Hindawi
Wireless Communications and Mobile Computing
Volume 2022, Article ID 7284213, 9 pages
https://doi.org/10.1155/2022/7284213

Research Article

Agglomeration and Spatial Distribution of E-Commerce Sector in China: A Case Study of Jiangsu Province

Fan Yong

Department of Economics and Administration, University of Malaya, Malaysia

Correspondence should be addressed to Fan Yong; 358200174@qq.com

Received 4 June 2022; Revised 7 July 2022; Accepted 22 July 2022; Published 12 December 2022

Academic Editor: Kuruva Lakshmanna

The research intends to examine the pattern of e-commerce and to investigate the clustering of e-commerce activities in the Jiangsu Province of China. The development of "Taobao villages" has become a new growth pattern for the economy of rural areas in China. This typical model of e-commerce industry agglomeration has generated huge sales, which is not only important for local economic development but also has some implications for other places with underdeveloped e-commerce industries. The proposed study combines theory and empirical evidences based on panel data generated from "Taobao villages" in all 13 regions of Jiangsu Province, China. To explore the spatial distribution and economic returns of e-commerce in the perspectives of economic agglomeration, data of five years—2016 to 2020—is exploited. Samples of regions are selected based on different agglomeration types. The type of e-commerce industry agglomeration in the form of "Taobao villages" is measured by constructing a spatial weight matrix. Using the facts and figures of the five years, a Moran scatterplot and a Local Indicators of Spatial Association (LISA) cluster map are drawn. From the perspective of economic agglomeration, the e-commerce industry in Jiangsu Province presents three basic patterns: High-High cluster, Low-High cluster, and Low-Low cluster. In addition, the Location Quotient (LQ) was used to quantitatively characterize the agglomeration of "Taobao villages." Findings of the analysis revealed that there is a positive spatial correlation between the clusters of Taobao villages, mainly between the H-H cluster and L-L cluster. The results are summarized and the most useful solutions for promoting the e-commerce industry in China. The empirical model proposed has great significance in e-commerce and may be used to enhance rural economy of China.

1. Introduction

Taobao village refers to a locality with at least 50 households utilizing the facility of online entrepreneurs to operate their businesses (Li, A. H. [1]). Normally, a Taobao village contains a cluster of rural online entrepreneurs that is an evolving force in rural e-commerce development. With the development of global Internet technology and digital economy, e-commerce has broken through the limitations of time and space dimensions and becomes the most rapidly developing and widest-reaching new industry of the 21st century. The rapid development of e-commerce groups in China in a short period has completely changed both the traditional forms of commodity distribution in China and the consumption habits of Chinese consumers. This development is an endogenous demand for the development of the e-commerce industry and has also driven the development of the regional economy, providing a good opportunity for China to seek new economic growth pattern.

In 1999, the first Taobao villages, e-commerce enterprise Alibaba was established. By 2009, several "Taobao villages" had emerged in developed coastal areas of China, i.e., villages where the number of operating online shops reached more than 10% of the number of local households and where e-commerce revenues exceeded 10 million CNY. It is the most typical new e-commerce model for China's small- and medium-sized towns in the perspective of the information age, having undergone a process of germination, growth, agglomeration, and large-scale replication over the past decade. "Taobao villages" have largely driven China's traditional rural economy into a new era of Internet-based development.

E-commerce is emerged and developed with the expansion of Internet technology. In a subset of commerce, e-commerce has crossed the boundaries of time and space, and it affects the economies of scale of the agglomeration. Existing international research on e-commerce has focused on areas such as industrial development [2, 3] and entrepreneurial motivation [4–6]. While some studies have addressed the Internet for development in rural areas [7, 8], few scholars have directly studied the unique phenomenon of "Taobao villages" in China [9, 10]. At the same time, research on the aggregation of rural e-commerce entrepreneurs in "Taobao villages" in China is not mature, and existing studies have mainly focused on theoretical analysis, lacking region-specific indicator measurements, and empirical analysis. China has become a major e-commerce country, taking its place in the international e-commerce arena, and the agglomeration of e-commerce in China is gradually taking shape. "Taobao villages" have become typical of China's e-commerce industry, whose development is closely linked to the level of local economic activity and interacts with regional economic growth. Compared to the large base of Chinese cities and towns, the proportion of "Taobao villages" is small and unevenly distributed, though in some provinces, it is a widely adopted mean of business; however, there are some places to which this feasible way of commerce is still unknown.

