

# Research on Industrial Competitiveness Evaluation of Cross-border E-commerce Comprehensive Pilot Zone Based on Ecological Niche

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**Abstract.** The article takes the 86 cross-border e-commerce comprehensive pilot zones in the first five batches of China as research objects. At first, it designs an evaluation index system including five secondary indicators and 10 tertiary indicators from economic strength, cross-border e-commerce, technological innovation, talent environment, financial environment dimensions. Next this paper constructs a niche evaluation model of cross-border e-commerce industry in comprehensive pilot zone based on the niche ecostate-ecorole theory. Finally, it uses the clustering method to compare and analyze the differences in competitiveness of cross-border e-commerce industry in different comprehensive pilot zones. The study finds that, based on the gap in industrial competitiveness, the 86 cross-border e-commerce comprehensive pilot zones can be divided into three echelons: strong, catch-up and disadvantaged. In terms of development strategies, strong comprehensive pilot zones, which are at a high niche in all dimensions, should expand their niche by integrating domestic and international resources; catch-up comprehensive pilot zones, which have demonstrated strong competitiveness in some dimensions, should actively develop synergistic cooperation with neighboring regions while giving full play to their own distinctive advantages, so as to jointly build ecological alliances and avoid homogeneous competition; disadvantaged comprehensive pilot zones with relatively weak industrial competitiveness and a lack of relevant industrial infrastructure, should improve their business environment and promote the introduction of niche through policy support.

**Keywords:** Cross-border e-commerce, CECZ, industrial competitiveness, niche.

## 1. Introduction

Since 2015, there are 165 cross-border e-commerce comprehensive pilot zones (CECPZs) in China, covering 31 provinces. And they have formed a nationwide development pattern of linkage between land and sea, and mutual benefit between east and west. However, according to the result of the "Evaluation of Comprehensive Pilot Zones for Cross-border E-commerce in 2021" published by the Ministry of Commerce of China in 2022, the development of cross-border e-commerce in CECZs is uneven. The competitive advantages of CECZs in Beijing, Shanghai, Guangzhou and Hangzhou have been revealed, while the other have yet to break through. With the national decision to implement an assessment and withdrawal mechanism, these comprehensive pilot zones are under greater pressure.

Industrial competitiveness determines the survival and sustainable development of CECZ. Based on niche perspective, this article empirically analyzes the competitiveness of cross-border e-commerce industry in comprehensive pilot zones, studies the differences in industrial development among CECZs, and further identifies positive factors that can help promote the development of CECZs and proposes differentiated strategies based on current industrial competitiveness of various CECZs. The rest of the paper is organized as follows. The next section discusses existing relevant studies about CECZ. Section 3 constructs a niche evaluation model of cross-border e-commerce industry in comprehensive pilot zone. Section 4 talks about the measurement and analysis of cross-border e-commerce industrial niche of comprehensive pilot zone. In section 5, the paper also gives some suggestions to improve their niche. And conclusion is in section 6.

## 2. Literature References

With the continuous promotion of CECPZ, relevant research results have been enriched. Some of the studies qualitatively analyze the current situation and problems of the construction of CECPZs and put forward suggestions. Wei Dayu and Zhang Jianmin [1] summarized the construction achievements of the first three batches of CECPZs in terms of institutional innovation, enriching trade rules and promoting national strategies, while also pointing out that there are problems such as lengthy regulatory and approval processes and insufficient innovation dynamics. Xiao Liang and Ke Tongping [2] proposed a four-stage evolution model of innovation cultivation, innovation breakthrough, innovation deepening and innovation diffusion for the development of CECPZs from two perspectives of innovation evolution stages and stage dynamics mechanism. And they found that the conflict between industrial development and institutional environment is an important driving force for innovation evolution in the comprehensive pilot zone. Zhang Zhengrong et al. [3] selected 70 CECPZs to study the establishment model, and they revealed that the expansion of comprehensive pilot zone is mainly based on policy-driven and factor-driven. The former relied more on the supporting role of policy factors, while the latter emphasized the influence of industrial structure and e-commerce development. Thus they thought the development of each comprehensive pilot zone inherently has regional heterogeneity. Zhu Xianqiang and Wang Qing [4] argued that for certain cities with weak regulation and services, simply copying the models of other comprehensive pilot zones only further exacerbated regional heterogeneity. Wang Shucui and Wang Dandan [5] focused on summarizing and analyzing the differences between cross-border export retail and traditional export trade processes, and suggested that establishing the leading position of goods trade rules and a hierarchical and categorical management system for cross-border data flow are key directions for improving cross-border export retail rules. Zhou Guanglan et al. [6] put forward improvement ideas and suggestions for the statistical methods of cross-border e-commerce.

