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Differentiation of rural development driven by industrialization and urbanization in eastern coastal China

Hualou Long^{a,*}, Jian Zou^{a,b}, Yansui Liu^a

^a*Institute of Geographic Sciences and Natural Resources Research (IGSNRR), Chinese Academy of Sciences, 11A Datun Road, Anwai, Beijing 100101, China*

^b*Graduate University of Chinese Academy of Sciences, Beijing 100049, China*

A B S T R A C T

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With the socio-economic transformation, regional development factors recombination and followed industrial restructuring have changed the rural areas in eastern coastal China deeply. The interaction between the material and non-material elements affecting rural production and lifestyles shaped different rural development types depending on a carrier, which is composed of different industries. Accordingly, this paper makes the definitions of four rural development types, i.e., farming industry dominated rural development type (FIT), industry dominated rural development type (IDT), rural development type focusing on business, tourism and services industries (BTT), and balanced rural development type (BDT), and classifies the rural development types in eastern coastal China. Then, taking the social representation approach and basing on the major factors affecting the long-term rural development and the exertion of the functions of the countryside with regard to society, the assessment indicator system of rurality degree index (RDI) was established to distinguish the rurality degree of different types. The results indicated that, to some extent, the RDI may accurately reflect the status quo of rural development and the exertion of the functions of the countryside with regard to society, and can also reflect the different stage in what the same rural development type in different region stays. The authors argue that the study on the interaction of rural development factors in the process of economic and social transformation and the subsequent rural development model is very important to deeply understand the rural development and to smoothly achieve coordinated and balanced rural–urban development in developing countries, which are experiencing rapid industrialization and urbanization.

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Introduction

Rural area is a spatio-territorial system, which includes all areas other than urban regions (Zhang, 1998). In 2006, China's urban built-up area amounted to 33,660 km², combined with township area the total was less than 60,000 km², and the rest of the country's rural area accounted for 99.4% of China's total land area. China's rural population in 2006 accounted for 56.1% of the total population. While urban development in China has attracted the interest of a wide variety of researchers and government officials with the globalization of the world economy (Chen, Jia, & Lau, 2008; Gu & Shen, 2003; Ma, 2002; Shen, Feng, & Wong, 2006; Wu & Ma, 2006), the development for rural area has found much less attention. However, rural development plays a vital role in urban development and regional economic growth.

Since the adoption of economic reform and open-door policy in 1978, China's rural area has experienced an unprecedented

development, but the regional differentiation of which is obvious. The study of Liu (2006) revealed that inter-regional rural inequalities between the eastern, central and western regions have been more serious than provincial inequality within the regions themselves, and China's regional rural inequality remained at a high-level and the coastal/interior income differential continued to increase.

Although the eastern coastal China has experienced rapid industrialization and urbanization (Liu, Wang, & Long, 2008; Long, Tang, Li, & Heilig, 2007), nearly half of the population still live in rural areas, which are affected to varying degrees by the industrialization and urbanization. There are both high-developed villages and very poor hamlets (mainly located in the remote and mountainous areas) in eastern coastal China, which can be considered a miniature of China's rural development. Rural development can be viewed from a multi-perspective including the political, economic, social, cultural, environmental and many other aspects (Zaslavskaya, Muchnik, & Muchnik, 1984). The regional differentiation of rural development in eastern coastal China is very obvious, due to the influences of physical conditions, the existing economic

* Corresponding author. Tel.: +86 10 6488 8169; fax: +86 10 6485 7065.
E-mail address: longhl@igsnr.ac.cn (H. Long).

fundamentals, historical and cultural background, together with the location and traffic conditions and other factors.

The rural development in China (rather in the eastern coastal China) has gradually attracted the interest in academic circles both at home and abroad, ranging from rural–urban migration (Liu, 2008; Ma, 1999; Rozelle, Li, Shen, Hughart, & Giles, 1999; Zhang, Brauw, & Rozelle, 2004), rural industry and employment (Mohapatra, Rozelle, & Goodhue, 2007; Shen & Ma, 2005; Unger & Chan, 1999), rural associations and state corporatism (Unger, 2008), rural taxation and government regulation (Tao, Lin, Liu, & Zhang, 2004), rural poverty alleviation (Heilig, Zhang, Long, Li, & Wu, 2006; Unger, 2002b, 2003), rural transformation and development (Unger, 2002a, 2006), to urban–rural land-use change and building new countryside (Liu, Wang, & Deng, 2008; Long, Liu, Wu, & Dong, 2009; Long, Wu, Wang, & Dong, 2008; Peng et al., 2008). However, the research on rural development types and their regional differentiation has found much less attention. The aims of this paper are: (1) to briefly analyze the rural–urban relationships in China; (2) to define the rural development types; (3) to classify the rural development types shaped by industrialization and urbanization in eastern coastal China and assess their rurality degree; and (4) to discuss some of the major implications for promoting the rural development and deepening rural development studies.