To study the clustering phenomenon and the contribution of China's mature "Taobao villages" in the country's economy, this paper has chosen the case of Jiangsu Province of China, where the first "Taobao villages" were born, and where there are all 13 regions had clusters of "Taobao villages." One of the best known and typical clusters is Shaji town (a town consisting of 10 or more neighboring "Taobao villages" is a cluster). According to the various research works [11–15] including the Ali Research Centre [16], the types of clusters that drive the development of "Taobao villages" in China are those that do not rely on pre-existing industries. However, rather develop from scratch, such as the town of Shaji in Jiangsu Province, the resource advantages are not naturally formed but are created. Research in the domain shows that once a cluster is formed, it becomes a cluster advantage and exemplary [17–19]. One of the most famous cases in Jiangsu Province is Shaji town. In 2006, three young men who had lost their jobs and returned to their hometown of Shaji, a small, government-subsidized village in China's Jiangsu Province, found local carpenters to create cheap IKEA-style furniture and sell it online. Their success has influenced more unemployed villagers and the clustering of the local furniture industry formed in the area. The phenomenon of many farmers selling their products directly through third-party e-commerce platforms and forming clusters has resulted in all villages in 2016 paved the way for "Taobao villages." The per capita GDP in the poor mountainous region of a decade ago is now higher than the national level in China. This economic boost is still rare not only in China but also in other parts of the world. The emergence of this new phenomenon, and the uneven development of e-commerce from the perspective of economic agglomeration, has prompted questions of concern and reflection [20–24]. In this context, it is important to investigate research questions like (1) whether there is a clustering of e-commerce industry activities, (2) what is the pattern of the e-commerce clusters, and (3) what are the factors affecting the promotion of this new era business.

Based on the above, this paper explores the spatial distribution and economic returns [3, 25] of this typical e-commerce agglomeration cluster by using qualitative methods with the relevant theories and research results on agglomeration economy. The Moran scatterplot and Local Indicators of Spatial Association (LISA) cluster map are drawn for typical regions to visualize the type of e-commerce industry clustering in "Taobao villages." In addition, an econometric model is constructed using relevant indicators as samples to analyze the different factors affecting the economic returns of e-commerce. Only a theoretical and quantitative study can explore the significance of China's unique "Taobao Village," which will help more farmers in China to transform themselves into e-merchants. This will provide some lessons to the Chinese villagers to lift out their poverty and contribute to the development of the Chinese economy.

Key contributions of the research paper include (1) the research links economic agglomeration with e-commerce development and regional economic development, which is a complement to existing studies. (2) The paper uses STATA 17.0 to conduct an empirical analysis and to draw relevant conclusions and policy recommendations. (3) The paper extends the depth of research on "Taobao villages" and broadens the breadth of research in agglomeration clusters, which is conducive to promoting this new type of e-commerce development for regional economic growth.

2. Methodology

Aims behind this research work include the discovery of phenomena, concrete analysis, and conclusion in the domain of Taobao villages. The first two chapters have identified the issues and objects to be studied. The analytical approach in this chapter is empirical and focuses on building a spatial weight matrix as well as measuring Moran's I of e-commerce returns in "Taobao villages" and plotting the related graphs, using STATA17.0 for multiple regression. The final chapter summarizes the results of the analysis and makes policy recommendations.

2.1. Spatial Autocorrelation Analysis. In the spatial autocorrelation analysis method, a set of statistics are used to describe how a variable is autocorrelated with respect to space. For the statistical computation, the error term (ε) is assumed to be normally distributed with mean zero and constant variance [26].

2.1.1. Moran's I. Global spatial autocorrelation describes the spatial characteristics of a geographical attribute across a region and determines whether there is an aggregation of the attribute's value in the overall space [27]. E-commerce industry activities among all 13 regions in Jiangsu Province, China, are not independent of each other and may interact

Table 1: Independent variables.

Independent variable	Meaning of the indicator	Code for the indicator
Logistics	Number of logistics companies in the cluster	trans
Number of e-commerce	Number of different types of e-merchants in the cluster	num
Size	Area of the cluster	area
Duration	Average duration of establishment of "Taobao villages" in the cluster	dur
Employees	Proportion of e-commerce workers to total population	emp
Education level	Proportion of university students among e-commerce workers	edu
Age	Average age of e-commerce workers	age
Marital	Marital status of e-commerce workers	marital

with the flow of R&D elements. Therefore, the total e-commerce sales of "Taobao villages" in each of the 13 regions in the last five years were selected as observations, and the global Moran's I index was calculated to analyze the overall spatial correlation of the e-commerce industry in these regions, i.e., whether the geospatially adjacent regions have similar values of industrial attributes. The global Moran's index is calculated as

$$I_i = \frac{\sum_{k=1}^{N}\sum_{j\neq k}^{N} w_{kj}(x_k - \bar{x})(x_j - \bar{x})}{S^2 \sum_{i=1}^{N}\sum_{j\neq k}^{N} w_{kj}}, \quad (1)$$

where n is the number of study objects, x_j denotes the attribute values of spatial units i and j, W_{ij} is the spatial weight matrix, S^2 is the variance of observations, $\bar{x}$ is the mean of observations. As the proposed study is based on the construction of a geographic distance matrix with nested economic geographic distances, the analysis is measured according to the global Moran index formula using STATA17.0.