In terms of quantitative research, some literatures have found a positive relationship between the operational performance of CECPZs and the time of their approval and the level of economic development of the region in which they are located. [7], [8] [9] Based on the "counterfactual" perspective, Wang Lirong and Rui Lili [10] pointed out that the comprehensive pilot zones should not simply copy the practices of Hangzhou pilot zone, but should take the initiative to carry out institutional innovation, take the characteristics of local industry into consideration and effectively bring into play the promotion effect of comprehensive pilot zone on local economic development. Zhang Xiaodong [11] constructed a location value impact analysis model and conducted an empirical analysis with a sample of 35 CECPZs. And it is argued that the factors affecting the location value of comprehensive pilot zone include trade environment, e-commerce environment, economic environment, technological innovation, talent environment, logistics level and consumption level. Zhou Fang [12] applied her argued evaluation index system to study the competitiveness of regional cross-border e-commerce industry and analyze the regional gap of cross-border e-commerce development. Tang Wanhuan [13] found that the operation level of cross-border e-commerce has a positive empowering effect on export trade based on the sample data of the first two batches of CECPZs. In addition, Wang Rui et al. [14] found that the level of trade facilitation has a significant positive influence on urban cross-border e-commerce trade. While in terms of the competitiveness of cross-border e-commerce industry in comprehensive pilot zone, Wang Kun and Wu Kun [15] comprehensively compared the industrial competitiveness of Zhuhai with the 13 previously approved CECPZs, and made relevant suggestions on the development of Zhuhai's cross-border e-commerce business by clarifying the industrial development gap between cities. Based on niche theory, Zhang Xiaodong [16] measured the comprehensive niche and overlapping niche of comprehensive pilot zones, which helped him to further clarify the competitive pattern of comprehensive pilot zones. And he also gave some advice to enhance the competitiveness of the cross-border e-commerce industry.

A review of the existing literature shows that the research on the competitiveness of cross-border e-commerce industry in comprehensive pilot zones has so far focused on one aspect or a specific comprehensive pilot zone, while comparative research on the differences of industrial

competitiveness among CECPZs is still lacking. At the same time, when analyzing the competitiveness of cross-border e-commerce industry in comprehensive pilot zones, the existing literature often only examines their current characteristics, but neglects the assessment of their development potential. In view of this, this paper intends to apply the niche ecostate-ecorole theory to evaluate the development status and potential of CECPZs, and conduct a quantitative study on the differences of their industrial competitiveness, and finally propose strategies from the perspective of ecological niche.

### **3. Niche Evaluation Model of Cross-border E-commerce Industry**

#### **3.1. The Niche Ecostate-ecorole Theory**

Niche is the position of a species within an ecosystem or ecological community in terms of temporal order, spatial location, and functional activity relative to other species [17]. The concept was founded by Joseph Grinnell, an American ecologist. On basis of this theory, China's scholar Zhu Chunquan [18] proposed the niche ecostate-ecorole theory. According to this theory, niche is the status and role of a biological unit in a particular ecosystem, which is relative and is reflected by comparison with other biological units in the ecosystem. Niche consists of two aspects: first, the state of biological unit, which is usually expressed as the number of biological units, resource possession, etc., and it's the result of biological unit's past growth and development, learning and interaction with the environment; the second is the real influence and dominance of biological unit on environment, which can be regarded as "potential" of biological unit, usually expressed as growth rate, productivity, and ability to occupy new environment. A comprehensive consideration of the state and potential of each biological unit can reveal its relative position in the ecosystem and its ability to utilize resources, and further determine the level of competitive ability of each biological unit in a particular ecosystem. Therefore, the measurement of biological unit's niche can be carried out in terms of both state and potential. The niche of a biological unit is the ratio of the sum of state and potential of the biological unit to the sum of state and potential of all biological units in this ecosystem.