Rural–urban relationships in China

Since the establishment of the People's Republic in 1949, China had followed a Soviet type centrally planned model of development, with collectivized agricultural production in the countryside and concentration on heavy industry in the urban area during the first three decades. The development of agriculture and industry was very much unbalanced and a “dual track” structure was formalized in the national economy, and industrialization was pushed forward somehow under the sacrifice of agriculture and the peasants (Wu, 1997). At that time, the agricultural productivity was not high and the peasants were poor, and inequality between the countryside and the urban areas was widened because of the existence of “Price scissors”—artificially low prices of agricultural products for the exchange of high prices of industrial goods. Before 1978, traditional central planning economic policy had been carried out in China. At that time, the rural population in China had no choice but to work in collective farming (with weak incentives for work), and all members shared the output more-or-less equally (Long, Heilig, Li, & Zhang, 2007). Mao's insistence on pushing for the collectivization of agriculture in the 1950s is held responsible for at least two decades of relative agricultural stagnation (Putterman, 1997).

Since China's economic reforms launched in 1978, the traditional central planning economy was changed into a market based economy and the primarily agricultural economy is being transformed into an urban, industrial economy. The implementation of the responsibility system has aroused Chinese peasant's enthusiasm, liberated Chinese countryside from the self-sufficient status to open up a new prospect with the emerging of the township and village enterprises (TVEs). China's TVEs are widely regarded as one of the major successes of the country's reforming socialist economy (Jefferson, 1993; Weitzman & Xu, 1994). It contributes significantly to the increase in rural income levels and employment by making full use of the local resources, utilizing the capital scattered in the peasant's hands, developing the wisdom of the skilled craftsmen, and rising up the peasant's income. However, the rapid development of TVEs also brings about some problems, such as lacking of material, energy and capital due to too fast growing of rural enterprises, and worsening environmental quality because of no treatment for disposal of polluted water, poisonous gas and wastes.

The implementation of the household responsibility system has also liberated the rural productive force, and most of them shifted from farming to diversified productions run by households, villages or townships, or moved to the cities trying to find a new living. The labor-intensive industries create a lot of job opportunities, and have attracted large numbers of migrants, first from the surrounding rural areas and then from the peripheral regions. China's rural labor migration is directly linked to rural development through remittances, as well as through physical and human capital brought back by return migrants, and the patterns of temporary migration are mainly shaped by the magnetic force of the growth-pole region (Ma, 1999). However, there is a dark side to this picture. Peasants are made more vulnerable and must rely on migrant work for survival, meanwhile, most rural migrants are not granted permanent household registration in the city and are only registered temporarily, and they have a low social and economic status and do not enjoy many social welfare and economic opportunities reserved for the permanent urban residents (Fan, 2003; Shen, 2002).

Rural development and industrialization and urbanization are closely interrelated in the aspects of migration, employment, land-use and natural environments. With the process of urbanization, the rural population is increasingly marginalized and natural environments are increasingly destroyed (Gutman, 2007). The reform-induced industrialization and urbanization have rapidly altered the physical and human landscapes in China's rural areas, as evidenced by the substantial rate of rural housing development, rural-to-urban migration, agricultural to non-agricultural land conversion, widening rural–urban income gap, and regional rural inequalities. Zhang (2008) indicated three paradoxical dynamics concerning China's current rural–urban development: rapid urbanization concurrent with the under-urbanized feature, the massive and sustained flow of rural-to-urban migration concomitant with the bulk of migrants without urban citizenship, and the proliferating addition of new cities with inclusion of ample rural attributes. Driven by industrialization and urbanization, rural landscapes have been transformed into urban like ones, the ecological functioning and spatial structure of which has been being changed.

To some extent, agriculture and the countryside have made a big contribution to (simultaneously, the huge sacrifices for) the development of industries and the cities in China in the process of industrialization and urbanization since 1978. As a result, a series of problems that hampers the social and economic development of China occurred, such as degrading eco-environment, decreasing cultivated land, widening rural–urban income gap, and so on (Cai & Smit, 1994; Liu, Gao, & Yang, 2003; Xu & Tan, 2002; Yang & Li, 2000). With the implementation of an important long-term development strategy on “building a new countryside” (Long et al., 2009), a brand new rural–urban relationship that industries support agriculture and cities support the countryside is expected to be shaped.

Definition of China's rural development types

Rurality has proved very difficult to define in an all-embracing manner for three important reasons involving functions, dynamics and variation (Cloke, 1985). Rural areas are undergoing considerable spatio-temporal change due to social, economic and technological developments, and especially the interaction of various non-quantitative elements affecting rural development. This kind of change, to some extent, increases the difficulty in our understanding the rural development types. In general, rural issues are closely related to the marginalization of rural economic, political, social and cultural development, which occurs differently at the

intersection of material and experiential elements of rural lifestyles (Cloke, Goodwin, Milbourne, & Thomas, 1995). Compared with the city, the rural is always in a marginalized position. From the perspective of geographical location, the development of remote rural areas is even more marginalized. The marginalization and interaction of the material and non-material elements affecting rural production and lifestyles generate considerable regional differentiation at every scale.

It has generally been agreed that a combination of a pull factor of cities and a push factor of villages promotes the process of industrialization and urbanization (Soemarwoto, 1976), which in turn drives the development of rural areas. Usually, the situation of industrial development determines the level of economic development and employment in an area. In developing countries, the industrial division of labor in rural areas is characterized by (Zhou & Fan, 1988): (1) underdeveloped industrial division of labor and diversified part-time farmers; (2) to great extent, industrial division of labor in rural areas is in thrall to the neighboring urban economic development level; (3) the development level of industrial division of labor is directly depended on the linkages of the rural area with the outside world; (4) as a rule, the industrial division of rural labor begins with labor-intensive industries, then extends to other industries with the improvement of laborers' education level; and (5) the limitation of intra-regional flow of production elements constrains the development of industrial division of labor in rural areas. Redfield (1941) put forward the concept of rural–urban continuum, which favoured a sliding scale rather than an abrupt halt between rural and urban poles. They have a thousand and one links between rural industry and urban industry. So, it is unrealistic to discuss the development of rural areas breaking away the city.