2.1.2. Anselin Local Moran and LISA Cluster Map. The global Moran index only examines the spatial agglomeration of the whole spatial sequence; in fact, the e-commerce agglomeration in some regions may show negative spatial autocorrelation. Therefore, it is necessary to introduce the anselin local Moran to further examine the agglomeration characteristics of the 13 regions. The formula for measuring the local Moran index is

$$I_i = \frac{Y_i - \bar{Y}}{S^2}\sum_{j=1}^{n} W(Y_j - \bar{Y}). \quad (2)$$

I_i is Moran's I, which measures the spatial correlation between area i and the size of employment in neighboring areas, $S^2 = 1/n\sum_{i=1}^{n}(Y_i - \bar{Y})$, $\bar{Y} = 1/n\sum_{i=1}^{n} Y_i$, Y_i denotes the e-commerce sales of region i, n denotes the number of regions, and W denotes the weight matrix. If $I_i > 0$, it means that the region shows similar sales to the surrounding regions, showing High-High or Low-Low cluster; if $I_i < 0$, it means that the region shows High-Low or High-Low cluster.

As for the local correlation test, the Moran scatterplot is generally used to present it. In this paper, Moran scatterplots for the five years 2016-2020 are drawn using STATA17.0 based on the geographical distance nested matrix. And different types of aggregation are marked on the LISA cluster map to determine the spatial evolution process of the e-commerce industry through the panel data of the last five years.

Table 2: Measures of global spatial autocorrelation Weights matrix.

Name: W
Type: Imported (binary)
Row-standardized: No
Moran's I

Variables	I	$E(I)$	$sd(I)$	z	p-value*
Year 2016	0.359	-0.083	0.141	4.422	0.008
Year 2017	0.393	-0.083	0.138	5.715	0.003
Year 2018	0.405	-0.083	0.142	4.026	0.001
Year 2019	0.447	-0.083	0.117	5.964	0.005
Year 2020	0.564	-0.083	0.152	6.285	0.004

*1-tail test.

2.2. Measurement of Spatial Agglomeration Levels. There are several methods to measure the level of industrial spatial agglomeration: Location Quotient (LQ) to measure the degree of industrial specialization; EG index to measure the agglomeration structure of industries; employment to measure the spatial density of industries; and the spatial Gini (G) coefficient to measure the concentration of industries. In comparison, locational entropy is one of the most suitable measures for this paper. It is a tool proposed by Haggett [28] to measure the degree of industrial agglomeration: its advantage is that it can more easily reflect the degree of specialization of an industry to be studied and is widely used in locational analysis.

$$LQ_{ij} = \frac{q_{ij}/\left(\sum_{j=1}^{m} q_{ij}\right)}{\left(\sum_{i=1}^{n} q_{ij}\right)/\left(\sum_{i=1}^{n}\sum_{j=1}^{m} q_{ij}\right)}, \quad (3)$$

where q_{ij} is the number of "Taobao villages" in region j, q_j is the e-commerce total sales in region j, q_i refers to the number of "Taobao villages" in the country, and q is the national e-commerce total sales.

