Research on Time and Spatial Coupling Coordination of County Economy and Logistics in Inland Areas—A Case of Jinquli Region in Zhejiang Province

Tian-Ying JIANG\textsuperscript{1,a,*}, Hui ZHU\textsuperscript{2,b}

\textsuperscript{1}Ningbo Dahongying University, Ningbo, Zhejiang, China
\textsuperscript{2}Zhejiang University of Technology, Hangzhou, China
\textsuperscript{a}jty7608@126.com, \textsuperscript{b}joy65192@163.com
*Corresponding author

Keywords: County Economy, County Logistics, Coupling Coordination, Inland.

Abstract. It evaluates the comprehensive economic and logistic developmental conditions by entropy method and analyses time and spatial coupling coordination features of county economy and logistics on the base of coupling and coupling coordination models in inner-land areas of Jinquli region located at central and southern Zhejiang province. Some conclusions are summarized as follows: the degree of coupling coordination of county economy and logistics in this region is relatively low and the spatial differentiation is significant; Yiwu stands prominent position in economic development and logistical improvement and features high level of coupling coordination; the coupling coordination of economy and logistics in many counties are still imbalanced or recessionary but the developmental trend tends to be better; the coordination degree in some counties are decreased apparently especially in areas belong to transitional coordination type.

Introduction

With the speeding up of the globalization process and the constantly refined of the social division of labor, The logistics industry’s optimization effect to promote regional economic development and to optimize the effect of regional economic structure is increasingly highlighted, the development of the regional logistics become an important embodiment of comprehensive strength in the regional economic. However, in recent years, some areas where the economic development rapidly, relatively backward level of logistics has seriously hampered the rapid development of regional economy, and in some less developed areas, the logistics supply and cannot match the backward economy, coordinated development of regional economy and regional logistics is becoming more and more attention.

Academia began the study of the relationship between regional economy and regional logistics in industrial location theory. Foreign research explored more intrinsic link between regional logistics and regional economy from the perspective of transport [1-2], domestic scholars are more focused on the causal relationship between the two [3-4]. In recent years, scholars began to explore the two-way interaction between, more like Yang Jianglian [5] found that regional logistics promote regional economic development in the exploration of Chongqing regional logistics and economic interaction, and the development of economic can accelerate enhance the regional logistics value. Tian Yuan [6] through input-output analysis methods also reached similar conclusions. But with the rapid development of logistics...
resources to enrich and logistics industry, modern logistics has penetrated into all aspects of social and economic production, some scholars believe that the two are no longer confined to simple two-way causal relationship, but collaborate by joining various elements interact to form a dynamic coupling relationship [7]. Liu Weilin [8] through the system dynamics method analyze dynamic association and coupling structure between regional logistics system and regional economic growth, and case of Tian Jin to emulate empirical, show that both indicate the presence of adaptive mechanisms. Zhang Jiansheng, Hu Xiuzhong [9] based on the relevant statistical data of 2008 to 31 provincial level administrative region in mainland China logistics and economic comprehensive development level and the coupling coordination degree has carried on the quantitative evaluation, the results show that the eastern region economy, the logistics coupling coordination degree is higher, the Midwest logistics development level is higher than the level of economic development, the coordination degree is lower.

But only a few references on the subject, and mostly focus on capital cities, for the interior of the economy, the logistics base is relatively weak little attention county region, the coupling coordination relationship of logistics industry and economic development issues not involved. In fact, the coordinated development of county economy and logistics, to promote the county economy growth mode transformation, promote urbanization process and the coordination of urban and rural economic development and so on all has the vital significance, therefore, from a small county geographical space scale to research the coupling not only can enrich the regional economy and regional logistics development and research of existing research results, and for the region coordinated development of economy, logistics and planning to provide more targeted countermeasures and Suggestions, and to other counties (cities) of logistics and coordinated economic development also has certain reference significance.

Based on this, this article takes Jinquli in Zhejiang province as an example, to county administrative region (including district, county-level cities, counties and autonomous counties) as the basic spatial unit, based on the analysis of the county economy and the county logistics, on the basis of coupling mechanism, based on statistical yearbook data, from 2002 to 2011 counties (city) economy, the logistics development level to do comprehensive evaluation, on the economy and logistics, coupling and coupling coordination degree to measure, and based on the empirical conclusion, put forward to promote the coordinated development of county economy and China's continental logistics related countermeasures and Suggestions.