Rural–urban interdependence plays an important role in rural development. Using spatial economic data from four small English towns, Courtney, Mayfield, Tranter, Jones, and Errington (2007) measured the strength of economic integration between town and hinterland and estimated the magnitude of town–hinterland spill-over effects, and indicated that the potential value of a town as a 'sub-pole' in local economic development is dependent on structural differences in the local economy. As for the production side of the economy, in the process of industrialization through rural–urban interdependence (Murata, 2002), that agricultural productivity was enhanced by utilizing non-agricultural inputs was proved by many case studies of India, Japan, the United States, Taiwan, West Pakistan, and so on (Johnston & Kilby, 1975; Johnston & Mellor, 1961; Mellor, 1966). In addition, Rigg's (1998) case study of southeast Asian showed that the diversification of the household economy and the interpenetration of rural and urban have created multiple hybridities through individuals and households' shifting between agricultural and industrial pursuits and crossing between rural and urban areas.

To recognize some of the differences between degrees of rurality, Cloke (1977) and Cloke and Edwards (1986) constructed an "index of rurality" for local government districts in England and Wales using a range of statistics from the 1971 and 1981 censuses. The indicators, including population, household amenities, occupational structure, commuting patterns and the distance to urban centers, were fed into a formula that placed districts into one of five categories—extreme rural, intermediate rural, intermediate non-rural, extreme non-rural and urban. Although the indices of rurality marked an improvement on simple dichotomous definitions, it still provokes a number of critical questions (Woods, 2005: p. 7). Concerning China's rural communities development types, Unger and Chan (1999) put forward a distinct four-type model based on relations of production through investigating rural south China, i.e., predominance of private industry, collectives, foreign industry, and no industry.

Before China's economic reforms launched in 1978, the rural China took on a look of balanced development. Three decades' reform has greatly changed the homogeneous status in rural coastal China. Rural development difference and industrial divergence were exaggerated by the rapid industrialization and urbanization and absorbing advanced technologies and foreign capitals. Recently, new change of the scale, structure and pattern of economic growth in rural coastal China has occurred due to the spatio-territorial recombination and industrial restructuring around the urban agglomeration, which were embodied in three primary aspects, i.e., transferring traditional agriculture to scale management agriculture, shifting dispersed rural housing to town or rural new-type communities, and developing industries in development zone or industrial park.

Therefore, in rural coastal China, industrial structure has been being changed by rural–urban interpenetration, which also resulted in the transformation of rural employment structure. It is a common phenomenon that farm is in thrall to non-farm, and industry is often relying on 'rural' labor. This kind of interaction between the material and non-material elements of rural production and lifestyles has shaped different rural development types relying on a carrier, which is composed of different industries. Accordingly, it is feasible to divide the rural development types basing on the forces of production. Usually, the rural areas close to urban agglomeration have the obvious advantages for fostering manufacturing industry. However, remote and mountainous rural areas may focus on developing farming industry or tourism if there were good tourism resources. Of course, there are some rural areas with no obvious individual advantages.

We argue that there are four rural development types in China: (1) farming industry dominated rural development type (FIT), usually located in the remote and mountainous areas, with a slow process of industrialization and urbanization, where the local economic development depends on agriculture-oriented industries to some extent; (2) industry dominated rural development type (IDT), where the rapid industrialization and urbanization exerts far-reaching impacts on local rural industrial structure and employment structure; (3) rural development type focusing on business, tourism and providing services (BTT), where the rural development mainly depends on tertiary industry¹ such as trade, tourism and services industries, and so on; and (4) balanced rural development type (BDT), where the urban and rural development keep almost the same pace, and there is no obvious individual advantages in the development of primary industry, secondary industry and tertiary industry.

Study area

The eastern coastal China, the study area, covers 10 provinces or municipalities: Beijing, Tianjin, Hebei, Shandong, Shanghai, Jiangsu, Zhejiang, Fujian, Guangdong and Hainan (Fig. 1). The eastern coastal China has a population of 469 million, and it is unique because of its high population density. In 2006, the population density in this region amounted to 512 persons/km², which was much higher than the average population density (137 persons/km²) of China at the same period (Table 1). Relying on the national policies of making use of the sea in connecting China to the global economy, the eastern coastal China is developing very rapidly in the

¹ In China, economic activities are categorized into the following three strata of industry: primary industry refers to agriculture, forestry, animal husbandry and fishery and services in support of these industries; secondary industry refers to mining and quarrying, manufacturing, production and supply of electricity, water and gas, and construction; tertiary industry refers to all other economic activities not included in the primary or secondary industries (NBSC, 2007).