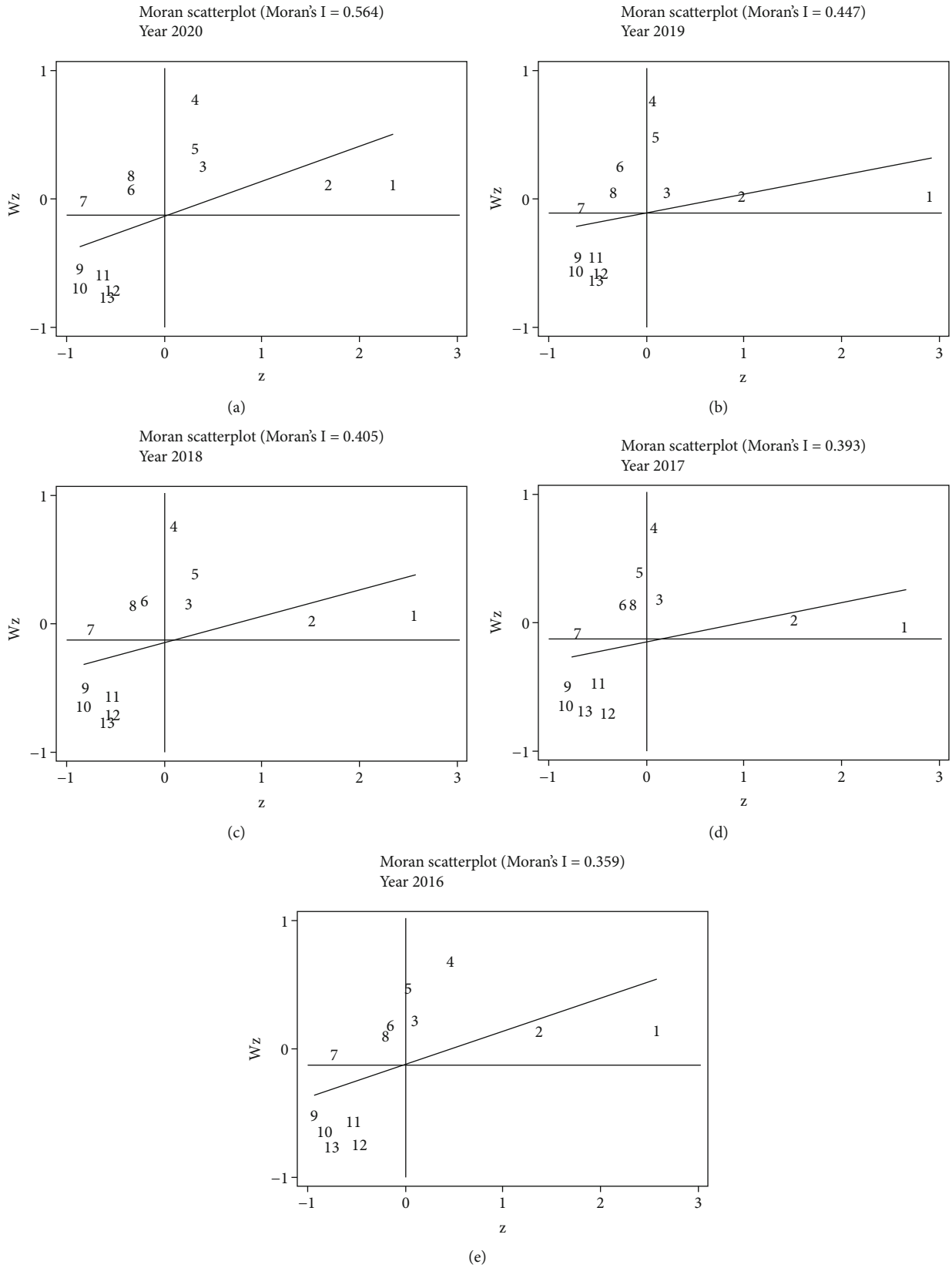

Figure 1: Local Moran's I in the five years—(a) 2020, (b) 2019, (c) 2018, (d) 2017, and (e) 2016.

Table 3: Spatial agglomeration types of e-commerce industry in Jiangsu Province.

	H-H cluster (first quadrant)	L-H cluster (second quadrant)	L-L cluster (third quadrant)	H-L cluster (fourth quadrant)	Across the quadrant
From 2016 till 2020	R1, R2, R3, R4	R6, R7, R8	R9, R10, R11, R12, R13	——	R5 (from the second quadrant to the first)

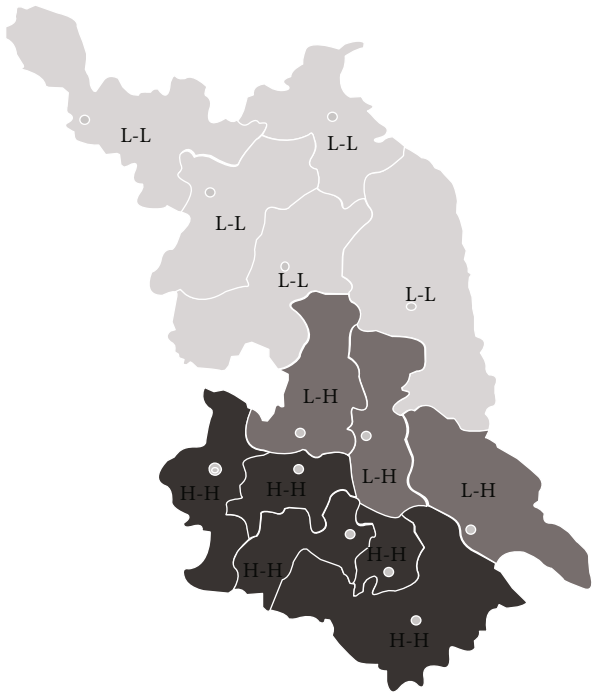

Figure 2: LISA cluster map.

2.3. Econometric Model Setting. To further study the agglomeration development of the e-commerce industry represented by "Taobao villages," this paper sets up a nested model for OLS regression, as the agglomeration of "Taobao villages" is often influenced by several factors and may be correlated. This model is based on Shaji Town, the first town in China to form a "Taobao village," and in 2016, all 17 of its administrative villages became "Taobao villages." It is the most famous "Taobao villages" clustering area in China and is also an important economic belt in China's Jiangsu Province, with great research significance.