This paper applies the niche ecostate-ecorole theory to study the cross-border e-commerce industry competitiveness of CECPZ. The ecosystem of each CECPZ is composed of various enterprises and organizations related to cross-border e-commerce and the living environment they depend on, which continuously exchange information and materials with the surrounding environment, constituting a dynamic ecosystem. According to the niche ecostate-ecorole theory, the niche of cross-border e-commerce industry in a CECPZ is the ratio of the sum of state and potential of cross-border e-commerce industry in the CECPZ to the sum of state and potential of cross-border e-commerce industry in all CECPZs. The larger the ratio is, the higher the niche is, indicating that the CECPZ is more capable of acquiring and utilizing resources related to cross-border e-commerce industry in a specific economic environment and ecological resource space. It also means that the competitiveness of cross-border e-commerce industry in the CECPZ is stronger.

#### **3.2. Niche Index System of Cross-border E-commerce Industry**

In order to comprehensively and systematically compare and evaluate the differences in competitiveness of cross-border e-commerce industry in different CECPZs, this paper constructed a niche evaluation index system including 5 dimensional niches and 10 elemental niches in accordance with the principles of science, objectivity, feasibility and typicality with reference to previous research (for details, see Table 1).

**Table 1.** Niche index system of cross-border e-commerce industry

| Target layer                                              | Dimensional niche          | Elemental niche                     |                                                                                  |
|-----------------------------------------------------------|----------------------------|-------------------------------------|----------------------------------------------------------------------------------|
|                                                           |                            | Elemental name                      | Elemental indicator                                                              |
| E Comprehensive Niche of Cross-border E-commerce Industry | B1 Economic Development    | C1 Economic Scale                   | Per capita GDP (yuan)                                                            |
|                                                           |                            | C2 Spending Power                   | Per Capital Annual Expenditure of urban households (yuan)                        |
|                                                           |                            | C3 Foreign Trade                    | Total value of imports and exports (100 million yuan)                            |
|                                                           | B2 Cross-border E-commerce | C4 Internet Development             | Fixed Internet Broadband Access Users (10,000 users)                             |
|                                                           |                            | C5 Logistics Level                  | Express Business (10,000 pieces)                                                 |
|                                                           | B3 Technology Innovation   | C6 R&D Investment                   | Science and technology expenditure (100 million yuan)                            |
|                                                           |                            | C7 Patent Application               | Number of Patent Applications Accepted (item)                                    |
|                                                           |                            | C8 Talent Development               | Number of students enrolled in general colleges and universities (10,000 person) |
|                                                           | B4 Talent Environment      | C9 Talent Attraction                | Average annual wage of employed persons in urban non-private sector (yuan)       |
|                                                           |                            | C10 Financial Services Capabilities | Deposits of Financial Institutions (100 million yuan)                            |

Among the dimensional niche, economic development contains two factors of economic scale and consumption ability. The higher the level of economic development of the city where the cross-border e-commerce pilot zone is located, the stronger the consumption ability of city residents, the more conducive to promoting the development of cross-border e-commerce industry. As Zhang Xiaodong [19] also used GDP per capita and consumption expenditure as the measure of economic development in his study of the coupled development of cross-border e-commerce and economic system. As for cross-border e-commerce dimension, referring to Bi Lingyan et al. [20] in their study of the competitiveness of China's provincial cross-border e-commerce industry, this paper uses foreign trade, internet development and logistics level to indirectly measure the indicator of cross-border e-commerce due to the lack of direct data sources. A strong foreign trade strength can bring more opportunities for enterprises in the CECPZ to expand their overseas markets. At the same time, since cross-border e-commerce operates based on the Internet, the higher the level of Internet development, the wider the coverage and deeper the penetration of cross-border e-commerce industry. As an important link in the value chain of cross-border e-commerce, the development level of logistics has an important impact on the economic benefits of CECPZ. The third dimension, technological innovation. The stronger the technological innovation capability of a CECPZ, the more beneficial it is to promote the continuous innovative development of that CECPZ in terms of system, management and service. Ye Qilin and Zhang Jianming [21] just used the number of patent applications and expenditure on science and technology as indicators to measure the competitiveness of Shanghai's high-tech industry. The fourth dimension, talent environment. Talent is a fundamental factor driving