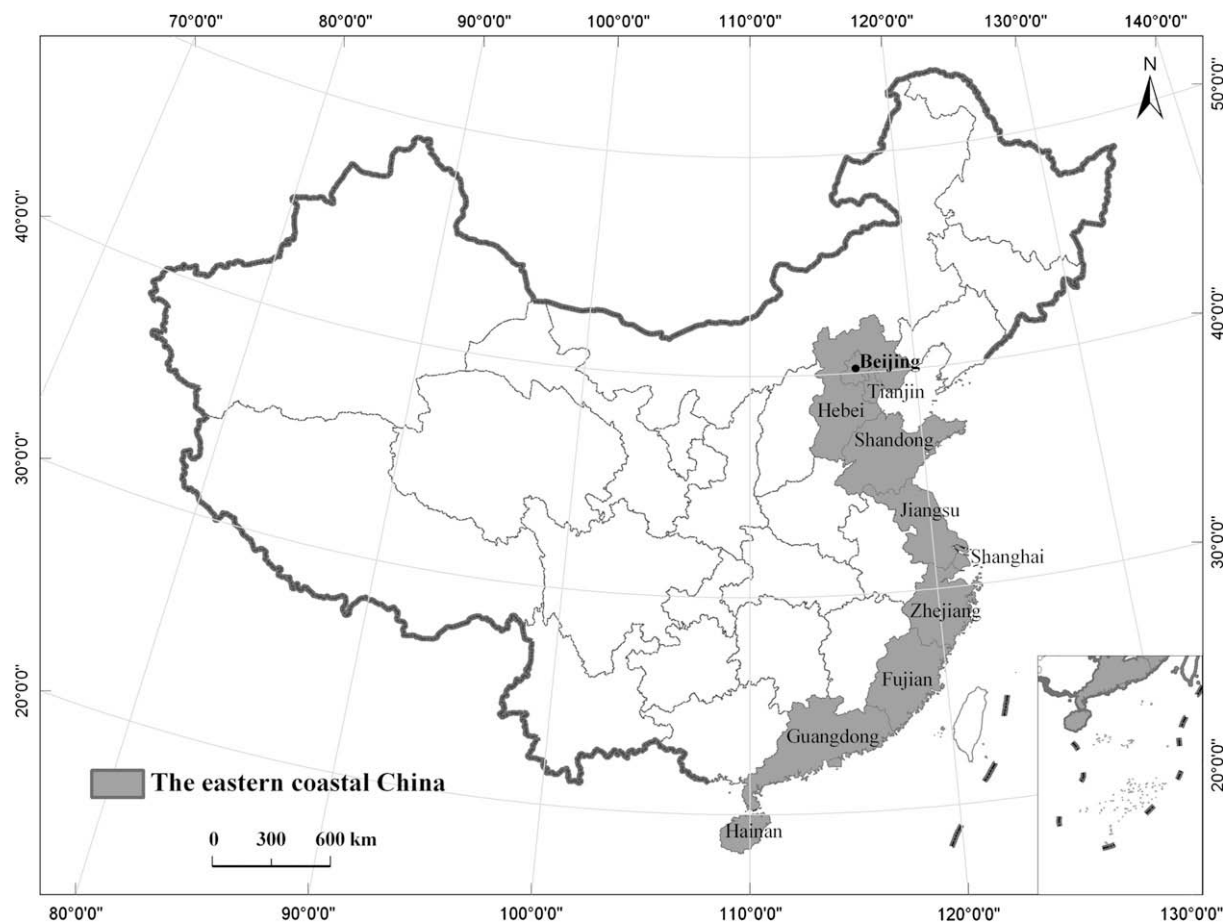


Fig. 1. Location of the study area.

last three decades since the adoption of economic reform and open-door policy in 1978, and plays a significant role in promoting China's rapid economic growth and enhancing the nation's international competitiveness. Concomitant to this development is the rapid change of landscape in both urban and rural areas, and the obvious enhancement of socio-economic development level (Table 1). In 2006, the GDP per capita of this region amounted to 27,567 RMB¥, which was much higher than that of China (16,084 RMB¥) at the same period. In 2006, the primary industry only provides 7% of the total GDP in eastern coastal China; however, 52% and 41% are provided by the secondary industry and tertiary industry, respectively.

During the last three decades, the industrialization and urbanization in coastal China has been accelerated and the economy of metropolitan areas such as “Beijing–Tianjin–Hebei”, “Yangtze River Delta” and “Pearl River Delta” has grown vigorously, and the rapid urbanization and centralization of population and industries have been the obvious characteristics of urban–rural integrated development in the region (Liu, Wang, & Long, 2008). However, the rapid industrialization and urbanization in eastern coastal China increased the demand for construction land, which diminished cultivated land. In addition, the industrialization pushed forward the development of TVEs, which is helpful for improving rural employment but caused the pollution of local environment. Due to loose and neglected protection of the environment, the consequences of uncontrolled rural industrialization in this region are particularly serious (Xie, Batty, & Zhao, 2007). Rapid loss of farmland and ongoing deterioration of local environment are major concerns in eastern coastal China.

Materials and methods

Data source and processing

Rural development is usually depending on various industries. Therefore, the status quo of rural industrial development can be used to diagnose the rural development type, to which a region belongs. In this paper, the output value data of total GDP as well as its primary, secondary and tertiary industries of 615 counties (or cities at county level) in eastern coastal China was collected from the above mentioned ten coastal provinces' statistical yearbook in 2006. The proportions of the output value of primary (GDP1%), secondary (GDP2%) and tertiary (GDP3%) industries in the total GDP, respectively, were chosen as the indicators to classify the rural development types. Then, the mean and standard deviation of indicators GDP1%, GDP2% and GDP3% were counted (Table 2).

