

Research Article

Mobile E-Commerce Information System Based on Industry Cluster under Edge Computing

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Mobile e-commerce is e-commerce implemented on mobile devices, such as mobile phones, and mobile Internet networks as we usually understand. With the rapid development of mobile electronic devices and mobile Internet networks, this new type of e-commerce field has gradually emerged. In the context of edge computing, this paper takes mobile e-commerce information system as the research object and aims to study the mobile e-commerce information system based on industry clusters under edge computing. First of all, this paper expounds the theory of industrial clusters and the manifestations of e-commerce industrial clusters, as well as the concept and technical framework of the Internet of Things, and proposes the order relationship analysis method and the fuzzy comprehensive evaluation method, and conducts experiments in the form of questionnaires. The experimental results show that, from the perspective of industrial integration, with a correlation coefficient of 0.687, there is a significant positive correlation between e-commerce information system and supply chain cooperation.

1. Introduction

Industrial clusters are an economic phenomenon common to all over the world. They are industrial clusters in which some related companies gather in specific geographical locations because of certain economic activities. The phenomenon of industrial agglomeration has a relatively long history. The phenomenon of foreign industrial agglomeration is based on the cotton spinning industry in Lancashire, England, the Detroit automobile manufacturing cluster in the United States, and the Gig High-Tech Industrial Park, which are in the early stages of industrialization [1]; The phenomenon of industrial agglomeration in this sense is based on the coastal areas after the reform and opening up, including the Yangtze River Delta, the Pearl River Delta, and other regions, forming an industrial agglomeration area with a relatively concentrated manufacturing industry. A large number of domestic and foreign research studies have

shown that enterprises in industrial clusters have obvious advantages compared with noncluster enterprises. The main manifestation is that enterprises in the cluster are highly competitive, develop faster, and have strong innovation capabilities. This is the so-called sum of parts is greater than the overall economic effect of the organizational structure. Enterprises in the industrial cluster have greatly reduced production costs, improved production efficiency, and at the same time reduced the risk of survival and greatly enhanced the core competitiveness of the market. In recent years, industrial clusters at home and abroad have developed rapidly, and diversified industrial clusters have spread all over the world, which have constituted the economic spatial structure of today's world development. At the same time, under the promotion and encouragement of the background of international organizations, the development strategy of industrial clusters is becoming a new trend and new driving force for the development of various countries. At present,

China's industrial clusters are in a stage of rapid development. Encouraging and promoting the development of industrial clusters is becoming a new model of regional economic development.

With the advancement of the Internet, China's mobile e-commerce information system industry has developed rapidly and has gradually become the backbone of promoting and accelerating the entire social and economic development. Mobile e-commerce information systems integrate and share local resources to allow industrial clusters to open up markets, respond reasonably quickly, facilitate knowledge dissemination and learning within clusters, and enable enterprises to collaborate with each other. In the rapid development of mobile e-commerce information system, in order to complement resources, online retailers will exhibit agglomeration in geographical locations. The agglomeration of mobile e-commerce information system has led to the emergence of a large number of mobile e-commerce information system industrial parks. The continuous growth of online sales has promoted the development of online retailers [2]. In order to complement resources and achieve a win-win situation, online retailers have gradually moved closer to the e-commerce industry. E-commerce industrial clusters are the future trend and are represented by e-commerce industrial parks. Currently, the oldest and most representative sectors are Hangzhou Internet Business Industrial Park, Guangzhou Huadu River E-Commerce Park, Bachelor's Degree Pioneer Park, and Quanzhou Internet Business Pioneer Park. Hangzhou Internet Entrepreneurship Industrial Park is also known as China's e-commerce industry base. The Hangzhou Pioneer Industrial Park gathers more than 100 e-commerce, e-commerce, and creative design companies every year. The total export value exceeds 10 billion yuan, which has driven the rapid growth of the regional economy. The e-commerce industry can not only promote regional economic growth, but also promote the upgrading and transformation of the industry and at the same time improve regional innovation opportunities and organizational competitive advantages. However, with the continued development of e-commerce industry clusters, many instability factors and enormous risks are also exposed. Therefore, studying and understanding the laws of development and change in e-commerce agglomeration and then scientifically predicting risk indicators of future development trends of industrial clusters are very important for the sound development of the e-commerce industry.

In recent years, the boundaries between e-commerce and social networks have become increasingly blurred. In his research, Zhao proposed a novel solution for cross-site cold-start product recommendation. The solution is designed to recommend products on e-commerce sites to users on social networking sites in a "cold-start" situation. This problem is true. It is rarely explored. The research

process uses recurrent neural networks to learn the feature representations of users and products from the data collected by e-commerce websites (referred to as user embedding and product embedding, respectively) and then applies an improved gradient boosting tree method to transform the user's social network functions into the user embedding to develop a feature-based matrix factorization method. This research can use the learned user embedding technology to recommend cold-start products, but the data set obtained in the experimental part of the research is not large enough to fully prove the effectiveness of the proposed framework [3]. In order to extract popular product attributes from product description pages from different e-commerce websites, Bing et al. developed an unsupervised learning framework. Unlike existing information extraction methods that do not consider the popularity of product attributes, the framework proposed in this paper can not only detect popular product features from customer reviews but also relate product attributes to these popular features. The novelty of this framework is that it can bridge the vocabulary gap between the text on the product description page and the text on the customer review. Although extensive experiments have been carried out in the experimental part of the study and the effectiveness of the framework has been proved, the effectiveness is not enough, and the robustness of the framework needs to be reflected [4]. Previous studies have found that trust plays an important role in shaping consumers' purchase intentions. Oliveira et al. have tested the path model empirically in their article so that Internet providers have appropriate solutions to increase trust. The path model presented in this article measures three main aspects of trust: competence, integrity, and tenderness. Then, they assessed the impact of consumer confidence overall. This article also analyzes the various sources of trust: consumer characteristics, company characteristics, website infrastructure, and the impact of consumer interaction on the scope of trust. The disadvantage of this study is that the sample data selected in the research process is not large enough, and the experimental results obtained cannot fully explain the problem [5].