The regression model takes the following specific form:

$$\begin{aligned} TS = {} & \alpha + \beta_1 \text{trans} + \beta_2 \text{num} + \beta_3 \text{area} + \beta_4 \text{dur} + \beta_5 \text{emp} \\ & + \beta_6 \text{edu} + \beta_7 \text{age} + \beta_8 \text{marital} + \varepsilon. \end{aligned} \quad (4)$$

This paper uses STATA17.0 to illustrate this creation of nested models, where different models have similar structures and partially similar variables, which in turn allows for some interrelated results, making the results of studying the factors influencing e-commerce spatial agglomeration more reliable.

The five years of data from 2016 to 2020 are still chosen here, with the total e-commerce sales (TS) of all the "Taobao villages" in this Shaji region as the dependent variables and the eight factors that have an impact on the agglomeration effect as independent variables. These variables serve as potential influencing factors for the development of local e-commerce. The meaning of the indicator and code for the indicator are shown in Table 1 to explain every independent variable of the econometric model.

2.4. Data Sources. The data in this paper is taken from the China Ali Research Institute, the China Ecommerce Industrial Park Directory, the China Industrial Enterprise Database, the China Statistical Yearbook, and the official website of the Statistics Bureau of Jiangsu Province, China. These institutions provide comprehensive data on the e-commerce industry in 13 regions of Jiangsu Province, including the number of "Taobao villages" in each region, e-commerce sales, and other relevant data. Based on this data, statistical analysis was conducted to calculate the Location Quotient using the number of "Taobao villages" in the e-commerce cluster.

3. Results and Discussion

To analyze the local spatial linkages, the degree of spatial differences, and the spatial pattern of the 13 regions of Jiangsu Province and their neighboring regions, the global Moran index and the Moran scatterplot over a five-year period were chosen for spatial statistical analysis in this study. In addition, LISA cluster maps were made, and spatial evolution processes were analyzed according to most years.

3.1. Analysis of Moran's I. The global Moran's I of all 13 regions in Jiangsu Province for the past five years was used to consider whether there was clustering or outliers in these regions. If there is global spatial autocorrelation appearing, then analysis of the local spatial autocorrelation, the local Moran's I will reflect where outliers or agglomerations exist. In this paper, the data was processed and analyzed through STATA17.0 and the following Table 2 shows the results it generated.

In the measure of global spatial autocorrelation, a Moran's $I > 0$ indicates that the data exhibits spatial autocorrelation, while Moran's I indices in the above table for the last five years all range between 0.3 and 0.6, with p-values less than 0.01 so indicating that this data is agglomeratively distributed, with a z-score much greater than 2.58. It indicates that there is 99% certainty that this data is not randomly distributed, and the probability of random distribution is less than 1%. To consider the local Moran's I and LISA cluster map, the following figure, Figure 1, shows the relationship between specific regions and neighboring regions through the Moran scatterplot in STATA17.0. The value 13 in the figure indicates the number of regions of the Jiangsu Province of China.

Table 4: Locational quotient for regions A1, A2, and A3.

	2016	2017	2018	2019	2020
A1	1.841218992	1.448109373	1.017096057	0.122493817	1.000245142
A2	1.455760234	1.254834034	1.137294839	1.028463920	1.008426483
A3	1.342296583	1.144990986	1.037298117	1.008752093	1.105456007

The four quadrants of the Moran scatterplot represent the four forms of spatial association between its own spatial units and those of its neighbors. The first quadrant is High-High (H-H) cluster, where both of its neighboring observations are high. The second quadrant is Low-High (L-H) cluster, where the low observations are surrounded by neighboring high observations. The third quadrant is Low-Low (L-L) cluster, where both the neighboring observations are low. The fourth quadrant is High-Low (H-L) cluster, where the high observations are surrounded by neighboring low observations.

The Moran scatterplot can be used for analysis of the change in e-commerce agglomeration in these areas over the last five years. The first quadrant to the fourth quadrant represent H-H cluster, L-H cluster, L-L cluster, and H-L cluster, respectively. Quantitatively, there is no H-L cluster in all 13 regions of Jiangsu Province, and there are more H-H cluster and L-L cluster. That is, areas with high or low e-commerce development scores are more likely to be spatially clustered. The five Moran scatterplots are combined to reflect the evolution of the spatial agglomeration types of the e-commerce industry in 13 regions of Jiangsu Province in the past five years (see Table 3). The table shows that the spatial agglomeration types of the e-commerce industry in these regions are relatively stable.

