

# Quantitative Research on Regional Competitiveness of Longyan City of Fujian

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**Abstract:** As the regional economy enhances its position in national economic space pattern, the urban-regional relationship is restructuring, and the urban development has an increasing demand on enhancing its competitiveness through collaborative cooperation and advantage remolding from the perspective of overall regional scale. By aid of SPSS and GIS spacial analysis and mathematical statistic analysis tools, this paper adopts a set of multidimensional and comprehensive indicator system, establishes 7 first-level indicators and 16 second-level indicators to recognize the current competitiveness of Longyan City in Hercynian economic zone; besides, it reveals that the prominent presentation of insufficient regional competitiveness lies in the problems of population-employment, land-space and industry-economy. Wherein, the population-employment problem refers to insufficient attraction of population, uneven distribution of employment space, deficient employment positions in counties and low employment structure energy level out of the central cities; the land-space problem refers to few quantity of land suitable for construction, relatively-extensive urban land in limited construction lands, disperse and inefficient construction lands in rural areas; the industry-economy problem refers to single and primary pillar industries, insufficient science and technology innovation impetus, lack of talent cultivation and attraction. This paper provides basis for formulating urban competitiveness enhancement strategy for the regions centering on urban agglomeration.

**Keywords:** Regional competitiveness; Competitiveness evaluation; Longyan City

## 1. Introduction

### 1.1. Core connotation of regional competitiveness

Regional competitiveness researches the rareness of regional resources to provide new idea for regional economic development, including short-term and long-term economic development objectives as well as economic structure policy, which mainly researches the invisible hand, namely the market resource allocation problem with its core in creating competitiveness. Therefore, the essence of regional competitiveness is how to optimize and allocate resources, lies in the resource allocation capability in subordinated areas and unification of competitive assets and competition process, and depend on the elements including transformation factor, transformation process, environmental situation, enterprise confidence, industrial order and structure. Based on comparative research on several regional economic indicators, the regional advantages, disadvantages, chances and challenges (SWOT) in macro-regional competition are explored thus to provide basis for formulating regional economic development strategy and countermeasures.

### 1.2. Existing researches on regional competitiveness

The researches on regional competitiveness mainly center on the following two aspects: research on influencing factors of urban competitiveness and research on advan-

tageous theory of urban competition. DuanZhiguo (2004), Zhou Qunyan, TianPeng (2005) and Wang Licheng (2006) conduct systematic research on the connotation, influencing factors, optimization strategy and route of regional competitiveness; Chen Dening (2003), Lu Jitong (2008), Shui Wei (2010), Xian Shi and Chen Zhenguang (2014) conduct deep and interdisciplinary analysis and explanation on the theories related to regional competitiveness, they think regional competitiveness has multi-dimensional geographical hierarchies from country to different regions, and is featured with multiple understandings of production rate, corporate and industrial competitiveness, regional treasure, income and living standard enhancement, resource attraction, configuration and transformation capability, innovation capability, regional environment, export trade capability, macro and micro competitiveness.

The main evaluation methods of regional competitiveness include mode comparison method, quantitative structure comparison method and coefficient comparison method in comparative economics as well as multivariate statistical analysis and correlation analysis methods in econometrics. Related indicator selection mainly involves human power, capital, science and technology, infrastructure and government management, as is shown in the following Table 1.

**Table 1. Indicator selection for evaluation and research on regional competitiveness**

		Evaluation indicators
1	Hunan Academy of Social Sciences	Five categories of indicators including regional economic strength, regional economic alloplasty, infrastructure guarantee ability, social public service ability and ecological environmental capacity
2	“Urban competitiveness research” topic team of Taiyuan Normal University	Four categories of indicators including economic development competitiveness, openness competitiveness, human capital competitiveness, social development competitiveness
3	Yang Huawen (2013)	Five categories of indicators including urban economic strength, urban economic alloplasty, public facility guarantee ability, social public service ability and sustainable development ability
4	Bo Xinian (2007)	Six categories of indicators including output competitiveness, basic competitiveness, structure competitiveness, agricultural competitiveness, consumption competitiveness, talent competitiveness
5	Wen Shouxun, Zhang Taisong (2012)	Six categories of indicators including comprehensive economic strength and economic benefit level, infrastructure construction and supporting ability guarantee, industrial reasonableness degree and environmental bearing capability, openness degree and human resource quality, government management efficiency and public service ability, living quality and social security guarantee
7	Wei Qiang (2009)	Six categories of indicators including urban comprehensive strength, infrastructure and service facility, openness degree, environmental situation, human resource and citizen quality, government management level
8	Zhang Leilei (2014)	Six categories of indicators including economic development, structure adjustment, living standard, public service, ecological environment and infrastructure