The innovation of this article lies in the following: (1) in terms of evaluation method, it is different from the traditional quantitative evaluation method. Based on the analytic hierarchy process, the combination of order relation analysis and fuzzy comprehensive evaluation can reflect the problem more comprehensively. (2) Research on e-commerce constitutes a new driving force for economic development. This study further quantifies e-commerce, and based on its significant characteristics and advantages, the e-commerce application dimensions are integrated through three aspects: information integration, electronic transactions, and network communication capabilities. Through empirical analysis to study the relevance of e-commerce application and enterprise supply chain

collaboration, it provides new ideas for the research of enterprise supply chain collaboration management.

2. Research Methods of Mobile E-Commerce Information System Based on Industry Cluster under Edge Computing

2.1. Industrial Cluster Theory

2.1.1. The Concept of Industrial Clusters. Industrial clusters are economic trends. That is, many specific companies or industries are concentrated in a particular geographic location due to the relevant business connections and continuous integration of industrial capital elements in the geographic area [6, 7]. Industrial agglomeration was defined as an “industrial zone” in the early days, and it is now called an “industrial cluster.” There is no clear definition at present, and different researchers define the concept of industrial clusters from different perspectives [8], mainly introducing the representative research in different periods, as shown in Table 1.

In short, industrial clusters have gone through multiple stages, and each stage has its own unique properties and characteristics. Based on previous studies, the definition of industrial clusters can be unified as follows: companies or institutions in the same specific field, geographically. They are close to each other and they are related to each other. Due to some complementary and common characteristics, they are closely related to each other [9, 10]. Of course, not all industrial clusters have good results, and it is difficult to maintain long-term competitive advantages. When industrial clusters need to be transformed and upgraded, various risks may arise from the external environment and internal factors.

2.1.2. E-Commerce Industry Cluster. The theory of industrial clusters has been studied a lot and has been quite mature, and it has also been widely used in reality. E-commerce is a new type of industry that is developing rapidly and started late. Therefore, the application of agglomeration theory in the field of e-commerce is less [11]. With the rapid development of global e-commerce in recent years, various industries are presenting agglomeration, especially the online retail industry. At present, many cities in my country have established e-commerce industrial parks, gathered enterprises of a certain size, and integrated resources to promote mutual development [12, 13]. On the basis of studying the conditions for the formation of e-commerce service industry clusters, some scholars have found that e-commerce service industry clusters are a form which refers to a group of institutions or individuals and related companies that are geographically close to each other through the integration of their respective advantages, and the related legal person systems are mutually shared and complementary and jointly provide certain services to meet the needs of customers [14]. Some scholars have discovered in the study of Shanghai e-commerce industry clusters that the emergence of e-commerce industry clusters is due to a group of companies

that use the Internet as an operating platform, have a certain connection in business, and are mutually complementary and agglomerate on a geographic location or on a virtual platform [15]. A survey of the Wuhan e-commerce industry cluster found that the e-commerce industry cluster is a group company in a specialized field that uses the Internet as a platform for business activities [16, 17].

At present, there are few researches on e-commerce industry clusters at home and abroad, and it is necessary to apply the theory of industrial clusters to the e-commerce industry. Through the analysis of the definition of e-commerce industry cluster, it can be found that the e-commerce industry cluster mainly relies on the Internet platform, with online retailers as the main cluster in the entire e-commerce service enterprise industrial chain.

2.1.3. The Manifestation of E-Commerce Industry Clusters. E-commerce industrial clusters are mainly based on e-commerce as the main platform, through the combination of e-commerce and industrial clusters, to achieve the purpose of industrial cluster transformation and upgrading [18]. Due to regional and resource differences, the signs of industrial clusters are diversifying through four main formats: specialized market e-commerce platforms, online industrial belt models, e-commerce villages, and e-commerce industrial parks [19, 20].

2.1.4. Professional Market E-Commerce Platform. Professional market e-commerce platform refers to the transformation of the traditional market, with e-commerce as the core, and local companies to carry out e-commerce activities on this platform. In addition, there are some e-commerce organizations that can integrate e-commerce platforms to promote and connect with each other to establish a jointly developed e-commerce ecosystem.

2.1.5. Online Industry Belt Model. The online industry belt model is based on offline traditional markets and supported by online sites. By bringing together companies and products from characteristic industry belts, buyers can directly contact the supply of goods, reducing the cost of competition between enterprises and the threshold of e-commerce. This enhances the core development ability of the enterprise and strengthens the agglomeration effect of the industrial belt. Alibaba is such a model, a site that cooperates with local service providers. The online industry belt model can effectively gather industries and promote the growth of enterprises.

2.1.6. E-Commerce Village. The e-commerce village is based on the village as a basic unit based on a third-party open e-commerce platform, attracting local grassroots online merchants. It is the perfect combination of “countryside + e-commerce” [21, 22]. At present, my country’s third-party open e-commerce platforms are developing rapidly and are of various types. For example, JD.com, Taobao, Suning, etc. have been successful. This has also caused the differentiation

TABLE 1: Comparative analysis table of industrial clusters and related concepts.