The LISA cluster map in Figure 2 shows the spatial distribution pattern of each agglomeration type. Except the year 2017, all the years show the same results. For accuracy's sake, most of the years are used to make the map. The local Moran scatterplot and the LISA agglomeration plot further show that the e-commerce agglomeration in 13 regions of Jiangsu Province, China, is characterized by strong regularity. In terms of economic agglomeration, the spatial distribution of e-commerce in China has a spillover effect on the contribution of the economy but provides a possible new path for the realization of new urbanization in rural areas in the Internet era.

3.2. Analysis of Locational Quotient. Based on the Moran index analysis and the LISA agglomeration map, this paper classifies 13 regions in Jiangsu Province of China into three different levels of agglomeration: High-High cluster, Low-High cluster, and Low-Low cluster. One region in each of the three types was selected to measure the spatial agglomeration level of the e-commerce industry. Region 1 is in the H-H cluster, while Regions 2 and 3 are in the L-H cluster and L-L cluster, respectively, and Table 4 shows the calculated LQ for each region, denoted by A1, A2, and A3, respectively.

The higher the value of LQ_{ij}, the higher will be the level of regional industrial agglomeration. The LQ values of the three regions with different levels of agglomeration are all greater than 1, which proves that the e-commerce agglomeration in these regions has advantages in the country and has certain research significance.

Furthermore, this paper selects Shaji Town, the best developed region in Jiangsu Province, to further study its "Taobao villages" agglomeration to explore the factors influencing e-commerce sales and their spatial correlation. Although Shaji Town is in the L-L cluster, it is the first area in China where "Taobao villages" have emerged, and its development is mature with comprehensive data. The model was selected to study Shaji Town in Jiangsu Province, which is conducive to the collection of receipts and has great research significance.

3.3. Multiple Regression Analysis. The target of the study here is Shaji town, the first "Taobao villages" in China, whose all 17 villages established "Taobao villages" in 2016. It is a national "Taobao villages" cluster area in China and an economic belt for e-commerce industry development in Jiangsu Province, China.

About the model, in model (1), only the null model was set up, with no other variables; in model (2), variables such as logistics companies, number of e-commerce, area of the cluster, average duration of establishment "Taobao villages," and number of employees were added; in model (3), education level was added; in (4), age was added; and in (5), the full model was set up, in which the marital status of the employees was further added. The results are shown in Table 5.

It can be seen that the constant term in model (1) is significant, which means that there are many variables that have a significant effect on the dependent variable when they are not included in the model. However, the R-squared of the model is 0, which also indicates that this null model does not explain the variance change in the dependent variable and further consideration of other model results is required.

Models (2)-(5) all involve the logistics factor and find that the number of logistics companies is significant for the e-commerce returns, with high significance in all conditions, and does contribute to the economic returns.

Models (3)-(5) all involve the education factor but are not significant, as the actual development of these "Taobao villages" has contributed to the development of China's rural economy because this mode of e-commerce development does not require many high-tech workers and does not necessarily require a high level of education, most of them are farmers.

The inclusion of the age factor in model (4) is not stable, suggesting a complex relationship between the age of e-commerce practitioners and the economic returns of "Taobao villages" in the region.

Table 5: Regression results for the five models.

	(1) TS	(2) TS	(3) TS	(4) TS	(5) TS
trans		0.193***	0.201***	0.126***	0.173***
		(0.024)	(0.023)	(0.022)	(0.024)
num		0.932***	0.723***	-0.312***	0.002***
		(0.001)	(0.002)	(0.001)	(0.002)
size		0.118***	0.113***	0.125***	0.138***
		(0.030)	(0.029)	(0.029)	(0.031)
dur		0.105***	0.108***	0.112***	0.109**
		(0.051)	(0.053)	(0.0051)	(0.049)
emp		0.042***	0.038***	0.041***	0. 033***
		(0.003)	(0.002)	(0.003)	(0.003)
edu			-0.041***	-0.062***	-0.067***
			(0.001)	(0.001)	(0.001)
age				0.015***	-0.012***
				(0.001)	(0.001)
marital					-0.041***
					(0.003)
_cons	6.531***	8.390***	40.409***	-14.499***	-20.922***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
N	5	5	5	5	5
R^2	0.000	0.061	0.178	0.179	0.186

Standard errors in parentheses. $^{*}p < 0.05$, $^{**}p < 0.01$, and $^{***}p < 0.001$.

Model (5) shows that the marital status of the practitioners has no significant effect on the economic income of Taobao villages, which is a side argument for the change in the cluster development of "Taobao villages" from the family-based model to a more cooperative model.

Furthermore, with respect to the above results, it can be found that the factors of logistics companies, number of e-commerce, area of the cluster, average duration of establishment "Taobao villages," and number of employees have a significant effect on the economic income of "Taobao villages" but the marital status and education level of worker are not significant. In addition, in models (4) and (5), the direction of significance of age changes with the inclusion of marital status as a factor.