**Coupling Mechanism between County Economy and County Logistics**

County economy is an administrative county which is ranged as independent planning and financial functions (including county-level cities), Market-oriented, take the county government as the subject, fully functional and has regional characteristics of regional economic system [10]. The county logistics is an regional logistics at the administrative county, it is the "tail" of urban logistics and the "head" of rural logistics, it is a combination of urban and rural logistics, and involved in the production, distribution, exchange and consumption and so on. The coupling of county economy and logistics can be considered as two systems: the county economy and the county logistics interact through coupling elements of interaction process. As shown in figure 1, the county logistics consists of two subsystems: logistics supply logistics demand, both are in the internal coupling between supply and
demand. At the same time, these two subsystems also through coupling factors, such as scale
and development of economic, industrial structure, consumption levels, openness and other
factors produce which are included in the county's economic system to generate coupling
effects.

Study Area, And Research Methods

Study Area

Jinquli region located at central and southern Zhejiang province. Bounds Shanghai, Hangzhou and Ningbo on the north, adjacent Ningbo, Taizhou, Wenzhou on the east, radiation Anhui, Jiangxi and Fujian on the west and south. The total area is 370,000 square kilometers. It is an important channel of economy radiation to the Midwest from Yangtze River Delta and the southeast coast of Zhejiang Province, and also the location of one of the key construction of the central in Zhejiang province. The rea covers Jinhua, Quzhou, Lishui, including five municipal districts, six county-level cities, 12 counties and one autonomous county, a total of 24 county-level administrative regions, most of the county (city) was mountainous, hilly
landscape.

Index System and the Weights

Under the guiding principle of completeness, hierarchy, feasibility, etc., on the basis of
both the science and the data on the availability of this study refer to related research, based
on economic, coupling mechanism logistics County Select the number of indicators to reflect
the inland economy, logistics development characteristics. It should be noted that, due to the
logistics mainly inland county road transport logistics (not including passenger output) based,
so the logistics of supply and logistics needs of both selected relevant indicators to be
reflected. In addition, given the lack of online retail businesses and county rapid development
of county statistics related to trade and logistics, this study indirectly reflect the county level
development of the Internet business logistics supply situation. Finally, in consultation with
relevant experts views on some indicators have been adjusted, the final formation of a more
complete and independent evaluation index system.

In recent years, the entropy method and analyses is widely used in the comprehensive
evaluation of indicators, as its objectivity, operational advantages, this paper intends to use
this method to determine the weight of index.

Evaluation Model

This paper learns the concept of capacity coupled and capacity coupling system model in
physics, refer to the relevant literature, builds coupling model between county economy and
the county logistics, calculated as follows:

\[ C = \left\{ \frac{U_1 \times U_2}{(U_1 + U_2)(U_1 + U_2)} \right\}^{1/2} \]

In the above formula: U1 and U2 represent the level of development of county economy and
county logistics comprehensive value, C is the coupling values, ranging between [0, 1].
When C = 1, the degree of coupling reaches the largest and the system reaches resonance,
have good coupling effect.

In order to avoid the coupling is difficult to reflect synergies of economic and logistics,
coupling coordination degree model is introduced in the coupling of the model, based on the
formula [19] as follows:
\[ D(x, y) = \sqrt{C \times T} \]
\[ T = \alpha U_1 + \beta U_2 \]

In the above formula, D is coupling coordination degree; C is the coupling; T is the integrated coordinated index of county economy and county logistics, \( \alpha, \beta \) coefficients to be determined, in accordance with the relevant academic studies [20], in this, the \( \alpha, \beta \) assigned the same value of 0.5. Generally, \( T \in [0,1] \), \( D \in [0,1] \).

**Empirical Analysis**

**The Evaluation of Economy and The Logistics Development Level in The County (city)**

The **Level of Economic Development**. In 2002, the highest level of the county comprehensive value’s economic development is Yiwu with 0.89. Jinhua urban and dongyang ranks the second and the third with 0.75 and 0.60 respectively. The lowest comprehensive score is Qingyuan county, only 0.12. The next is Songyang county and Kaihua county, followed by 0.15 and 0.16. In the year 2011, the high level of economic development is Yiwu. But the comprehensive value fell slightly with 0.18. Jinhua is still the second. But the comprehensive value fell to 0.59. Yongkang over Dongyang ranks the third with 0.52. The lowest three of comprehensive value has not changed. It is still Qingyuan county, Songyang county and Kaihua county. The comprehensive value of the three counties is 0.18.