the innovative development of CEPZ and a key source of motivation to improve CEPZ's competitiveness. And the last dimension, financial environment. The cross-border e-commerce platform has greatly lowered the threshold for international trade, thus more and more small and medium-sized enterprises can join this camp, whose "asset-light" characteristics require the support of supporting financial services. Li Haiju [22] just chose the number of students enrolled in general universities and the balance of deposits in financial institutions as indicators of talent and financial environment, respectively to evaluate the industrial competitiveness of the 10 CEPZs in Jiangsu Province. To facilitate data processing and indicator presentation, the indicators are coded in this paper: the target layer code is E, the dimensional niche indicator codes are B1-B5, and the elemental niche indicator codes are C1-C10, as shown in Table 1.

### 3.3. Niche Evaluation Model

On the basis of above niche evaluation index system of cross-border e-commerce industry, according to the measurement principle of the niche ecostate-ecorole theory, the niche evaluation model of cross-border e-commerce industry in CEPZ can be expressed as follows: in the data matrix consisting of "n" CEPZs as columns and "m" elements as rows, "k" is the number of element in dimension "s", "r" is the number of dimension;  $S_i$  is the state of cross-border e-commerce industry in CEPZ "i",  $S_{ij}$  is the value of element indicator "j" corresponding to the cross-border e-commerce industry in CEPZ "i", while  $P_i$  is the potential of cross-border e-commerce industry in CEPZ "i",  $P_{ij}$  is the value of element indicator "j" corresponding to the cross-border e-commerce industry in CEPZ "i", and A is the scale conversion coefficient. Then the elemental niche of cross-border e-commerce industry in CEPZ "i" can be measured as follows:

$$C_{ij} = \frac{S_{ij} + AP_{ij}}{\sum_{i=1}^n (S_{ij} + AP_{ij})} \quad (1)$$

The dimensional niche of cross-border e-commerce industry in CEPZ "i" can be measured as follows:

$$B_{is} = \frac{1}{k} \sum_{j=1}^k C_{ij} \quad (2)$$

And the comprehensive niche of cross-border e-commerce industry in CEPZ "i" can be measured as follows:

$$E_i = \frac{1}{r} \sum_{s=1}^r B_{is} \quad (3)$$

The value of niche ranges from 0 to 1, where the closer the value of  $E_i$  is to 1, the higher the comprehensive niche of cross-border e-commerce industry in CEPZ "i". That's means the stronger the competitiveness of cross-border e-commerce industry in CEPZ "i", and vice versa, the weaker its competitiveness.

## 4. Niche Measurement and Analysis of Cross-border E-commerce Industry

### 4.1. Data Sources

Based on the above niche evaluation index system of cross-border e-commerce industry, this paper selected the relevant index data of the cities where the CEPZs are located from 2019 to 2020, took the data of 2020 as the measurement index of "state", took the change data of 2019-2020 as the measurement index of "potential". Then, the corresponding index data were substituted into the niche calculation formula (1) (2) (3) to calculate the value of each elemental, dimensional and comprehensive niche of cross-border e-commerce industry in each CEPZ. However, although China has 165 CEPZs now, considering the availability of indicator data, 86 of them were finally selected for niche measurement. The relevant data mainly come from the 2019-2020 China City Statistical Yearbook, the statistics bureau and postal administration of the cities where each CEPZ is located,

as well as China Customs and the National Bureau of Statistics. All data are public information, which helps reflect the reliability and objectivity of this study. At the same time, the 86 CECZs can basically reflect the full picture of CECZ in China.

#### 4.2. Result and Analysis of Niche Measurement

Table 2 shows the top 10 CECZs based on the comprehensive niche score. At first, from the perspective of each dimensional niche, it can be found that CECZs have little difference in economic development and talent environment relatively. This is probably because the economic development of city where CECZ is located is an important consideration when approving whether to set up a CECZ in a certain city. Meanwhile cross-border e-commerce industry tends to have a high demand for talent, so most of CECZ are set up in cities with relatively abundant talent. However, there is a clear difference when it comes to cross-border e-commerce, technology innovation and financial environment. In the cross-border e-commerce dimension, the niche score of Shanghai comprehensive pilot zone is more than 3 times that of Tianjin comprehensive pilot zone. And in technology innovation dimension, Shanghai and Beijing comprehensive pilot zones have a significant advantage than others. Similar distributional characteristics are also exhibited in the financial environment dimension. Then from the perspective of comprehensive niche, there is a significant difference in the comprehensive niche scores of cross-border e-commerce industry in CECZs. The strong economic strength, good talent environment, developed financial environment, active science and technology innovation subjects and technological innovation activities, especially the first-mover advantage in developing cross-border e-commerce industry, make Shanghai, Beijing, Guangzhou and Shenzhen comprehensive pilot zones steadily rank in the top four of the comprehensive niche ranking.