The degree of rural development will be different even in the same rural development type because of the difference of regional physical conditions and socio-economic development level. Rurality degree index (RDI) was established to diagnose the difference of rural development types. Defining the degree of rural development, we have employed the idea of the functions of the countryside with regard to society. In general, the major factors affecting the long-term rural development and the exertion of the functions of the countryside with regard to society involve: (1) coverage of society's food and agricultural raw material production; (2) the change of rural population; (3) rural economic development level; and (4) rational spatial organization of the activities of the rural population.

Table 1
The situation of rural–urban development in eastern coastal China.

Indicator	National total	Eastern coastal China	% Of national total
Area of land (10,000 km ²)	960.0	91.6	9.5
Area of cultivated land (km ²)	1,217,760	263,960	21.7
Per capita cultivated land (ha)	0.0926	0.0563	
Population at the year-end (10,000 persons)	131,448	46,906	36.3
Rural population (10,000 persons)	73,742	22,217	30.1
Employment of TVEs at the year-end (10,000 persons)	14,680	7262	49.5
Population density (persons/km ²)	137	512	
Gross Domestic Product (GDP) (100 million RMB¥)	210,871	128,593	55.7
Primary industry	24,737	9343	37.8
Secondary industry	103,162	66,798	57.8
Tertiary industry	82,972	52,452	57.9
The ratio of primary, secondary and tertiary industries	12:49:39	7:52:41	
Per capita GDP (RMB¥)	16,084	27,567	
Economic density (10,000 RMB¥/km ²) ^a	220	1404	
Grain output (10,000 tons)	49,748	13,316	26.8
Per capita disposable income of urban households (RMB¥)	11,759	14,967	
Per capita net income of rural households (RMB¥)	3587	5188	
The ratio of urban–rural residents' income	3.28:1	2.88:1	

Notes: (1) All the data are the value of 2006, the data of cultivated land are from the Ministry of Land and Resources of China (MLRC, 2007), and other data are from National Bureau of Statistics of China (NBSC, 2007); (2) In 2006, exchange rate US\$ to RMB¥: 1–7.8.

^a Economic density was calculated by dividing the gross domestic product (GDP) of country or eastern coastal China by the total area of country or eastern coastal China.

The social representation approach can produce a more robust and flexible way of defining rurality, through accommodating the effects of social and economic change in rural environments (Woods, 2005: pp. 10–11). Usually, the effects of social and economic change in rural environments can be primarily showed by the change and output value of cultivated land, change and employment of rural population, and the productivity of rural labor. Accordingly, the assessment indicators of RDI were constructed (Table 3). It seems that there is a strong correlation between the change of cultivated land and its output value. But the actual situation in coastal China is that many farmlands are idle and even the utilized farmlands are not in an intensive way because of the low incentive for raising cultivated land-use intensity (Li & Wang, 2003). Similarly, there is not a strong correlation between the change of rural population and the percentage of employed population in primary industry and the productivity of rural labor, for existing lots of surplus rural labors in the statistic rural population and most of them are rural–urban migrants (Fan, 2003; Long, Heilig, et al., 2007). So, the five indices used to synthetically measure the rurality degree in Table 3 are relatively independent, and the variables also passed the tests for independence in the software of SPSS 11.5 for Windows.

Methods

To classify the rural development types, we regard that, if a certain indicator value of a county exceeds the sum of the indicator's mean and standard deviation, it can be determined that rural development in this county is dominated by the factors relative to the indicator. Accordingly, the indicator system classifying rural development types was constructed (Table 4).

Because the socio-economic data for the various indicators in Table 3 are in many different dimensions, it was impossible to

Table 2
The mean and standard deviation of indicators.

Indicator	Mean	Standard deviation
GDP1%	19.19	12.76
GDP2%	47.13	13.36
GDP3%	33.66	8.13

directly compare the rurality variation in the various measures. Therefore, they were transformed into common units by normalizing all measurements, according to the formula (1):

$$S_i = \begin{cases} \frac{x_i - x_{\min}}{x_{\max} - x_{\min}} \text{ (adapted to positive indicator)} \\ \frac{x_{\max} - x_i}{x_{\max} - x_{\min}} \text{ (adapted to negative indicator)} \end{cases} \quad (1)$$

Where S_i is the standardized value of indicators; x_i is the value of indicator i ; x_{\min} is the minimum value of indicator i ; x_{\max} is the maximum value of indicator i ; and i is the number of indicators.

We used the normalized values to calculate the RDI according to formula (2):

$$RDI = \sum_{i=1}^5 w_i S_i \quad (2)$$

Where RDI is the rurality degree index, the higher the index value, the stronger the rurality degree; S_i is the standardized value of indicators; w_i is the weight for indicator i .

Geographic information system (GIS) analysis was adopted for the research. In particular, the ESRI's ArcGIS spatial analysis module was used to aggregate, synthesize and analyze the databases, and to identify spatial relationships.

Results

What kind of rural development types the 615 counties (or cities at county level) in 10 provinces of eastern coastal China belong to was determined by diagnosing their rural development status, and the RDI of each county was calculated according to formula (2).