Related concepts	Enterprise cluster	Industrial cluster	Industrial park	Block economy	Industrial clusters
Authoritative source	Qiu Baoxing “small business cluster research”	Weber’s “industrial location theory”	Marshall’s “principles of economics”	Fei Xiaotong “small city, big problem”	Michael Porter “national competitive advantage”
Proposal time	1949	1992	Late nineteenth century and early twentieth century	1980s	1990
Constitute the subject	Independent and interconnected enterprises	Industrial agglomeration in space	The government takes the lead in attracting enterprises, universities, etc. to enter the park	Small and medium enterprises, micro enterprises, etc.	Enterprises, universities, scientific research institutions, government organizations, etc.
Links with industrial clusters	Possess a certain number and scale of enterprises and a narrow geographic space	With trade characteristics and interfirm resource dependence	A cluster of enterprises formed by the government and a certain industry in a region	Concentration of new industrial clusters such as China’s local economic phenomenon and rural small industries	Spontaneous formation, government guidance, spatial agglomeration, clear division of labor and cooperation

of e-commerce parks. Taobao Village is an e-commerce village. Due to the low threshold of e-commerce, it provides access and convenience for the weaker rural enterprises and individuals. However, with the continuous increase of e-commerce villages and the influence of local characteristic industry market competition, there is an urgent need to open up new channels and support from external resources.

2.1.7. E-Commerce Industrial Park. The development of e-commerce is based on the establishment of the main B2B and B2C business technology platforms, the core of the IT-based e-commerce park, focusing on training the most sustainable and effective e-commerce professionals [23, 24]. In recent years, the state has increased favorable policies to guide the construction of electronic industrial parks. A new type of industrial park that combines the Internet and traditional e-commerce industrial parks has emerged and is developing faster and faster. E-commerce industrial park is an industrial cluster that provides e-commerce services for e-commerce enterprises by standardizing the management of agglomeration of e-commerce enterprises in specific industrial parks under the support and guidance of government policies and supplemented by related enterprises and public service platforms. The scope of business of the e-commerce industrial park mainly includes e-commerce investment and financial services, software and hardware services, online sales services, online transaction services, and credit security certification services.

2.2. Internet of Things

2.2.1. The Concept of the Internet of Things. The concept of the Internet of Things was proposed in 1999. When studying RFID, Professor Ashton of the EPC Global MIT Auto-Identification Center first proposed the concept of the Internet of Things [25]. From the point of view of the Internet

of Things application, the Internet of Things is an information detection device such as Radio Frequency Identification (RFID), infrared sensor, Global Positioning System, and laser scanner. Through protocol capture, any network-connected transaction can exchange information with the Internet, and communication to realize positioning, tracking, monitoring, and intelligent management applications [26, 27]. The Internet of Things is established on the basis of ubiquitous networking technology. It is another revolutionary network in the information industry after computers, the Internet and mobile communications, and it is also the latest technology field [28]. Most of the new Internet of Things has the following three basic characteristics.

2.2.2. Comprehensive Perception. With the help of RFID sensors, two-dimensional barcodes, and other detection equipment, the Internet of Things can dynamically collect object data and fully understand the world without time and geographical constraints.

2.2.3. Reliable Transmission. The Internet of Things uses local area networks, wireless networks, and 3G mobile networks to send data in real time. This is especially true of today’s ubiquitous wireless networks. These networks help prevent the transmission of perceptual information.

2.2.4. Intelligent Processing. The Internet of Things uses the most advanced technologies (such as cloud computing) to process large amounts of data and timely data to achieve intelligent control and management and communication between people and things (such as real things).

2.2.5. The Technical Architecture of the Internet of Things. From the perspective of technical architecture, the Internet of Things can be divided into three layers: perception layer,

network layer, and application layer, as shown in Figure 1 below.

- (1) Perception layer: the main function of this layer is to collect data and locate objects that are the source of the Internet of Things for object recognition [29]. This layer mainly includes various intelligent sensing devices such as RFID, readers, sensors, GPS, cameras, and smart terminals.
- (2) Network layer: the main function of this layer is to transmit and process the information obtained by the perception layer. This layer mainly includes the Internet, network management center, intelligent processing center, and cloud computing platform [30]. After receiving the data from the perception layer, the network layer will transmit and process the data. The cloud computing platform at this layer has extremely powerful data storage and analysis functions and is the core technology of the Internet of Things network layer and the basic technology of the application system.
- (3) Application layer: this layer is the interface between the Internet of Things and users. It combines with industry needs to realize intelligent applications of the Internet of Things, including applications in green agriculture, telemedicine, smart home, intelligent transportation, and environmental monitoring [31, 32].

2.3. Order Relationship Analysis Method. Judging from the literature in recent years, the ordinal relationship analysis method (G1 method) has been recognized by many scholars and has been widely used. It is different from the analytic hierarchy process in that it has been improved on its basis and has achieved complementarity. The G1 method is easy to understand and easy to operate. It does not need to construct a judgment matrix and perform a consistency check. Compared with the analytic hierarchy process, the workload is greatly reduced. The specific process of the G1 method is as follows:

- (1) Determine the order relationship.

Suppose the order of each index is $Z = (x_1, x_2, \dots, x_m)$; if the importance of x_i ($i = 1, 2, 3, \dots, m$) is greater than x_j ($j = 1, 2, 3, \dots, m$), it can be recorded as $x_i > x_j$. Under normal circumstances, the decision maker will select the most important indicator in the indicator set Z as x_1^* and then select the second most important indicator as x_2^* and so on, in order as follows:

$$x_1^* > x_2^* > x_3^* > \dots > x_m^*. \quad (1)$$

- (2) Give a comparative judgment on the relative degree between x_k^* and x_{k-1}^* :

$$r_k = \frac{W_{k-1}^*}{W_k^*}, \quad k = m, m-1, \dots, 3, 2. \quad (2)$$

- (3) Calculate the weight coefficient W_m . The specific calculation formula is as follows:

$$W_m = \left(1 + \sum_{k=2}^m \prod_{i=k}^m r_i \right)^{-1}. \quad (3)$$

Then, the other weights are

$$W_{k-1}^* = r_k \times W_k^*, \quad k = m, m-1, \dots, 3, 2. \quad (4)$$

2.4. Fuzzy Comprehensive Evaluation Method. The fuzzy comprehensive evaluation method is different from other evaluation methods. It is based on fuzzy theory and uses scientific methods such as statistical mathematics and matrix algebra to solve complex systems with multiple levels and multiple factors. This evaluation method is more comprehensive and reasonable [33]. It has strong application value, can quantify cluster risk, and can accurately reflect the comprehensive impact of risk indicators at various levels on the research object. It is mainly through the establishment of mathematical models to quantify indicators, and the calculation results to determine the risk assessment value of each risk indicator. The specific steps are as follows:

- (1) Determine the factor set X . The first-level index is to divide the factor set X into n first-level index sets, and X_i represents the i th ($1 \leq i \leq n$) index in the first-level index.

$$X = \{X_1, X_2, \dots, X_n\}. \quad (5)$$

Secondary indicators: each primary indicator corresponds to several secondary indicators; for example,

$$X_i = \{X_{i1}, X_{i2}, \dots, X_{ij}, \dots, X_{ik}\}. \quad (6)$$

Among them, X_{ij} is the second-level indicator of X_i , and the same goes for the second-level indicators of other elements.