Therefore, the question arises: it is likely that marital status and age of practitioners have some unexplained effects on the economic returns of "Taobao villages."

4. Conclusion

This paper examines the spatial distribution of "Taobao villages" clusters in 13 regions of Jiangsu Province, China, and empirically investigates the spatial spillover effects using spatial econometric model based on theories on the impact of industrial agglomeration on economic returns. The main conclusions are as follows.

There is a positive spatial correlation between the clusters of Taobao villages in Jiangsu Province, China, with obvious spatial clustering characteristics, mainly H-H cluster and L-L cluster. The southern region of Jiangsu Province, China, is a high agglomeration area with innovation efficiency and industrial synergy, the northern region is L-L cluster, and the central region is a transitional area with L-H cluster. But all regions in this province are above the level of e-commerce development in China.

The "Taobao villages" in Jiangsu Province is not only a success story but also a typical new path of rural urbanization. As a new model, it is a regional benchmark for China's rural economic development, with farmers consciously learning and using online e-commerce, information technology and logistics, and warehousing technologies, as well as serving as a reference for the development of e-commerce in other rural areas. By promoting this new model of e-commerce development, it is possible to realize the development of special industries in China's rural areas at the regional productivity levels, to achieve a leap forward in the rural economy.

4.1. Policy Recommendations. In response to the above conclusions, this paper puts forward the following policy recommendations. Rural regions should commit to building regional collaboration platforms to achieve mutual benefits and win-win results in the e-commerce industry. The emergence of "Taobao villages" is not only changing the economic landscape of villages but also a profound change in agricultural production methods, rural lifestyles, farmers'

ways of thinking, and values. Therefore, when developing "Taobao villages" in the rural region, each region should firstly strengthen the exchange between the regions that are mature in e-commerce development and play their role in providing assistance, sharing advanced technology, knowledge, and organizational management experience. It improves the efficiency of spatial allocation of agglomerated resources, to narrow the gap in the level of economic development between regions. Secondly, through the introduction of technology to developed regions, underdeveloped counterparts improve their own absorption and digestion capacity in terms of imitation, and the regions can cooperate to achieve the sharing and innovation of various resources. While developing products with local characteristics, cooperation with producers from neighboring is needed to achieve the agglomeration effect and the enhancement of product innovation. Finally, the Chinese government should treat "Taobao villages" as an important element in promoting urbanization and improving people's livelihoods, focusing on coordinated regional development on the one hand, and weakening the Matthew Effect. For regions in China that have the potential to develop into "Taobao villages," the government should form effective support for such e-commerce activities in terms of financial, educational, market, and information environments. It should also break through the barriers of administrative regions to achieve the flow and allocation of factors on a wider scale, especially for the inter-regional flow of outstanding experience and R&D personnel, and should improve the reform of the household-registration system, the enhancement of treatment and benefits, and the flow mechanism of factors, so as to expand the spatial radius of the agglomeration economy by increasing mobility, thus promoting the development of the e-commerce industry and making the "Taobao villages" will benefit the majority of Chinese farmers on a larger scale. A key limitation of the model is its inability to cope with the variance change in the dependent variable. The R -squared of the model is 0, which indicates that the model does not explain the variance change in the dependent variable. This necessitates further consideration results of other models for optimal performance. In the future, the research work will be extended to compensate for the zero R-square value.

Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The author solemnly declares that he has no conflict of interest.

References

[1] A. H. Li, "E-commerce and Taobao villages," *China Perspectives*, vol. 2017, no. 3, pp. 57–62, 2017.

[2] J. Jofre-Monseny and A. Solé-Ollé, "Tax differentials in intraregional firm location: Evidence from new manufacturing establishments in Spanish municipalities," *Regional Studies*, vol. 44, no. 6, pp. 663–677, 2010.

[3] X. Yang, Z. Qiang, X. Zhao, and Z. Ling, "Research on distributed e-commerce system architecture," *Eighth ACIS International Conference on Software Engineering, Artificial Intelligence, Networking, and Parallel/Distributed Computing (SNPD 2007)*, vol. 2, pp. 821–825, 2007.

[4] K. Behrens, "Agglomeration without trade: how _non-traded_ goods shape the space-economy," *Journal of Urban Economics*, vol. 55, no. 1, pp. 68–92, 2004.

[5] Z. Cheng and W. Jin, "Agglomeration economy and the growth of green total-factor. Productivity in Chinese industry," *Socio-Economic Planning Sciences*, vol. 83, no. article 101003, 2020.

[6] D. Ding, G. Chong, D. L. K. Chuen, and T. L. Cheng, "From ant financial to Alibaba's. Rural Taobao strategy–how Fintech is transforming social inclusion," *Handbook of Blockchain, digital finance, and inclusion*, vol. 1, pp. 19–35, 2018.