## 2. Evaluation on Regional Competitiveness of Longyan City

### 2.1. Research object and scope

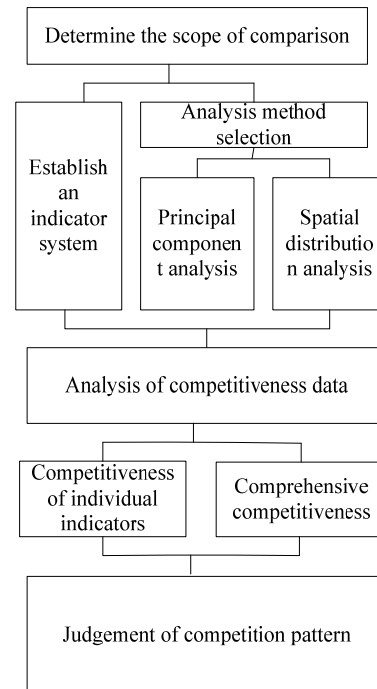
Longyan City is a coastal city in the inland and situated in the west of Fujian, the common border of Fujian, Guangdong and Jiangxi, which is the transportation junction and important channel connecting both sides of the Taiwan Straits and expanding the hinterland for the Western Taiwan Straits Economic Zone. It has total population of 3,093,800 and total area of 1.91 square kilometers; in 2016, its GDP ranked 5th in the 9 prefecture-level cities of the whole province.

This paper selects Hercynian Economic Zone determined in Development Plan of Western Taiwan Straits Economic Zone as object, namely the regions centering on Fujian and covering Zhejiang, Guangdong and Jiangxi, 20 prefecture-level and above cities in total.

### 2.2. Establish the regional competitiveness evaluation system of longyan city

#### 2.2.1. Evaluation idea and method

This research firstly determines the comparative scope of regional competitiveness, refers to related literature researches and combines with the research orientation and guidance significance to actual urban development and planning thus to select the influencing factors of regional competitiveness, and then decomposes the elements level by level to form three levels of indicator systems; besides, it conducts analysis on factor, entropy evaluation method, expert scoring, ordering and spacial projection of single and comprehensive competitiveness by aid of SPSS and GIS.



**Figure 1. Evaluation idea of regional competitiveness**

What’s more, this research selects seven first-level indicators including regional transportation, population employment, industrial economy, space development potential, social culture, policy system and ecological environment to establish evaluation indicator system, and divide it into 16 second-level indicators and 50 third-level indicators, as is shown in the diagram. Afterwards, it conducts analysis on scoring, ordering and spacial dis-

tribution of single and comprehensive competitiveness by aid of SPSS and GIS.

**2.2.2. Select evaluation indicators**

This paper pays particular emphasis on the five-in-one development demand of economy, society, culture, politics and ecology, determines the evaluation indicators related to industrial economy, social culture, policy system and ecological environment; bases on the spacial carrier of new-type urbanization to determine the first-level indicators of spacial development potential; and determines the evaluation indicators from the characteristics of Longyan City and Hercynian economic zone, including internal endowment, direct connectivity and external factor mobility. Specifically, 7 first-level indicators are involved: factor circulation, population employment, industrial economy, spacial development potential, social culture, policy system and ecological environment; 16 second-level indicators are involved: economic factor, transportation factor, population quantity, population structure, employment guarantee, industrial development, financial strength, science and technology innovation capability, landform, public facility, information culture, local finance, enterprise strength, green environment quality, water environment quality and air environment quality; 53 third-level indicators.