- (2) Establish comment level set H .

Suppose the evaluation expert has a variety of possible evaluation results for the evaluation index, and all possible evaluation results become the alternative set of evaluation results, which is expressed as follows:

$$H = \{H_1, H_2, \dots, H_n\}. \quad (7)$$

Referring to the evaluation level or comment, it facilitates quantification of the evaluation set, as shown in Table 2.

- (3) Determine the weight set W of each factor.

Suppose the weight coefficient of the i th index is w_i ; then,

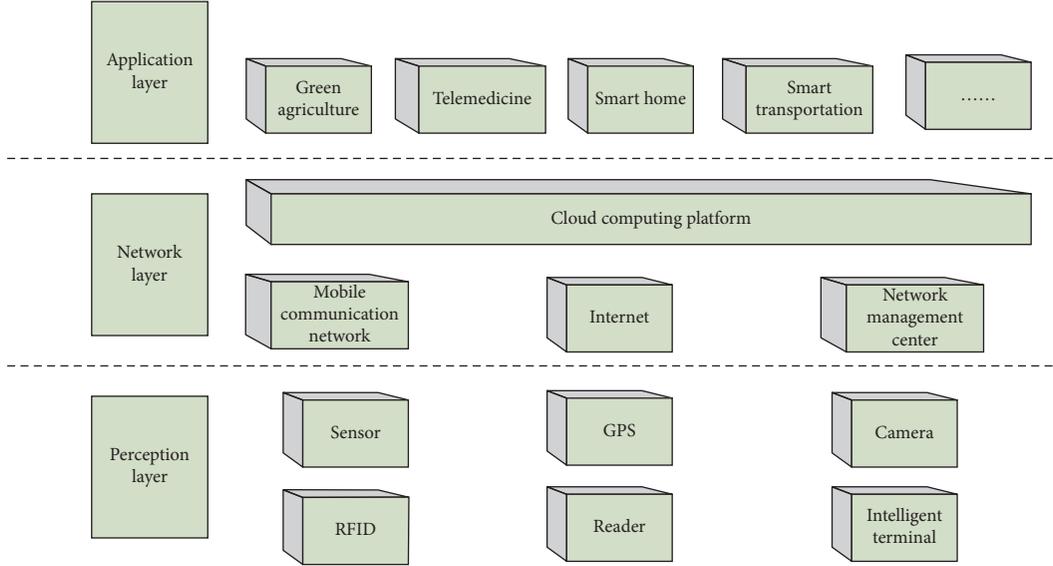


FIGURE 1: The technical architecture of the Internet of Things.

TABLE 2: Comparison table of quantitative evaluation grades.

Grade	H_1	H_2	H_3	H_4	H_5
Critical value	100–80	80–60	60–40	40–20	20–0
Description	Extremely high risk	High risk	Fair risk	Low risk	Basic security

$$W = \{w_1, w_2, \dots, w_i\}. \quad (8)$$

w_i represents the weight value of the evaluation factor.

(4) Establish fuzzy relation matrix Q .

The membership degree vector corresponding to each level index constitutes the fuzzy evaluation matrix Q , which refers to the single-factor evaluation from X to H .

$$Q = \begin{bmatrix} q_{11} & q_{12} & \cdots & q_{1m} \\ q_{21} & q_{22} & \cdots & q_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ q_{k1} & q_{k2} & \cdots & q_{km} \end{bmatrix}. \quad (9)$$

In fuzzy mapping, $0 \leq q_{ij} \leq 1$, $0 \leq i \leq n$, $0 \leq j \leq m$.

(5) Fuzzy comprehensive evaluation T :

The fuzzy comprehensive evaluation set is obtained through the product of the weight of each factor and the fuzzy evaluation matrix; namely,

$$T = (w_1, w_2, \dots, w_n) \cdot \begin{bmatrix} q_{11} & q_{12} & \cdots & q_{1m} \\ q_{21} & q_{22} & \cdots & q_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ q_{k1} & q_{k2} & \cdots & q_{km} \end{bmatrix} = (t_1, t_2, \dots, t_m). \quad (10)$$

(6) Judgment result processing:

refers to the comment level vector, T_i represents the fuzzy comprehensive evaluation value of each index, and the total evaluation score of the evaluation object can be obtained:

$$N = T \times h^r = (t_1, t_2, \dots, t_m) \times \begin{Bmatrix} h_1 \\ h_2 \\ \cdots \\ h_m \end{Bmatrix}. \quad (11)$$

Result analysis: mainly take the comment set as the standard and the evaluation result N as the basis to determine the risk level of each factor. By calculating the comprehensive evaluation value of each risk factor, the risk indicators can be arranged in order, and then the risk level can be determined, and then a comprehensive analysis can be carried out.

$$q_{ij} = \frac{h_{ij}}{\sum_{j=1}^m h_{ij}}. \quad (12)$$

3. Research Experiment on Mobile E-Commerce Information System Based on Industry Cluster under Edge Computing

3.1. Sample Selection and Data Collection. Research on the synergy of industrial clusters and supply chains is generally carried out through the research of enterprises, so the survey

content involved in the research should meet the following basic requirements:

- (1) It is best to choose a supervisor, employee, or management person who is very knowledgeable about the company's situation to fill in, rather than random ordinary people to fill in.
- (2) Based on the best choice of the type of industrial cluster in the industry to which the enterprise belongs, it is often found that the number of enterprises in the industrial cluster is large, and there is no upper limit, which basically follows the actual situation of the enterprise.
- (3) The enterprise filling in the questionnaire should have an information platform or website to provide service information; that is to say, if the e-commerce application is more successful, it can realize online communication and transaction with other partners.