**Comparison of Logistics Development Level.** Look at the logistics development level changes of every county(city). In 2002 the logistics development level of Jinhua is the highest with 0.92. Yiwu and Yongkang is the second and the third with 0.76 and 0.46. But Jingning is the last with only 0.01. Following by Pan’an and Changshan with only 0.06 and 0.07. In 2011 Yiwu past Jinhua to the first with 0.78 Comprehensive value. Jinhua and Lishui following by 0.65 and 0.44. The last three is Yunhe county, Jingning Autonomous county and Jinyun county. The comprehensive value of them are lower than 0.1. On the whole, The city and some county with strong economic power have higher logistics development level and the mountains and the region with weaken logistics development level are usually low. The regional logistics development level difference is obvious. Between 2002 and 2011, various counties (city) level of logistics development has a different degree of ascension and Jianshao city rise is the largest. Logistics development level in 2011 nearly 2 times that of 2002.

**The Degree of Space and Time Evolution of the County Economy and Logistics Coupling Coordination**

The **Time Differentiation of the Coupling Coordination Degree.** As we can know, in about ten years, the economic and logistics coupling coordination degree most on the rise. In 22 counties (cities), There are ten counties (cities) of the coupling coordination degree rise, 3 counties (cities) coupling coordination degree fell slightly, Another 9 counties (cities) coupling coordination degree were little changed. The largest rise of the coupling coordination degree in the order is Songyang county, Jingning county, Longyou county and Jiangshan city. Economic logistics coupling coordination degree levels drop most significant is jinhua city. The coupling coordination degree of this area is 0.64, in the 2011 it decrease to 0.55, drop of 0.09.

The **Coupling Coordination Degree of Spatial Pattern of Evolution.** Comprehensive related research results [18-19] and the actual development situation of JinQu Li area. This study of county economy logistics coupling coordination degree is divided into three levels and ten types.
Table 1. Evaluation Standard and Types of Coordinated Development between County Economy and County Logistics.

<table>
<thead>
<tr>
<th>Categories</th>
<th>The coupling coordination degree</th>
<th>Type recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>The coordinated development</td>
<td>$D \in (0.90, 1.00)$</td>
<td>Excellent coordination development</td>
</tr>
<tr>
<td></td>
<td>$D \in (0.80, 0.89)$</td>
<td>Good coordination development</td>
</tr>
<tr>
<td></td>
<td>$D \in (0.70, 0.79)$</td>
<td>Intermediate coordinated development</td>
</tr>
<tr>
<td></td>
<td>$D \in (0.60, 0.69)$</td>
<td>Primary Coordinated development</td>
</tr>
<tr>
<td></td>
<td>$D \in (0.50, 0.59)$</td>
<td>Reluctant coordinated development</td>
</tr>
<tr>
<td>The transition of coordinated development</td>
<td>$D \in (0.40, 0.49)$</td>
<td>On the verge of a recession class imbalance</td>
</tr>
<tr>
<td>Imbalance of recession</td>
<td>$D \in (0.30, 0.39)$</td>
<td>Mild recession class imbalance</td>
</tr>
<tr>
<td></td>
<td>$D \in (0.20, 0.29)$</td>
<td>Moderate class imbalance recession</td>
</tr>
<tr>
<td></td>
<td>$D \in (0.10, 0.19)$</td>
<td>Severe recession class imbalance</td>
</tr>
<tr>
<td></td>
<td>$D \in (0.00, 0.09)$</td>
<td>Extreme imbalance recession class</td>
</tr>
</tbody>
</table>

**Summary**

This study based on the characteristics of the county economy and the development of county logistic and expounds the coupling mechanism of both. It Analysis and discuss the economic, and logistics coupling coordination development in Jinquli district from 2002 to 2011 though the coupling and coupling coordination degree model. It result in the following conclusion. Most regional of our country influence by regional conditions, infrastructure and other factors who’s economic development level is not high. Its logistics basic condition is weak, the economy logistics coupling coordination degree is not high. Through the exploration of this study, combined with the county economy, logistics coupling mechanism we have of several revelations of logistics economy the coordinated development.

**Acknowledgement**

This research was financially supported by National Natural Science Foundation of China, Project of Cluster Innovation Ecosystem of Small and Medium sized Enterprises based on Complex Network Environment (Project No.71372001), and by Ministry of Education in China Project of Humanities and Social Sciences Research on Coupling Coordination of Industrial Clusters, Regional Logistics and New-type Urbanization (Project No. 14YJCZ0232).

**References**