This research selects the related data in the 2015 statistical yearbooks of Fujian, Zhejiang, Guangdong and Jiangxi

as well as China City Statistical Yearbook as original data, and conducts dimensionless processing on various indicators. Firstly, it analyzes the main components of 16 second-level indicators respectively by aid of SPSS platform and abstracts effective factors from the indicator system. Wherein, the regional transportation indicator corresponds to 3 main components, including 8 third-level indicators in the original indicator system; the population employment indicator corresponds to 4 main components, besides the agricultural population proportion indicator, other 7 third-level indicators respectively have obvious correlation with 4 main components; the industrial economy indicator corresponds to 5 main components, including 10 of original 16 third-level indicators; the space development potential indicator corresponds to 1 main component and 2 third-level indicators; the social culture and ecological environment indicators respectively correspond to 2 main components, and the 5 original third-level indicators all have large loads in the corresponding main components; the policy system indicator corresponds to 2 main components, including 4 of the 5 original third-level indicators. On the whole, the effectiveness of third-level indicators selected from original indicator system is high, which has obvious correlation with corresponding first-level indicators. The main components of various second-level indicators and effective third-level indicators are shown in Table 2.

**Table 2. Main components of various first-level indicators and effective factors**

First-level indicators	Main component	Proportion of main component accounting for the first-level indicator	Corresponding third-level indicator of main component
1. Factor circulation	Main component 1.1	40.17%	Total foreign trade value
			Highway density
			Actual road pavement area at the year end
	Main component 1.2	23.95%	Actual foreign capital amount for direct use
			Number of buses and trolleybus per ten thousand persons
			Highway passenger transportation volume
Main component 1.3	17.31%	Number of enterprises above designated size	
		Highway freight volume	
2. Population employment	Main component 2.1	28.73%	Proportion of tertiary industry population accounting for total population
			Proportion of residents aged over 65 years old
			Urbanization rate
	Main component 2.2	26.87%	Basic endowment insurance coverage rate in urban and rural areas
			Population density
Main component 2.3	18.10%	Total population	
Main component 2.4	15.39%	Registered urban unemployment rate	
3. Industrial economy	Main component 3.1	34.29%	GDP gross
			Deposit balance in financial institutions
			Fixed asset investment amount of the whole society
	Main component 3.2	21.24%	Local financial revenue
			Proportion of science and technology cause accounting for financial expenditure
			Proportion of high-tech output accounting total industrial value
		GDP per capita	

	Main component 3.3	11.46%	Increased proportion of secondary industry
	Main component 3.4	10.91%	GDP growth rate
	Main component 3.5	8.83%	Fixed asset investment rate
4.Space development potential	Main component 4.1	75.69%	Proportion of built-up area accounting for city area
5.Social culture	Main component 5.1	52.95%	Proportion of agricultural acreage
			Collection of books in public library per million persons
			Postal service quantity per capita
	Main component 5.2	37.98%	Bed quantity in hospital per thousand persons
			Mobile phone users
6.Policy system	Main component 6.1	47.05%	Local financial budgetary expenditure per capita
			Local financial general budgetary income per capita
	Main component 6.2	77.98%	Proportion of local finance accounting for GDP
			Total output of enterprises above designated size
7.Ecological environment	Main component 7.1	44.54%	Urban forest coverage rate
			Sulfur dioxide emission quantity per square kilometer
			Garden green area per capita
	Main component 7.2	27.76%	Green coverage rate of built-up area
			Treatment rate of domestic sewage

**2.3. Evaluation on the regional competitiveness of longyan city**

Based on weight sum, the comprehensive competitiveness scoring and ordering of 20 cities in Hercynian economic zone can be obtained. And then this research adopts natural interrupted classification method to conduct analysis on regional space distribution of single second-level indicators and comprehensive scoring by aid of GIS platform, which is divided into five levels of high, very high, moderate, very low and low.

**2.3.1. Evaluation on single competitiveness**

Factor circulation: Longyan City ranks 10th and lies in the third level, wherein, Sanming, Quzhou and Shantou are also in the same level. In view of this aspect, the competitiveness pattern presents the trend that costal cities are higher than inland cities, while southern cities are higher than northern cities.

Population employment: Longyan City ranks 17th and lies in the fourth level, wherein, Sanming, Meizhou, Fuzhou and Yingtan are also in the same level.