Based on a comparison of the above guidelines with real-world situations, this survey can be divided into two channels: WeChat, e-mail, online collection of corporate websites, and visits to offline collection of companies. The formal structured questionnaires were distributed from mid-to-late January to early March and were collected in various regions, mainly Zhejiang. A total of 318 questionnaires were collected, of which 53 were invalid questionnaires. Therefore, the number of available valid questionnaires was 265, which was valid. The recovery rate was 83.3%.

3.2. Descriptive Statistics of the Sample. A total of 265 questionnaires were effectively collected in this study. The questionnaires were mainly distributed and collected in the Pearl River Delta, Shanghai, Nanjing, Hangzhou, and Zhejiang Province. The distribution data of the number of employees in the surveyed companies is shown in Table 3.

Among them are IT/finance/e-commerce/internet operation, electronic equipment/electrical appliances/equipment, clothing/textile/leather, rubber/plastic/chemicals, metal smelting/metal products, general equipment/special equipment, and machinery. There are industries such as equipment/accessories, pharmaceutical/bioengineering/medical equipment, small appliances/parts/equipment, transportation/logistics, food/retail, and other industries. Table 4 shows the distribution of the sales scale of enterprises in the surveyed enterprises.

3.3. Questionnaire Reliability Test. The CITC test for the entire valid sample shows that the overall correlation value for each correction item is close to 0.5 for the measurement items corresponding to each variable, indicating that the correlation for the entire sample is relatively good. Because the median of the CITC value of each item is all higher than 0.5, and the overall Alpha value of each variable in the questionnaire is around 0.7; there is no redundancy after adjustment. Test the data in the sample. In general, if the absolute values of skewness and kurtosis are in the range of 3 and 10, respectively, it indicates that the sample follows a

TABLE 3: Distribution of the number of employees.

Number of workers	Frequency	Percentage (%)
Less than 100 people	89	33.59
100–499 people	57	21.51
500–999 people	36	13.58
More than 1000 people	83	31.32

TABLE 4: Distribution of enterprise sales scale.

Sales scale	Frequency	Percentage (%)
Less than 1 million	32	12.08
1 million–10 million	83	31.32
10 million–50 million	56	21.13
Over 50 million	94	35.47

nearly normal distribution. Analysis results based on the sample data show that the range of the absolute value of the skewness of each item is (0, 2), and the range of the absolute value of kurtosis is (0, 3). Obviously, the normal distribution requirement is met, and the next step satisfied basic conditions for empirical analysis.

4. Mobile E-Commerce Information System Based on Industry Cluster under Edge Computing

4.1. One-Way Analysis of Variance by Industry Category. Through the descriptive statistical analysis data of the questionnaire, it can be seen that the various enterprise industry categories collected in the sample are mainly concentrated in the four major categories of Internet finance, software and hardware equipment, processing and manufacturing, and electrical appliances. For the purpose of providing reference indicators for the research in this article, industry classifications are divided into five main categories, and specific industry classifications and summaries are performed according to the nature of the industry. Communications/transportation/logistics, food/retail, remaining options, and original items were selected as “other industries” and summarized as the first of the five categories, namely, other industries [34].

From Figure 2, we can see that in the case of different industry categories, there are subtle differences between the dimensions of e-commerce. Further analysis can draw the following conclusions:

- (1) In the case of differences in industry categories, there are also significant differences in the performance of the information integration dimension of e-commerce in the industry categories. This shows that in the application of e-commerce, the ability of information integration is more prominent in the information links of procurement, inventory, sales, logistics, and technology implemented by enterprises in the Internet financial industry and electrical appliances industry. The most significant application advantage of e-commerce is through information

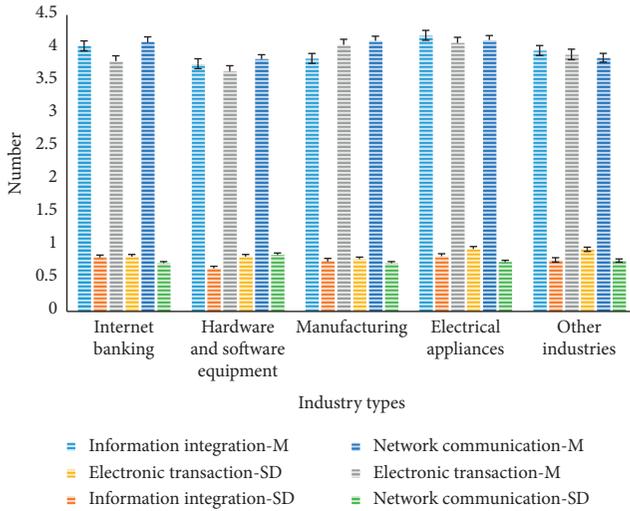


FIGURE 2: Differences in e-commerce by industry categories.

technology [35, 36]. Realize the real-time sharing of information, which enables timely interaction of the required information between upstream and downstream enterprises and customers in the enterprise supply chain; the manufacturing and hardware and software equipment industries focus mainly on the development of core technologies and products of the enterprise. Enterprise employees are mostly technical personnel, planning, purchasing and sales, etc. The division of departments is obvious, and the confidentiality work is well done. This type of enterprise generally only focuses on its own products and enterprise resources, so the overall product performance of the manufacturing industry and the software and hardware industries is better. The information integration score is weak; other industries have moderate performance in the information integration dimension, but their reference value is weak. From the above analysis, in the Internet finance and electrical appliances industries where the information integration capabilities of e-commerce applications exist, companies can accurately, quickly, and timely understand the required information and integrate and share information.