Overall, in the sample space, the comprehensive niche score of cross-border e-commerce industry in each comprehensive pilot zone also shows a bipolar distribution. The comprehensive niche of those cross-border e-commerce pilot zones after the score are mostly the fourth and fifth batch of the establishment. The reasons for their weak industrial competitiveness are mainly twofold. First, the lack of capital, technology, talent and other industrial resources, the low level of urban economic development, the limited spending power and consumer demand of residents, and the lack of leading enterprises in cross-border e-commerce traction. Second, these CECZs have not been established for a long time and still lack construction experience, and their cross-border e-commerce transactions, payments, logistics and other aspects still need to be further explored and perfection. In addition, the scores of technological innovation niche and comprehensive niche show an obvious positive correlation. Shenzhen and Beijing, which have stronger innovation capability, are also in a higher niche at the same time. While Huangshi and Panjin, which are still not effective in technological innovation, have a small score of comprehensive niche. Thus it can be seen that innovation is a key factor to improve the competitiveness of cross-border e-commerce industry.

**Table 2.** Top 10 CECZs for cross-border e-commerce industry with comprehensive niche ranking

| CECPZ     | Economic Development | Cross-border E-commerce | Technology Innovation | Talent Environment | Financial Environment | Comprehensive Niche |
|-----------|----------------------|-------------------------|-----------------------|--------------------|-----------------------|---------------------|
| Shanghai  | 0.017 966            | 0.066 578               | 0.101 245             | 0.021 843          | 0.109 165             | 0.063 359           |
| Beijing   | 0.018 374            | 0.040 070               | 0.076 006             | 0.022 736          | 0.125 146             | 0.056 466           |
| Shenzhen  | 0.018 480            | 0.068 926               | 0.054 687             | 0.011 763          | 0.073 130             | 0.045 397           |
| Guangzhou | 0.017 708            | 0.054 742               | 0.054 673             | 0.036 711          | 0.046 657             | 0.042 098           |
| Suzhou    | 0.017 188            | 0.042 400               | 0.059 928             | 0.012 257          | 0.022 348             | 0.030 824           |
| Hangzhou  | 0.015 676            | 0.029 418               | 0.034 927             | 0.017 334          | 0.038 567             | 0.027 184           |
| Chengdu   | 0.010 243            | 0.031 060               | 0.025 497             | 0.027 320          | 0.028 848             | 0.024 594           |
| Chongqing | 0.011 303            | 0.029 826               | 0.020 249             | 0.026 727          | 0.028 205             | 0.023 262           |
| Nanjing   | 0.017 617            | 0.016 596               | 0.026 769             | 0.023 084          | 0.027 199             | 0.022 253           |
| Tianjin   | 0.013 144            | 0.019 676               | 0.028 932             | 0.018 877          | 0.022 272             | 0.020 580           |

### 4.3. Cluster Analysis

On basis of the comprehensive niche score of CECPPs, cluster analysis was applied to classify the 86 sample comprehensive pilot zones, which helps to present more intuitively the differences in the competitiveness of cross-border e-commerce industry in CECPPs. This paper used SPSS25.0 to perform a systematic cluster on the scores of comprehensive niche of cross-border e-commerce industry in CECPPs. And then according to the obtained dendrogram (Figure 1), the 86 CECPPs were classified into three echelons: strong, catching-up and weak.

#### 4.3.1 Strong CECPPs

The four CECPPs in Beijing, Shanghai, Shenzhen and Guangzhou are in a high niche under the dimensions of economic development, cross-border e-commerce, technological innovation, talent environment and financial environment, so they belong to the strong type of comprehensive pilot zones.