Industrial economy: Xiamen and Fuzhou are in the first level while Yingtan is in the fifth level, besides, Longyan City ranks 11th and lies in the third level, wherein, Zhangzhou, Quanzhou and Jieyang are also in the same level.

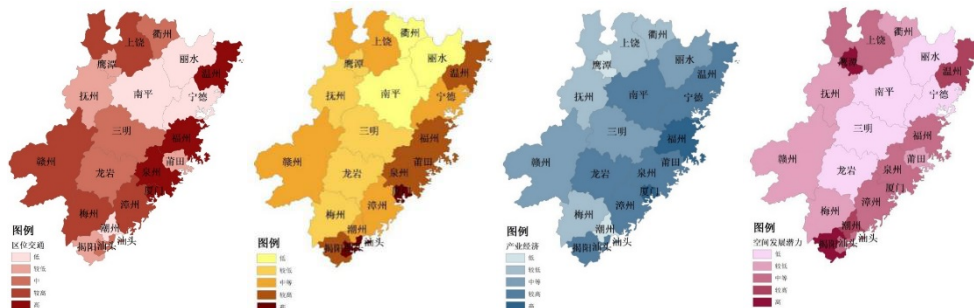
Space development potential: Yingtan and Jieyang are in the first level, Longyan, Sanming, Nanping, Lishui and Ningde are in the fifth level, wherein, Longyan City ranks 19th.

Social culture: Yingtan and Jieyang are in the first level, Longyan, Sanming, Nanping, Lishui and Ningde are in the fifth level, wherein, Longyan ranks 19th.

Policy system: Xiamen, Fuzhou and Quanzhou are in the first level, Shangrao, Fuzhou, Ganzhou and Meizhou are in the fifth level, wherein, Longyan ranks 9th and lies in the third level, Nanping, Ningde, Ganzhou, Chaozhou and Jieyang are also in the same level.

Ecological environment: Fuzhou, Shangrao and Nanping are in the first level, wherein, Longyan ranks 5th and lies in the second level, Nanping, Shangrao, Fuzhou, Wenzhou, Fuzhou (capital of Fujian Province), Quanzhou and Xiamen are in the same level.

On the whole, except the ecological environment competitiveness, the costal cities are generally higher than the inland cities in view of other single competitiveness. From the perspective of scoring and ordering, Xiamen, Quanzhou and Shantou rank top in multiple single competitiveness while Nanping, Sanming, Yingtan, Lishui and Quzhou rank in the low level.



Factor circulation    Population employment    Industrial economy    Space development potential

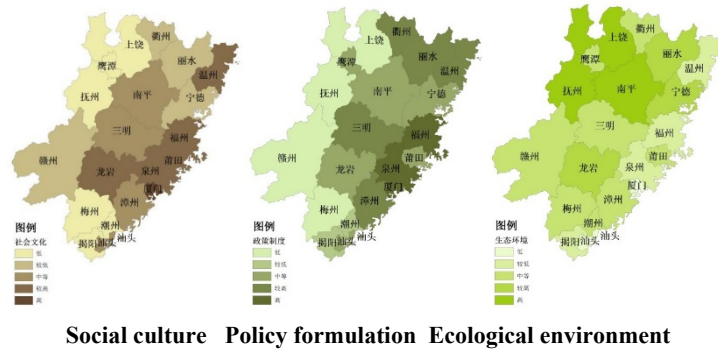


Figure 2. Analysis on single competitiveness

In view of comprehensive competitiveness scoring, Xiamen, Fuzhou (capital of Fujian Province), Quanzhou and Wenzhou are in the first level, while Fuzhou, Quzhou and Lishui are in the fifth level. While Longyan ranks 14th and lies in the fourth level, wherein, Sanming, Meizhou, Nanping and Ningde are in the same level. In general, the comprehensive competitiveness of coastal cities is generally higher than that of inland cities while the five cities located in Hercynian economic zone such as Longyan, Sanming, Nanping and so on has the lowest comprehensive competitiveness, because the regional transportation and population employment of the five cities rank in a bad position.