- (2) In the case of different industry categories, e-commerce also performs very differently in terms of electronic transaction dimensions. The above results show that under the conditions of different industry categories, electronic transaction capabilities are significantly different in the following major industries: manufacturing, electrical appliances, and Internet finance. Due to the rapid development of the Internet and information technology, e-commerce platforms and their technologies have penetrated into the above industries. Based on this sample research, it can be seen that the manufacturing, electrical appliances industry, and Internet finance

TABLE 5: Distribution of job categories.

Job categories	Frequency	Percentage (%)
Senior management	69	26.04
Middle manager	87	32.83
Grassroots manager	51	19.24
Corporate employees	58	21.89

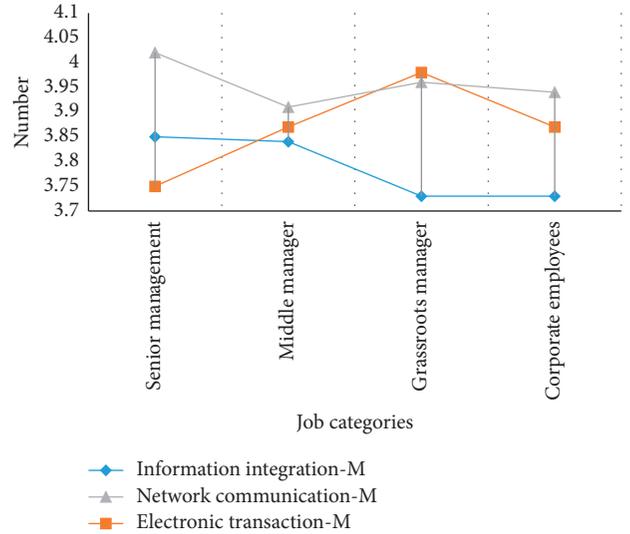


FIGURE 3: Analysis of e-commerce applications under different job categories.

are more inclined to use e-commerce platforms for online transactions and online order tracking to improve the efficiency of transactions between enterprises.

- (3) Under different industry categories, the performance of e-commerce's network communication ability dimension also differs to varying degrees. Internet finance, appliances, and manufacturing topped the list. As far as the sample of this study is concerned, these three industries and partners frequently make informal exchanges of experience, technology, and talent and leverage e-commerce to realize the benefits of both. This kind of communication helps to improve relationships with corporate customers in a timely manner.

4.2. Single-Factor Analysis of Variance by Job Category. The study of job categories as control variables aims to compare the degree of influence of different job categories on various dimensions of e-commerce and supply chain collaboration. In the sample data, the number of different job categories surveyed is shown in Table 5.

From the results of the analyses in Figures 3 and 4, there are no obvious differences in different aspects of e-commerce and supply chain collaboration from different per-

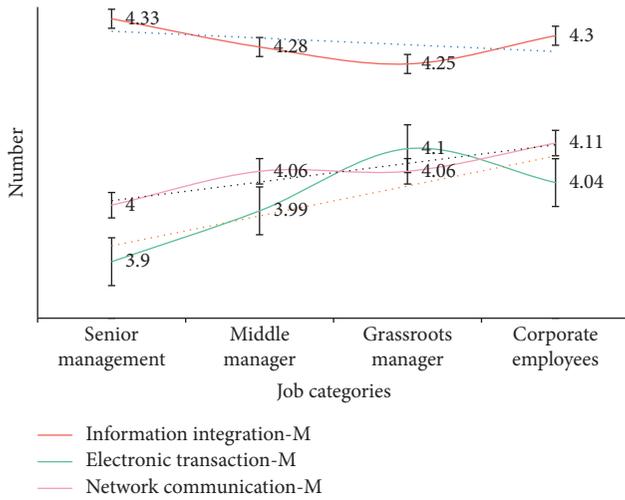


FIGURE 4: Analysis of supply chain collaboration under different job types.

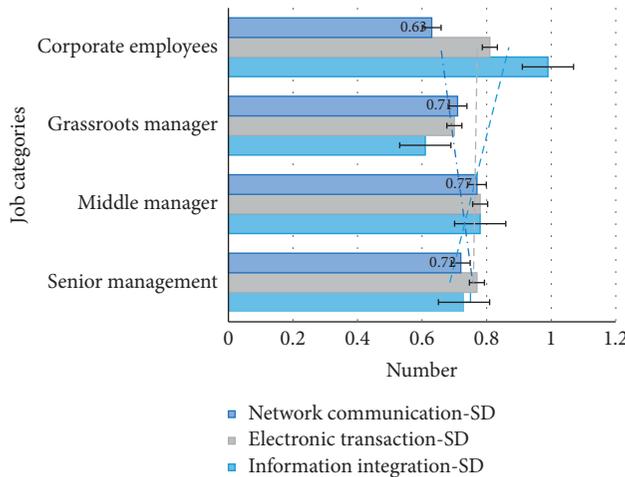


FIGURE 5: Variance analysis of e-commerce applications under different job categories.

spectives. Further analysis of different job categories in terms of e-commerce applications and supply chain collaboration is carried out, as shown in Figures 5 and 6.

It can be seen that in terms of the test results of the homogeneity of variance, in terms of the test variables of various dimensions of e-commerce applications and supply chain synergy, the statistical significance *P* value does not meet the standard and does not meet the requirements. Sample diversification has not reached a significant level and is statistically significant for understanding e-commerce applications and for supply chain cooperation between senior, middle, grassroots, and enterprise employees in various occupations. There was no difference.

