal with future opportunities and challenges and put ourselves in an invincible position.

#### Data Availability

The data used to support the findings of this study are included within the article.

#### Conflicts of Interest

The author declares that he has no conflicts of interest.

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