Figure 3. Spatial distribution of comprehensive competitiveness

Based on the above evaluation result, the 20 cities in Hercynian economic zone has basically formed the regional competitiveness pattern of “the middle region is lower than the coastal cities” and “the northern region is lower than the southern region”. The cities with high comprehensive competitiveness basically center on the coastal areas, except Yingtan, Shangrao and Wenzhou, the competitiveness of northern cities are basically in the low level and below. The regional competitiveness of Longyan is only in the fifth level, just higher than the fifth-level cities such as Fuzhou, Lishui and Quzhou, weaker than the overall strength of the same-level cities such as Meizhou, Sanming, Nanping and Ningde, having larger difference from the first-level cities in the single competitiveness and comprehensive competitiveness, present-

ing non-obvious comprehensive competitiveness potential. Wherein, the coastal city Ningde is far lower than the average level of the cities in Hercynian economic zone owing to its total foreign trade value, foreign capital for direct use, highway freight volume, highway density, road pavement area at the year end and number of buses and trolleybus per ten thousand persons, therefore, its regional transportation competitiveness is in the bottom level of the zone. Nanping, Longyan and Sanming are in the bottom level of the zone in population employment and space development potential.

2.4. Analysis on regional competitiveness crux in Longyan City

2.4.1. Analysis on advantageous competitiveness

The advantageous competitiveness of Longyan is mainly reflected in ecological environment and social culture. Among the third-level indicators of ecological environment indicator, the forest coverage rate and sulfur dioxide discharge quantity per square kilometer of Longyan rank top, besides, it also ranks top in the social culture, collection of books in public library per million persons, bed quantity in hospital per thousand persons and throughput of post and telecommunications per capita. It shows that Longyan has good basis in ecological resources and industrial development potential, therefore, it can largely develop the ecological industry based on its advantages, such as ecological tourism.

2.4.2. Analysis on disadvantageous competitiveness

The disadvantageous competitiveness of Longyan is mainly reflected in population employment and space development potential. In view of population employment, among the third-level indicators of population employment indicator, except the basic endowment insurance of urban workers, Longyan ranks 10th below in other indicators. In view of space potential, rich landform brings good ecological environment for Longyan but also limit the urban space

expansion, which makes Longyan ranks low in the proportion of built-up area accounting for the urban area and proportion of agricultural acreage, namely, Longyan has few lands for urban construction and weak space development potential.

**2.4.3. Analysis on potential advantageous competitiveness**

Longyan has potential advantageous competitiveness, involving factor circulation, industrial economy and policy system.

In view of factor circulation, Longyan ranks top in highway density, highway freight volume and number of buses and trolleybus per ten thousand persons, while it is in average level and below in highway passenger transportation volume, road pavement area at the year end and total foreign trade value, which shows that Longyan has strong development potential in external traffic and good public transformation in urban areas but it has weak agglomeration capacity in population and industry.

In view of industrial economy, Longyan ranks top in GDP per capita, proportion of secondary industry in added value, number of patents per ten thousand persons, technology and education expense per capita, proportion of science and technology cause accounting for financial expenditure, proportion of high-tech industry accounting for total industrial value, which shows that Longyan has formed obvious regional advantage in secondary industry and has development potential in high-tech industry; in addition, Longyan ranks low in the number of university students per ten thousand persons, namely, it is weak in public education facility construction and can not form continuous impetus in high-tech industry development, therefore, it should strengthen investment in this field.

In view of policy system, Longyan ranks top in local financial general budgetary income per capita and average salary of urban on-post staff, while it ranks low in the total output value of enterprises above designated size, which shows that Longyan has obtained good effect in financial strength and income distribution of staff, however, its industrial economy development is still in the middle and lower level in the whole province owing to its weak capability in agglomeration degree and attraction for enterprises above designated size.

**3. Analysis on Key Factors of Regional Competitiveness of Longyan**

Currently, the population urbanization rate and land space urbanization should be considered, the supporting industry, employment, social welfare for population relocation, urban and rural overall development can not be neglected. Therefore, the regional competitiveness enhancement of Longyan involves the population employ-

ment, land space and economic industry, which are also three core problems for research in the text below.