[7] S. Y. He, D. Wu, H. Chen, Y. Hou, and M. K. Ng, "New towns and the local agglomeration economy," *Habitat International*, vol. 98, article 102153, 2020.

[8] K. Ikeda, K. Murota, T. Akamatsu, and Y. Takayama, "Agglomeration patterns in a long narrow economy of a new economic geography model: analogy to a racetrack economy," *International Journal of Economic Theory*, vol. 13, no. 1, pp. 113–145, 2017.

[9] S. Hong, S. Danqing, and H. Fei, "Analysis of cross-border E-commerce development. In Jiangsu Province of China based on SWOT," *Science*, vol. 4, no. 2, pp. 56–60, 2016.

[10] A. Getis, "A history of the concept of spatial autocorrelation: a geographer's perspective," *perspective. Geographical analysis*, vol. 40, no. 3, pp. 297–309, 2008.

[11] Y. Li, E. Luo, H. Zhang, X. Tian, and T. Liu, "Measuring inter-regional spillover and feedback effects of economy and CO2 emissions: a case study of the capital city agglomeration in China," *Resources, Conservation and Recycling*, vol. 139, pp. 104–113, 2018.

[12] J. B. Parr, G. J. Hewings, J. Sohn, and S. Nazara, "Agglomeration and trade: some additional perspectives," *Regional Studies*, vol. 36, no. 6, pp. 675–684, 2002.

[13] J. Qi, X. Zheng, P. Cao, and L. Zhu, "The effect of e-commerce agribusiness clusters on farmers' migration decisions in China," *Agribusiness*, vol. 35, no. 1, pp. 20–35, 2019.

[14] Z. Ren, X. Xu, J. Wan, W. Shi, and M. Zhou, "Workload characterization on a production hadoop cluster: a case study on Taobao," in *2012 IEEE International Symposium on Workload Characterization (IISWC)*, pp. 3–13, La Jolla, CA, USA, November 2012.

[15] L. I. N. G. Shou-xing, "Research on forming and evolving mechanism of E-commerce industrial cluster in China′s rural area," *Commercial research*, vol. 57, no. 1, article 104, 2015.

[16] R. Ali, M. H. Siddiqi, and S. Lee, "Rough set-based approaches for discretization: a compact review," *Artificial Intelligence Review*, vol. 44, no. 2, pp. 235–263, 2015.

[17] Y. Lin, "E-urbanism: E-commerce, migration, and the transformation of Taobao villages in urban China," *Cities*, vol. 91, pp. 202–212, 2019.

[18] M. Liu, Q. Zhang, S. Gao, and J. Huang, "The spatial aggregation of rural e-commerce in China: an empirical investigation into Taobao Villages," *Journal of Rural Studies*, vol. 80, pp. 403–417, 2020.

[19] M. G. Martinsons, "Relationship-based e-commerce: theory and evidence from China," *China. Information Systems Journal*, vol. 18, no. 4, pp. 331–356, 2008.

[20] J. F. Thisse and J. F. Thisse, "Economics of agglomeration," in *Oxford Research Encyclopedia of Economics and Finance*, Oxford University Press, Cananda, 2019.

[21] C. C. Wang, J. T. Miao, N. A. Phelps, and J. Zhang, "E-commerce and the transformation of the rural: the Taobao village phenomenon in Zhejiang Province, China," *Journal of Rural Studies*, vol. 81, pp. 159–169, 2021.

[22] Y. D. Wei, J. Lin, and L. Zhang, "E-commerce, taobao villages and regional. Development in China," *Geographical Review*, vol. 110, no. 3, pp. 380–405, 2020.

[23] J. Wieland and D. Fischer, "Transaction cost theory and business legitimacy," in *Handbook of Business Legitimacy*, pp. 1147–1167, Springer, Cham, 2020.

[24] G. A. Wood and J. B. Parr, "Transaction costs, agglomeration economies, and industrial location," *Growth and Change*, vol. 36, no. 1, pp. 1–15, 2005.

[25] Y. Zeng, H. Guo, Y. Yao, and L. Huang, "The formation of agricultural e-commerce clusters: a case from China," *Growth and Change*, vol. 50, no. 4, pp. 1356–1374, 2019.

[26] E. Elahi, Z. Khalid, and Z. Zhang, "Understanding farmers' intention and willingness to install renewable energy technology: a solution to reduce the environmental emissions of agriculture," *Applied Energy*, vol. 309, article 118459, 2022.

[27] X. Liu, J. Wang, M. Liu, and B. Meng, "Spatial heterogeneity of the driving forces of cropland change in China," *Science in China Series D: Earth Sciences*, vol. 48, no. 12, pp. 2231–2240, 2005.

[28] P. Haggett, "The spatial economy," *American Behavioral Scientist*, vol. 22, no. 1, pp. 151–167, 1978.