The strong CECPPs are all located in first-tier cities. The local economic strength, technological innovation capability, talent attraction and capital attraction provide a good environment and strong support for the high-quality development of these CECPPs. Among them, Beijing is the only city in China that has both a national comprehensive demonstration zone for expanding and opening-up the service industry and a pilot free trade zone, and with the advantages of the "two zones" policy, the construction of Beijing comprehensive pilot zone has achieved positive results. While Shanghai port is one of the most important trade hubs in the world, about 30% of "Made in China" products are sent to the world through Shanghai, while about 30% of goods from various countries enter the Chinese market through the city, and the developed foreign trade base makes the Shanghai comprehensive pilot zone has obvious competitive advantages in construction and innovative development. Shenzhen, known as "China's Silicon Valley", has good industrial advantages and infrastructure, as well as many cross-border e-commerce market players and highly skilled talents, which provide favorable conditions for innovation and exploration of the development model of Shenzhen comprehensive pilot zone. For Guangzhou comprehensive pilot zone, since its approval in 2016, it has successfully replicated and promoted a number of good experiences and practices in building comprehensive pilot zone and overseas warehouses, and introduced a number of cross-border e-commerce facilitation policies and policies for the development of cross-border e-commerce in the region, which are showing development advantages such as large scale of cross-border e-commerce, strong market players and good clustering benefits.

#### 4.3.2 Catch-up CECPPs

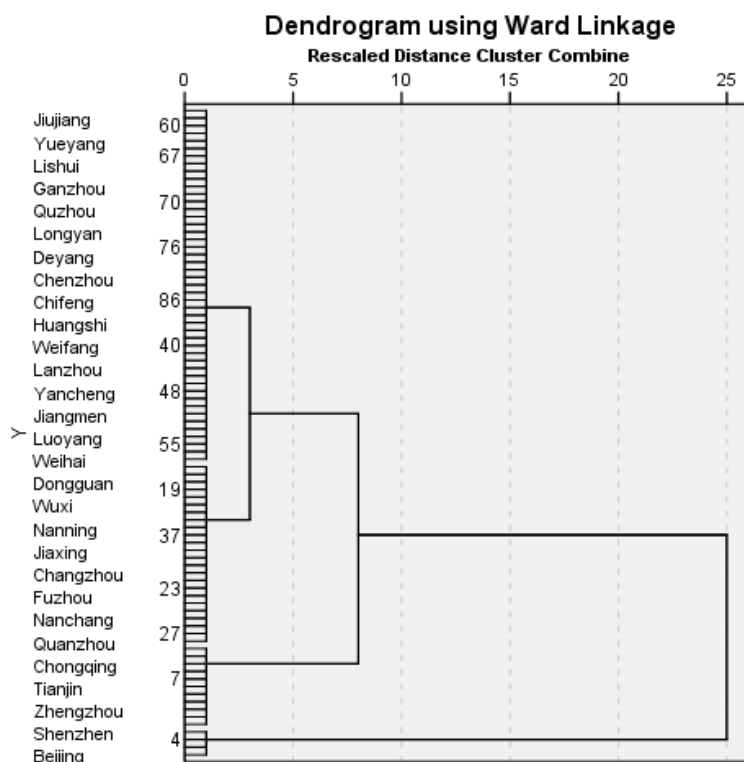
A total of 10 CECPPs represented by Hangzhou, Suzhou, Yiwu, Chengdu and Zhengzhou based on their own characteristics, taking the road of differentiated innovation and development, is catching up leapfrog development trend, belonging to the second echelon of catch-up.

Hangzhou comprehensive pilot zone is the forerunner and explorer of CECPP, its cross-border e-commerce business is abundant, and the "Hangzhou experience" has been widely replicated and promoted to other comprehensive pilot zones in China. While Yiwu comprehensive pilot zone has accelerated the formation of industrial clustering effect through the integration of local and neighboring cross-border e-commerce resources, showing a quantitative and qualitative rise. Based on the experience of "one zone with multiple parks" in Hangzhou comprehensive pilot zone, Suzhou comprehensive pilot zone focuses on B2B export of cross-border e-commerce, but also increasing the innovation of B2C export, and the business of cross-border e-commerce in the zone has achieved rapid growth. Chengdu comprehensive pilot zone relies on "one city, two fields" and the international railroad port, focusing on building a logistics hub, strengthening the strategic link between Europe and ASEAN, and continuously expanding the overseas market network, with the cross-border e-commerce industry showing a good development trend. Zhengzhou comprehensive pilot zone has taken advantage of the unique advantages of Henan Bonded Logistics Center to promote the rapid growth of cross-border export business of products with regional characteristics.