**3.1. Population and employment factors**

The population and employment of Longyan present the following characteristics: firstly, population outflow is serious, population attraction becomes the core problem, and the outward movement trend of population is enlarging. Secondly, the local residents prefer nearby work, and the urban space structure has large influence on employment (Figure 4 and Figure 5). Thirdly, the employment space distribution is non-homogeneous and the employment positions are insufficient obviously in surrounding counties. Fourthly, the employment structure level is low in towns of Longyan, which makes it provide insufficient support to population employment.



Figure 4. Employment population quantity distribution of Longyan

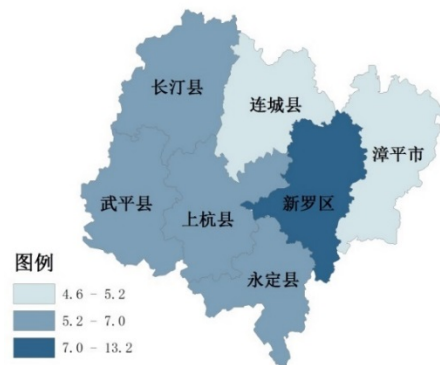


Figure 5. Employment population density distribution of Longyan

**3.1.1. Farmers have weak willingness in immigration and relocation**

Farmers in Longyan present “two low” characteristics in immigration and relocation: in view of immigration, farmers have low willingness in immigration, centering on the farmers willing to immigrate; in view of relocation, the farmers having intentions mainly select to relocate in central villages, counties and cities, namely, farmers have

low willingness in relocation, the urban center has weak attraction to farmers having relocation intentions. The reasons mainly involve the following three aspects (figure 6): firstly, the farmers have weak economic capability, a large proportion of them can not undertake the urban consumption level and have low capability in resisting various risks from living in cities; secondly, they are stumbled by various vested interests in rural areas. From the perspective of village, farmers enjoy various welfares and preferential policies corresponding to their agriculture accounts, meanwhile, the farmers have strong reliance on unique regional culture and life mode in rural areas, therefore, they form strong loyalty; finally, the weak attraction of household registration system and town economic development causes farmers to have low enthusiasm in immigration and relocation.

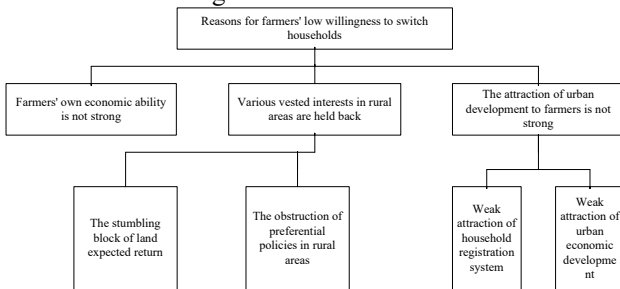


Figure 6. Analysis on the reasons of farmers having low willingness in relocation

**3.1.2. Employment insufficiency and worker recruitment difficulty coexist, the employment level and overall income level are low**

From the perspective of employment quantity and labor supply and demand, Longyan centers on labor output and is featured with serious population outflow and spacial mismatch of non-agriculture employment and population urbanization, therefore, there exists with large contradiction between worker recruitment demand of local enterprises and few employment population, and the problems of industry and employment support insufficiency is universal.

In view of employment structure, the non-regular employment is in high proportion, the employment level is low and the income is non-stable, which can not support individuals and family members to attain the income level for urbanization realization.

**3.2. Land and space factors**

**3.2.1. Low land space development potential**

By aid of ARCGIS software platform, the land for urban planning in Longyan is divided into spacial units of 100mX100m to provide basis for land bearing analysis in urban development. This research selects 3 kinds of factors for land evaluation, respectively including terrain elevation factor, terrain slope factor and natural reserve factor, and then conducts overlapping analysis to get the comprehensive evaluation map (Figure 7).

According to analysis, the land suitable for construction and available land in Longyan account for only 33.07%, distributed in Yongding County, Shanghang County and Xinluo District with the presentation of “Y”.