Relying on the advantages of location and national lean policies, 57.6% of the total territory of eastern coastal China belongs to BDT type, and 18.6%, 12.0% and 11.8% of the total area is shared by FIT type, IDT type, and BTT type, respectively (Fig. 2 and Table 5).

Among the FIT types, 59.1% of the type area shows a strong rurality (RDI > 0.5), mainly located in the northern Hebei province, southwestern Shandong, the border of Hebei and Shandong, parts of Hainan province, western Fujian, and northern Jiangsu. These areas, mostly located in the remote and mountainous areas, are the

Table 3
Assessment indicators of rurality degree index (RDI).

Indicator (Weight)	Definition	Explanation
Change rate of cultivated land (0.262)	$(CA_l - CA_e)/CA_e$	CA_l = cultivated land area of the later period; CA_e = cultivated land area of the early period; positive indicator, the higher the value, the stronger the rurality degree.
Change rate of rural population (0.225)	$(RP_l - RP_e)/RP_e$	RP_l = Rural population of the later period; RP_e = Rural population of the early period; positive indicator, the higher the value, the stronger the rurality degree.
The percentage of employed population in primary industry (0.154)	ELP/TL	ELP = the employed labors in primary industry; TL = the total labors; positive indicator, the higher the value, the stronger the rurality degree.
Output value of cultivated land (0.167)	AOV/CA	AOV = agricultural output value; CA = cultivated land area; negative indicator, the lower the value, the stronger the rurality degree.
Productivity of rural labor (0.192)	$OVFFAF/LFFAF$	$OVFFAF$ = gross output value of farming, forestry, animal husbandry and fishery; $LFFAF$ = labors employed in farming, forestry, animal husbandry and fishery; negative indicator, the lower the value, the stronger the rurality degree.

Notes: (1) The weights for the indicators were determined by conducting semi-structured interviews with relative experts; (2) The data used to calculate the change rate are the value of 1996 and 2004, other data are the value of 2004; (3) All the data are from the socio-economic statistical yearbooks of above mentioned 10 coastal provinces.

plant areas of primary agricultural products, with more rural labors employed in primary industry. There are only four counties with a weak rurality ($RDI < 0.4$), characterized by rapid decrease of cultivated land and rural population, and a higher output value of cultivated land. The type with a moderate rurality ($0.4 < RDI < 0.5$), in parts of Fujian and Guangdong, accounts for 37.3% of the type area (Fig. 3 and Table 5).

In the type of IDT, the area with a weak rurality and a moderate rurality takes up 33.4% and 42.8%, respectively, mainly located at the junction of Beijing, Tianjin and Hebei, the Yangtze River Delta, central and southern Shandong, and along the coastal belt of Shandong, Guangdong and Fujian (Fig. 3 and Table 5). In these areas, the industries are characterized by high added-value products, and high-grade, high-precision, advanced technology. A lot of cultivated land was occupied due to rapid industrialization and urbanization, and most rural labors were employed in factories. Area with a strong rurality accounts for 23.8% of the IDT type, located in the counties of southern Hebei and northern Guangdong, where the level of urbanization is not high, with a relatively laggard economic development, although the secondary industry is in a leading position, but most products are low value-added primary industrial products.

The area with weak, strong and moderate rurality shares 42.7%, 27.3% and 30.0% of the total area of BTT type, respectively (Table 5). The regions with a weak rurality mainly located in Beijing, Shanghai, Jinan, Qingdao, Nanjing, Guangzhou, Zhanjiang, Shenzhen, and some counties of Zhejiang and Fujian (Fig. 3), where the highly developed business, tourism and other services industries, have played an important role in promoting local rural development both in the aspects of industry and employment. The rest areas of this type with a strong and moderate rurality mainly distributed in western Hebei, northwestern Guangdong and the border of Zhejiang and Fujian, which are characterized by the development of primary tourism products and low-level business and services industries, the role of which to drive local rural development has much room for improvement.

Although slightly more than half area of the eastern coastal China gets a balanced development among the primary, secondary and tertiary industries, the level is different. There is only 17.2% of the BDT type with a weak rurality, mainly located in Huairou,

Zhangjiakou, Sanya, Yantai and Rizhao, as well as the Yangtze River Delta, the Pearl River Delta and coastal Fujian, with the characteristics of high added-value agricultural products, developed high-technology, tourism and leisure agriculture, and relative high-level business and tourism industries. Area with a strong rurality accounts for 37% of the BDT type, mainly in some counties of Hebei, central and western Shandong, western Zhejiang and Fujian, and northern Guangdong, which belong to low-level balanced development (Fig. 3 and Table 5).