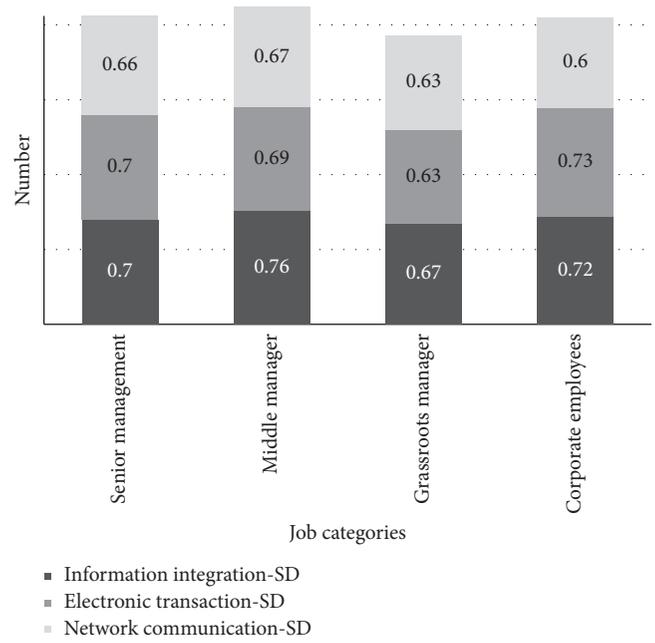


FIGURE 6: Variance analysis of supply chain collaboration under different job types.

5. Conclusions

This article is mainly based on the perspective of industrial clusters to study the mobile e-commerce information system under the background of edge computing. Through actual investigation and literature research, combined with sequential relationship analysis and fuzzy comprehensive evaluation, the conceptual model and risk evaluation model of the mobile e-commerce information system industry cluster are established. Combining a variety of methods, a quantitative evaluation method of the mobile e-commerce information system industry cluster is constructed. Through empirical analysis, a total of 265 questionnaires are studied. Industrial clusters are added as a moderating variable to explore the relationship between e-commerce applications and supply chain synergy. In addition, consider in terms of the influence of control variables on independent and dependent variables, the differences in the performance of e-commerce applications and supply chain synergy in different industries and job categories are further explored. Analyze and propose governance countermeasures based on the evaluation results to promote the friendly development of e-commerce industry clusters and enterprises. In the discussion of the control variable industry categories, it is found that there are significant differences in the performance of e-commerce applications and supply chain collaboration capabilities under different industry categories, but there is no significant difference in e-commerce applications and supply chain collaboration capabilities under

different job categories. As far as the sample of this study is concerned, compared with other industries, the Internet finance, electrical appliances, and manufacturing industries are more likely to form close trust partnerships with manufacturers, suppliers, retailers, and other members of the supply chain nodes and give full play to the benefits of e-commerce. Significant advantages are to further realize the construction of information sharing mechanisms for purchasing, manufacturing, planning and production, inventory, logistics, and sales. It can be seen that the application of mobile e-commerce information system has greatly promoted the continuous improvement of supply chain coordination capabilities and has added new economic power to enhance the competitiveness of enterprises. There are many risk factors affecting the industrial cluster system of mobile e-commerce information systems. Much research and experimentation is required to effectively and accurately predict and assess the risk of industrial clusters. The research conducted in this article requires further verification. Of course, due to limited time and energy, research needs to be further improved.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest with any financial organizations regarding the material reported in this manuscript.