### 4.3.3 Disadvantaged CECZs

The third echelon includes 72 CECZs in Jinan, Xi'an, Kunming, etc. Their establishment time is relatively short, the industrial development conditions and environment need to be improved, and it is difficult to directly copy and promote the experience and practices of the first and second echelon comprehensive pilot zones. Thus they are disadvantaged comprehensive pilot zones.

Firstly, compared with the first two types of comprehensive pilot zones, the economic strength of the cities where the disadvantaged comprehensive pilot zones are located is weaker. From the planning layout of the State Council's establishment of CECZs, it is clear that the expansion of the comprehensive pilot zones is along the path of coastal and then inland, eastern and then central and western, as well as first and second-tier cities and then third and fourth-tier cities. Most of them are located in inland, central and western China and third and fourth-tier cities, where the lower level of economic development restricts the expansion of cross-border e-commerce industry and makes it difficult to attract head cross-border e-commerce enterprises to settle down, and the vitality of market players needs to be stimulated. Secondly, there is a lack of infrastructure support to promote the development of cross-border e-commerce. From cross-border e-commerce transactions, payment, logistics and customs clearance to supporting financial services, statistical monitoring, e-commerce credit and foreign exchange supervision, etc., all need perfect and mature infrastructure to support industrial development, while the disadvantaged comprehensive pilot zones lack these infrastructures, making it difficult to fully release cross-border e-commerce policies in terms of system innovation, management innovation and service innovation as the first two types of comprehensive pilot zones. Thirdly, the disadvantaged comprehensive pilot zones also face the problems of lack of cross-border e-commerce talents, insufficient technological innovation, and a financial environment that is not friendly enough for cross-border e-commerce enterprises, especially small and medium-sized enterprises.



**Figure 1.** Clustering Dendrogram of 86 CECZs

## 5. Suggestions for Enhancing the Competitiveness of Cross-border E-Commerce Industry in the CECZ

### 5.1. Strong CECZs: Ecological Niche Expansion

Ecological niche expansion is an ecological niche strategy by which organisms break developmental bottlenecks by increasing their ecological capacity 错误!未找到引用源。 . By expanding its ecological niche, a strong species can occupy and more effectively use a wider range of environmental resources, and continuously increase its influence on the environment while improving its niche to achieve a comprehensive expansion of niche and potential. Specifically in the development of CECZs, as a limited number of the top comprehensive pilot zones in China, strong comprehensive pilot zones should, according to their own ecological position in each link of the cross-border e-commerce industry chain, continuously amplify their advantages and complement their disadvantages by integrating both domestic and foreign resources, so as to promote the high-quality expansion of the ecological niche of the comprehensive pilot zones. In particular, under the unprecedented changes in the world today, strong comprehensive pilot zones must seize the opportunities brought by regional economic integration institutional arrangements such as RCEP and strive to incorporate more international capital, advanced technologies, innovative talents and high-quality cross-border e-commerce enterprises into their industrial development. At the same time, it should accelerate the layout of overseas warehouses to reduce cross-border logistics costs and risks and improve the efficiency of cross-border e-commerce transactions. In addition, it should also take brand building as a key breakthrough in the innovative development of the comprehensive pilot zone, enhance the brand awareness of e-commerce enterprises in the zone, win competitive advantages by brand, and accelerate the transformation and upgrading of the e-commerce industry in the comprehensive pilot zone from quantitative growth to qualitative growth.

### 5.2. Catch-up CECZs: Ecological Niche Alliance

The catch-up comprehensive pilot zones have formed unique industrial competitive advantages in certain ecological niches, but they are still partially constrained by the industrial environment compared with the relatively all-powerful and strong comprehensive pilot zones. These comprehensive pilot zones should take the path of differentiation and competition based on their own characteristics, and at the same time explore new ways and modes of construction of comprehensive pilot zones and break through the constraints of the industrial environment by creating ecological niche alliances. Essentially, the ecological niche alliance is an ecological niche strategy emphasizing synergistic cooperation, which is reflected in the active synergistic behavior among species. On the one hand, catch-up comprehensive pilot zones should strengthen information sharing with various government departments in the region and actively promote government-enterprise cooperation. On the other hand, they should break through regional restrictions and actively strengthen cooperation with neighboring comprehensive pilot zones so as to replace competition with cooperation and achieve common development and mutual benefit for all comprehensive pilot zones in the alliance by establishing an ecological niche alliance among comprehensive pilot zones, and at the same time, reduce low-level homogenized competition among them.