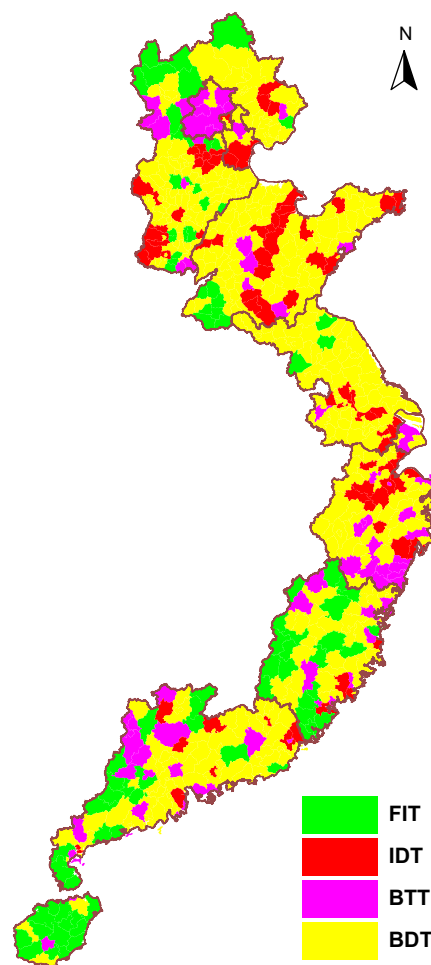


Fig. 2. Rural development types in eastern coastal China.

Table 4
The indicator system classifying rural development types.

Rural development type	Indicator and its value
FIT	$GDP1\% \geq 31.95$
IDT	$GDP2\% \geq 60.49$
BTT	$GDP3\% \geq 41.79$
BDT	not conform to the above three conditions

Table 5
Results of classification and assessment of rural development types in eastern coastal China.

Rural development type	Area (10,000 km ²)	Proportion of type area in the total area (%)	RDI value	Number of counties	Area (10,000 km ²)	Proportion of area of certain type with different RDI value in the total area of the type (%)
FIT	16.28	18.64	0.35–0.4	4	0.5973	3.67
			0.4–0.5	32	6.0655	37.26
			0.5–0.751	53	9.6174	59.07
IDT	10.48	11.99	0.2–0.4	30	3.4963	33.37
			0.4–0.5	37	4.4883	42.84
			0.5–0.646	19	2.4931	23.79
BTT	10.26	11.75	0.2–0.4	33	4.3847	42.73
			0.4–0.5	16	3.0738	29.96
			0.5–0.725	17	2.8025	27.31
BDT	50.34	57.63	0.2–0.4	83	8.6783	17.24
			0.4–0.5	164	23.0625	45.81
			0.5–0.87	127	18.6032	36.95

Discussion and conclusions

The interaction between the material and non-material elements affecting rural production and lifestyles shaped different rural development types depending on a carrier, which is composed of different industries. Accordingly, this paper makes the definitions of four rural development types, i.e., FIT type, IDT type, BTT type and BDT type, and classifies the rural development types in eastern coastal China. Then, basing on the major factors affecting the long-term rural development and the exertion of the functions of the countryside with regard to society, the assessment indicator system of rurality degree index (RDI) was established to distinguish the rurality degree of different types.

There are 18.6%, 12.0%, 11.8% and 57.6% of the total territory of eastern coastal China shared by FIT type, IDT type, BTT and BDT type, respectively. In the type of FIT, 59.1% of the type area shows a strong rurality ($RDI > 0.5$). In the type of IDT, the area with a weak rurality ($RDI < 0.4$) and a moderate rurality ($0.4 < RDI < 0.5$) takes up 33.4% and 42.8%, respectively. The area with weak, strong and moderate rurality shares 42.7%, 27.3% and 30.0% of the total area of BTT type, respectively. Almost half (45.8%) of the BDT type has a moderate rurality. To some extent, the RDI may accurately reflect the status quo of rural development and the exertion of the functions of the countryside with regard to society. The RDI can also reflect the different stage in what the same rural development type in different region stays. Combining with regional physical conditions and socio-economic development level, it will be helpful for us to analyze the regional differentiation of rural development and promote rural economic development by taking measures suited to local conditions.

Currently, both rural development and urban development in China are experiencing a transition period—the transformation of a traditional agricultural society into a modern industrial and urban society, and the economy is changing from a traditional planned economy to a modern market system. With the accelerated rural industrialization and urbanization process, rapid population growth and development of the market economy, the industrial structure, employment structure and land-use pattern in rural coastal China have been transformed tremendously. The functions and management mode of agriculture also come in multiple forms, step by step with the characteristics of changing from paying more attentions to the quantity turns to the quality and economic returns, and springing up of agriculture parks, urban agriculture, and tourism and leisure agriculture. With the economic and social transformation, regional development factors recombination and

followed industrial restructuring have changed the rural areas in eastern coastal China deeply.

China's accession to the World Trade Organization (WTO) will bring about obvious impacts on the agricultural production and its market. So, to confront with this challenge, rural associations will play an important role especially in the counties belonging to FIT type. The government's decision on agricultural products prices and food security will influence the farmers' enthusiasm for pursuing agricultural production. Correspondingly, the state corporatist rural associations what Unger and Chan (2008) argued need to help farmers improve traditional cultivation techniques and popularize agricultural standardization, to promote the strategic adjustment of agriculture structure by optimizing the industrial structure, the product structure and regional distribution of agriculture, and to improve rural (agricultural products) circulation system and strengthen the building of agricultural service system. However, civil rural organizations will be more flexible in finding domestic information on specific agricultural production and its market.

Rapid industrialization and urbanization have greatly changed the rural areas in the aspects of cultivated land loss for factory workshop, and rural labors transformation for workers. Although the counties belong to IDT type have the advantages in absorbing surplus rural labors, the monotonous industry mix is fragile, to some extent. In China's Pearl River Delta, seriously influenced by global economic crisis of 2008, many export-oriented enterprises were closed down, which resulted in a lot of rural migrators unemployed.² However, in the Yangtze River Delta, the situation causing unemployed rural labors is largely mitigated because of its diversified employed modes. So, in the counties belonging to IDT type, the adjustment of industrial structure needs to be paid more attention so as to evade this kind of risk.