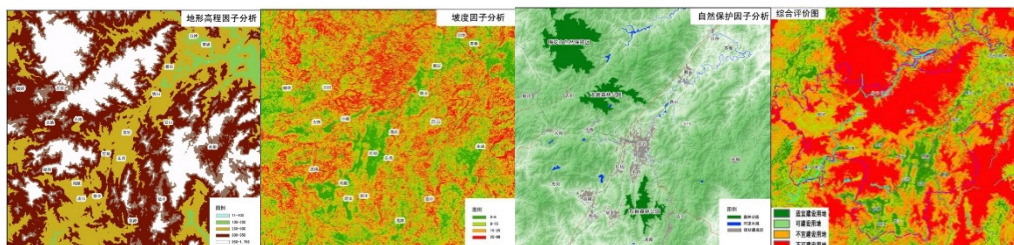


Figure 7. Analysis on land space development potential of Longyan

**3.2.2. The construction land is expanded extensively and the land proportion is unbalanced**

From the perspective of land for urban construction, the land per capita for urban construction of Longyan is 119.16 square meters/person, which is of high indicator with the extensive mode. Wherein, the proportions of residential land, industrial land and land for public facilities all surpass the international upper limit. But the construction land in villages of Longyan are mostly disperse, and the collective construction lands are used in an inefficient and extensive way, therefore, many farmers leave the village but retain their residential base thus to cause

many idle residential bases; meanwhile, there also exists with the phenomenon of inefficient usage of collective construction land.

In general, Longyan exists with the problems such as city space restriction, urban development space insufficiency, lack of unified consideration in external transportation facilities, unreasonable grid structure of urban road, slow development of public transportation, extensive development of industrial land, improper relocation of original residents and security of villages in central city.

**3.3. Economy and industry factors**

### 3.3.1. The economic development is good, the innovation talents and scientific research investment is insufficient

In view of the economic development of Longyan, it presents good development trend in its economy and presents a stable development in total output value. Currently, it still centers on secondary industry and relies too much on resources. Besides, it has gradually enhanced its financial income and expense; it increases first and then decreases in industrial economy growth and GDP contribution rate, which is more reasonable in industrial structure.

From the perspective of technology innovation talent, the universities, scientific research institutions and enterprises operate differently and can not realize deep integration, which restricts the innovative activities. In view of technology innovation investment, though the whole society has rapidly increased expense in research and development in recent years, the total research and development expense is insufficient, 1.5% lower than the average level of the whole province in GDP, having large difference from the 2.1% level.

### 3.3.2. The resource environment restriction is obvious and the industrial development has insufficient development potential

Currently, Longyan still faces many restriction factors in its industrial development. Firstly, it is insufficient in professional collaboration and supporting, and industrial agglomeration is not formed. Secondly, its industrial development has weak development potential. It faces the problems such as lack of major and high additional-value projects, insufficient deep processing, short industrial chain, insufficient enterprise innovation capability and weak competitiveness, which are not solved. Finally, it has small industrial economy, low industrial agglomeration and low economic extroversion.

Meanwhile, the regional competitive is increasingly fierce, therefore, the costal cities have become the "popular land" emphasized by domestic and overseas investors owing to good infrastructure, developed science and technology education and increasingly-perfect policy environment. While Longyan lags behind the costal cities in urban scale, talent agglomeration, infrastructure and industrial supporting, has larger difficulty in attracting investment and is in a disadvantageous position in the competition.

## 4. Conclusion

This paper takes Longyan City as empirical research case for deep analysis, adopts econometrics analysis method, bases on the SPSS and GIS software platforms to realize data analysis, establishes a set of multidimensional comprehensive indicators, involving 7 first-level indicators and 16 second-level indicators, explores the comprehensive situation of regional competitiveness of Longyan and know the presentation of insufficient regional competitiveness of Longyan lies in population-employment, land-space and industry-economy. Specifically, in view of population-employment, the population attraction is insufficient, the employment space distribution is uneven, the employment positions in counties are insufficient, the employment structure level is low out of the central cities; in view of land-space, the suitable construction land is few, the land for urban construction is relatively extensive, the construction land in rural areas is relatively disperse and inefficient, the overall road structure is imperfect, the urban internal and external connection system is weak, the land use in key development areas and environment landscape construction is lagged; in view of industry-economy, the pillar industry is single and primary, the technology innovation impetus is insufficient, the talent cultivation and attraction are insufficient.

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