References

- [1] Z. Lv, L. Qiao, K. Cai, and Q. Wang, "Big data analysis technology for electric vehicle networks in smart cities," *IEEE Transactions on Intelligent Transportation Systems*, vol. 22, 2020.
- [2] C. H. Wu and S. B. Tsai, "Using DEMATEL-based ANP model to measure the successful factors of E-commerce," *Journal of Global Information Management*, vol. 26, no. 1, pp. 120–135, 2018.
- [3] W. Zhao, "Connecting social media to E-commerce: cold-start product recommendation using microblogging information," *IEEE Transactions on Knowledge & Data Engineering*, vol. 28, no. 5, pp. 1147–1159, 2016.
- [4] L. Bing, T. L. Wong, and W. Lam, "Unsupervised extraction of popular product attributes from E-commerce web sites by considering customer reviews," *ACM Transactions on Internet Technology*, vol. 16, no. 2, pp. 1–17, 2016.
- [5] T. Oliveira, M. Alinho, P. Rita et al., "Modelling and testing consumer trust dimensions in e-commerce," *Computers in Human Behavior*, vol. 71, pp. 153–164, 2017.
- [6] Y. Fan, J. Ju, and M. Xiao, "Reputation premium and reputation management: evidence from the largest e-commerce platform in China," *International Journal of Industrial Organization*, vol. 46, no. May, pp. 63–76, 2016.
- [7] D. R. Agrawal and W. F. Fox, "Taxes in an e-commerce generation," *Cesifo Working Paper*, vol. 24, no. 5, pp. 903–926, 2016.
- [8] C. Viana, G. M. Zemolin, L. S. Mueller et al., "Liquid chromatographic determination of caffeine and adrenergic stimulants in food supplements sold in Brazilian e-commerce for weight loss and physical fitness," *Food Additives & Contaminants*, vol. 33, no. 1, pp. 1–9, 2016.
- [9] F. Biagi and M. Falk, "The impact of ICT and e-commerce on employment in Europe," *Journal of Policy Modeling*, vol. 39, no. 1, pp. 1–18, 2017.
- [10] Z. Deng and Z. Wang, "Early-mover advantages at cross-border business-to-business e-commerce portals," *Journal of Business Research*, vol. 69, no. 12, pp. 6002–6011, 2016.
- [11] J. Zhang, X. Wang, and H. Kai, "Integrated on-line scheduling of order batching and delivery under B2C e-commerce," *Computers & Industrial Engineering*, vol. 94, no. Apr, pp. 280–289, 2016.
- [12] J. Chaparro-Peláez, Á. F. Agudo-Peregrina, and F. J. Pascual-Miguel, "Conjoint analysis of drivers and inhibitors of e-commerce adoption," *Journal of Business Research*, vol. 69, no. 4, pp. 1277–1282, 2016.
- [13] Y. H. Hsiao, M. C. Chen, and W. C. Liao, "Logistics service design for cross-border E-commerce using Kansei engineering with text-mining-based online content analysis," *Telematics & Informatics*, vol. 34, no. 4, pp. 284–302, 2017.
- [14] L. M. Jannach and L. Lerche, "Session-based item recommendation in e-commerce: on short-term intents reminders trends and discounts," *User Modeling and User-Adapted Interaction*, vol. 27, no. 3-5, pp. 351–392, 2017.
- [15] Y. Guo, M. Wang, and X. Li, "Application of an improved Apriori algorithm in a mobile e-commerce recommendation system," *Industrial Management & Data Systems*, vol. 117, no. 2, pp. 287–303, 2017.
- [16] C. Chen, L. Zheng, V. Srinivasan, A. Thomo, K. Wu, and A. Sukow, "Conflict-aware weighted bipartite B-matching and its application to e-commerce," *IEEE Transactions on Knowledge and Data Engineering*, vol. 28, no. 6, pp. 1475–1488, 2016.
- [17] X. Chen, Y. Xue, and Y. Shiue, "Rule based semantic reasoning for personalized recommendation in indoor O2O e-commerce," *International Core Journal of Engineering*, vol. 6, no. 1, pp. 309–318, 2020.
- [18] A. M. Lokman and M. Nagamachi, "Validation of kansei engineering adoption in e-commerce web design," *Kansei Engineering International Journal*, vol. 9, no. 1, pp. 21–27, 2016.
- [19] T. M. Nisar and G. P. Prabhakar, "What factors determine e-satisfaction and consumer spending in e-commerce retailing?" *Journal of Retailing & Consumer Services*, vol. 39, no. nov, pp. 135–144, 2017.
- [20] K. Murugesan, P. Balasubramani, P. R. Murugan et al., "Color-based SAR image segmentation using HSV+FKM clustering for estimating the deforestation rate of LBA-ECO LC-14 modeled deforestation scenarios Amazon basin: 2002–2050," *Arabian Journal of Geosciences*, vol. 14, no. 9, pp. 1–15, 2021.
- [21] Y. Liu, J. Lu, J. Yang et al., "Sentiment analysis for e-commerce product reviews by deep learning model of Bert-BiGRU-Softmax," *Mathematical Biosciences and Engineering*, vol. 17, no. 6, pp. 7819–7837, 2020.
- [22] H. Bao, B. Li, J. Shen, and F. Hou, "Repurchase intention in the Chinese e-marketplace," *Industrial Management & Data Systems*, vol. 116, no. 8, pp. 1759–1778, 2016.
- [23] J. K. Dan, M. S. Yim, V. Sugumaran et al., "Web assurance seal services trust and consumers' concerns: an investigation of e-commerce transaction intentions across two nations," *European Journal of Information Systems*, vol. 25, no. 3, pp. 252–273, 2016.

- [24] K. Haji, "E-commerce development in rural and remote areas of BRICS countries," *Journal of Integrative Agriculture*, vol. 20, no. 4, pp. 979–997, 2021.
- [25] S. Bailey, "E-Commerce und stationärer handel-omnichannel commerce für die perfekte customer journey," *Wirtschaftsinformatik & Management*, vol. 12, no. 1, pp. 6–13, 2020.
- [26] Y. W. Sullivan and D. J. Kim, "Assessing the effects of consumers' product evaluations and trust on repurchase intention in e-commerce environments," *International Journal of Information Management*, vol. 39, pp. 199–219, 2018.
- [27] O. Wang, S. Somogyi, and S. Charlebois, "Food choice in the e-commerce era," *British Food Journal*, vol. 122, no. 4, pp. 1215–1237, 2020.
- [28] J. Mero, "The effects of two-way communication and chat service usage on consumer attitudes in the e-commerce retailing sector," *Electronic Markets*, vol. 28, no. 2, pp. 1–13, 2018.
- [29] C. D. Wang, Z. H. Deng, J. H. Lai et al., "Serendipitous recommendation in e-commerce using innovator-based collaborative filtering cybernetics," *IEEE Transactions on*, vol. 49, no. 7, pp. 2678–2692, 2018.
- [30] C. Dhote, R. Vichoray, S. Baskar, and P. Mohamed Shakeel, "Hybrid geometric sampling and AdaBoost based deep learning approach for data imbalance in e-commerce," *Electronic Commerce Research*, vol. 20, no. 2, pp. 259–274, 2020.
- [31] L. F. Chen, "Green certification e-commerce and low-carbon economy for international tourist hotels," *Environmental Science and Pollution Research*, vol. 26, no. 18, pp. 17965–17973, 2018.
- [32] J. P. Peng, J. Quan, and L. Peng, "IT application maturity management institutional capability and process management capability," *Journal of Organizational and End User Computing*, vol. 31, no. 1, pp. 61–85, 2019.
- [33] J. Laemmel, D. Alon, and D. Vega, "Alkosto faces up to Amazon in Colombia's e-commerce market," *Global Business and Organizational Excellence*, vol. 38, no. 6, pp. 31–41, 2019.
- [34] S. B. Tsai and K. Wang, "Using a novel method to evaluate the performance of human resources in green logistics enterprises," *Ecological Chemistry and Engineering*, vol. 26, no. 4, pp. 629–640, 2019.
- [35] C. H. Wu, Z. Yan, S. B. Tsai, W. Wang, B. Cao, and X. Li, "An empirical study on sales performance effect and pricing strategy for e-commerce: from the perspective of mobile information," *Mobile Information Systems*, vol. 2020, Article ID 7561807, 8 pages, 2020.
- [36] G. Khatwani and P. R. Srivastava, "Impact of information technology on information search channel selection for consumers," *Journal of Organizational and End User Computing*, vol. 30, no. 3, pp. 63–80, 2018.