Rural development depends on the change of its affecting factors, including material and non-material aspects of two major groups involved in natural resources, human resources, industry and employment, information, science and technology, customs and so on. The change of these elements, even their inter-regional flow results in the occurrence of rural development change from quantitative to qualitative. So, the rural development types classified in this paper cannot always keep the same situation, at least

² Slowing economy spurs disquiet in China (<http://chinadigitaltimes.net/2008/12/slowing-economy-spurs-disquiet-in-china/>).

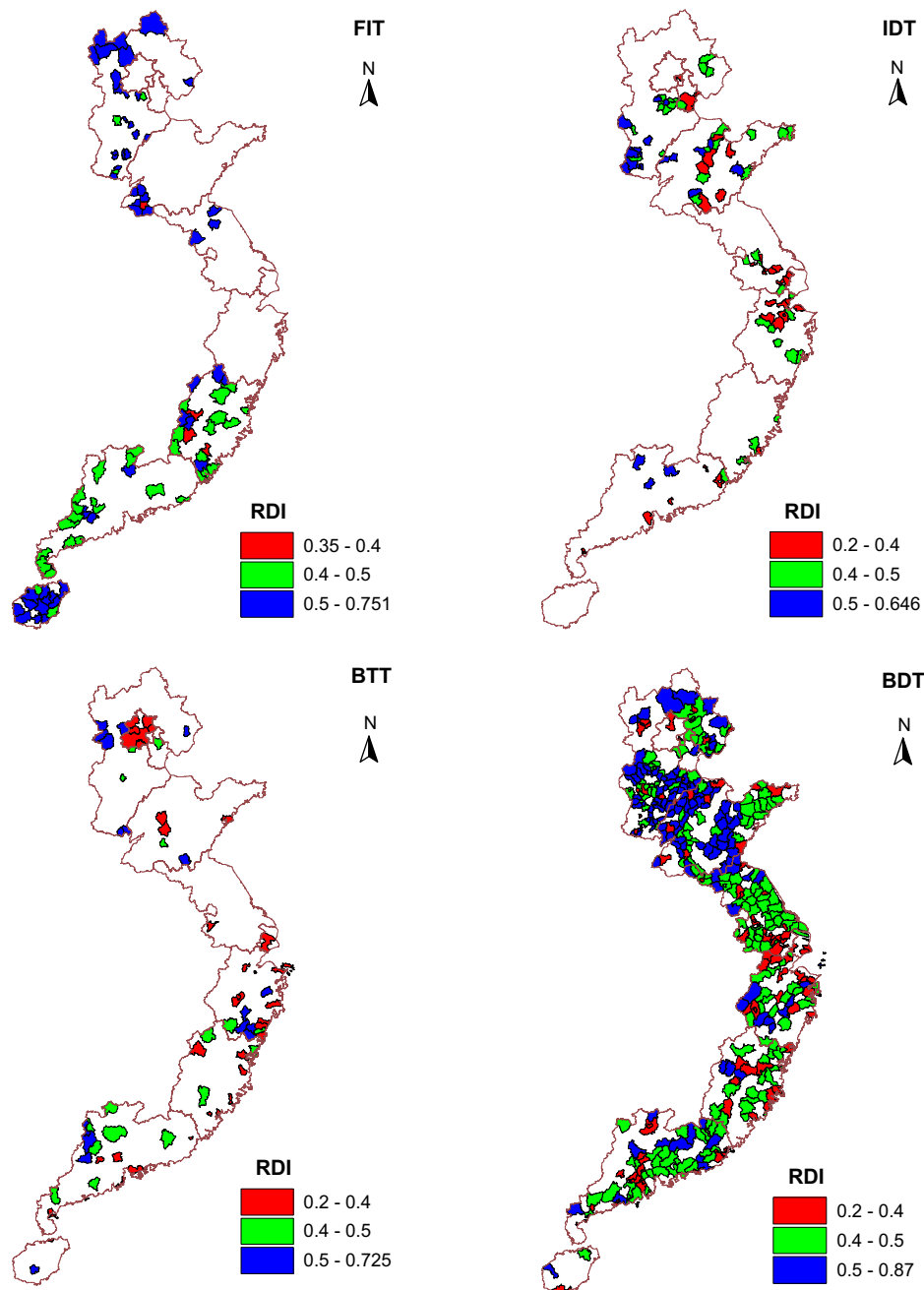


Fig. 3. Rurality degree index (RDI) of different types in eastern coastal China.

the quantitative change occurs momentarily. The study was to make clear the differentiation pattern and degree of rural development in eastern coastal China, and to provide scientific basis for understanding its further development trend and setting down corresponding developmental strategy.

In addition to the shape of a rural development type, another manifestation of the interaction of these elements is the socio-economic development model of a specific rural area. We argue that the study on the interaction of rural development factors in the process of economic and social transformation and the subsequent rural development model is very important to deeply understand the rural development and to smoothly achieve coordinated and balanced rural–urban development in developing countries, which are experiencing rapid industrialization and urbanization.

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