For example, with the Shanghai comprehensive pilot zone as the leader, a comprehensive pilot zone alliance in the Yangtze River Delta will be created. Hangzhou, Ningbo, Suzhou and other comprehensive pilot zones can take advantage of Shanghai's port facilities to improve cross-border logistics efficiency and reduce logistics costs, and take advantage of the good financial environment in the Shanghai comprehensive pilot zone to provide diversified financial services for cross-border e-commerce enterprises in the zone, helping more enterprises, especially small and medium-sized enterprises, to enter the cross-border e-commerce fast track. The Shanghai comprehensive pilot zone can leverage the first-mover advantage of Hangzhou comprehensive pilot zone, the headquarters effect of Alibaba's cross-border e-commerce and the regional advantage of Hangzhou's Internet

capital to jointly form a cross-border e-commerce development ecosystem with complementary advantages and functional interaction.

### 5.3. Disadvantaged CECZs: Ecological Niche Introduction

Ecological niche introduction is a type of ecological niche strategy for disadvantaged species to achieve their own ecological niche enhancement and competitiveness enhancement by actively introducing factors with stronger ecological adaptability in the development process. Disadvantaged comprehensive pilot zones account for majority of China's CECZs, and their performance in various ecological niches is weak. This type of comprehensive pilot zones should take their actual conditions into account and accelerate the creation of a business environment suitable for the development of cross-border e-commerce industry in order to promote the introduction of ecological niches. Relevant government departments should do a good job in the top-level design of the construction and development of the comprehensive pilot zones, actively learn from the beneficial experience of the first two types of comprehensive pilot zones, and give timely policy guidance and support in various aspects of cross-border e-commerce transactions and nodes of the cross-border e-commerce supply chain according to the development trend of the cross-border e-commerce industry and changes in the needs of cross-border e-commerce enterprises, platforms and logistics and storage enterprises, so as to help improve the industrial competitiveness of the comprehensive pilot zones.

In terms of specific measures, disadvantaged comprehensive pilot zones should accelerate the construction of cross-border logistics systems, unify the standards of logistics infrastructure construction and establish standardized logistics networks in order to attract more well-known logistics and warehousing enterprises to settle down and improve the logistics ecological niche of the comprehensive pilot zones. Comprehensive pilot zones with insufficient demand for cross-border e-commerce imports and exports should actively promote the transformation and upgrading of personal and corporate consumption through policy dividends, continuously stimulate internal and external demand, and promote the innovative development of cross-border e-commerce B2B and B2C business. At the same time, various functional departments of the government shall strengthen communication and coordination, formulate suitable tax policies and regulatory systems for cross-border e-commerce import and export, simplify the processes and approval procedures for logistics, warehousing, customs clearance, export tax rebates, etc., reduce the burden of enterprises, stimulate their potential, and create a favorable industrial environment for the development of cross-border e-commerce in comprehensive pilot zones.

## 6. Conclusion

Cross-border e-commerce, as a new form of foreign trade, has become an important grasp of foreign trade stability in the state policy support. While as an innovative highland of cross-border e-commerce development, the comprehensive pilot zone effectively contributes to the stable scale and excellent structure of foreign trade, and effectively promotes the innovative development of business forms. The driving effect of CECZ on cross-border e-commerce is obvious. However, this paper find that there is a great difference in the development of cross-border e-commerce industry in each comprehensive pilot zone. The cross-border e-commerce industry in most of CECZs is at a competitive disadvantage. Meanwhile, the development of cross-border e-commerce industry, especially in technological innovation and talent environment need to be improved. Therefore, from the perspective of ecological niche, this paper proposes that the strategy of niche expansion should be adopted in the strong comprehensive pilot zone, and the strategy of niche alliance should be adopted in the catch-up comprehensive pilot zone, the disadvantaged comprehensive pilot zone should promote the introduction of competitive niche for the development of cross-border e-commerce industry to create a good business environment.

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