


## Article

# Rural Land Use Change Driven by Informal Industrialization: Evidence from Fengzhuang Village in China

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**Abstract:** This study investigates the spatial expansion process, the *de facto* land use change, and their endogenous driving forces in the village of Fengzhuang since the 1990s. Fengzhuang is a specialized village in Hebei, North China, in which above 80% of rural residents are engaged in the manufacturing of mahogany furniture. Land use data were extracted from a participatory rural appraisal (PRA) survey conducted in 2014–2015. The results suggest that the land in Fengzhuang has been expanding rapidly under the influence of the informal furniture industry. The villagers transform their residential areas into family workshops and factories for the production of furniture. Most rural areas officially marked as residential are, in effect, used for industrial production, resulting in the informality of land use and circulation. The in-depth survey also reveals that the informality of the furniture industry, the bottom-up process of land development, and the evolution of government regulation are the major reasons leading to the *de facto* change of land use in Fengzhuang. This study offers a microscopic perspective of land use change, which helps to explore the formation and change of rural land use and actual functions, as well as the mechanisms behind them. These findings are expected to provide some implications for improving rural development strategies, rural planning, and governance in China's specialized villages such as Fengzhuang.

**Keywords:** rural development; *de facto* land use change; specialized village; informal development; furniture industry; Fengzhuang; China

## 1. Introduction

Tracking spatial restructuring in rural settlements in terms of their land use changes and their underlying economic dynamics is a key perspective in the study of rural development around the world, especially in fast-growing China [1,2]. The reform and opening policy, which took place in the 1980s, has significantly transformed China's rural areas. A large amount of rural labor force has moved to and is working in cities due to the attraction of the lifestyle and the prosperity that cities can offer, resulting in many hollow villages [3]. In contrast, urbanization and industrialization has caused a dramatic change in the land use and natural landscape of rural areas, along with a significant loss of cultivated land, a spatial expansion of the surrounding cities, and an increase in the construction of rural settlements [4,5]. Meanwhile, the rise of rural industry, through township and village enterprises and the formation of specialized villages, has greatly reshaped the economy, the environment, and the way of production and living in the countryside [6–9].

Many empirical or case studies have investigated the various types of rural restructuring processes under different economic drivers that result in land use transformation [10,11]. For example, some have

detected that, since the 1980s, the process of rural industrialization in China has greatly transformed the spatial structure of rural areas, such as the change in land use from cultivated land to construction land, the appearance of collectively owned industrial parks, and the rise of family workshops/factories [7,12]. Also, the development of the tourism and service industry has prompted a land use change from residential housing to service facilities such as hotels and grocery stores [13,14]. Recently, some studies have found that the development of e-commerce in rural areas has restructured land use for family factories and workshops, as well as has spurred on the building of transport and logistics infrastructure in villages [15].

However, most existing studies mainly focus on the macroscale characteristics of rural land use, relying on remote sensing images and land use cover data. The macroscale approach can recognize a general land use change, for example, from agricultural land to built-up areas, while it rarely distinguishes specific socioeconomic activities that have occurred in each land parcel in detail, that is, the microscale land use features [16]. It is difficult to tell whether a building is used for dwelling or production purposes when using remote sensing analysis, especially when commercial and production activities in rural areas are hidden in residential buildings. Although recent studies have started to investigate the inner spatial structure of and the concrete land use and function in villages [17–19], they mainly focus on land use on the surface, identified by official data. This lacks observation of the actual usage of rural land, that is, the *de facto* land use, which represents the actual use of land that differs from that shown in official or formal records.

Informal economic activity is a major cause of *de facto* land use. Increasing discussions have been taking place regarding spatial informality around the world, especially in the urban areas of the Global South [20,21]. The informality of cities is often associated with poverty, immigration, and the profit-making activities of enterprises, resulting in city phenomena such as informal housing, informal economy, and informal employment [22,23]. However, the impact of informality on rural areas has received much less attention than those in urban areas. Only a limited number of studies focus on the informal economy, informal employment, and informal credit in rural areas [24–26], while even less research pays attention to rural land use transformation under the influence of informality.

This study focuses on the village of Fengzhuang in Hebei Province, North China—a typical specialized village dominated by the informal mahogany furniture industry—and investigates its official and the *de facto* land use/functions, as well as its process of transition in recent decades. The analysis combines an in-depth interview approach to identify *de facto* land use in the past and present with a remote-sensing approach for outlining rural land parcels. Moreover, this study aims to discuss the informal factors that lead to the disparity between official and *de facto* land use, as well as the endogenous driving mechanism behind this informality.

## 2. Literature Review

### 2.1. Land Use Transition in Rural China

Tracking land use changes is an important approach to understanding the evolution of rural development [27]. In general, the typology of land often includes woodland, grassland, water, cultivated land, and construction land. Long and Li provided a new analytical framework for topologizing rural land use, including its dominant and recessive morphologies and functions [28], and then extended the framework to emphasize residential land use transition in rural areas [29]. The dominant morphology of rural construction land represents the quantity, structure, and spatial pattern, while the recessive morphology indicates the corresponding quality, property right, management mode, etc.

On the one hand, many studies have surveyed the transition of the dominant morphology in rural China [28,30,31], especially relative to hollowed villages and rural restructuring [32]. These studies focus on the change of rural construction land in terms of its quantity and morphology, as well as the transformation between construction land and other land use. Traditionally, the macroscale characteristics of rural land use transition are identified, including the expansion of construction land

and the loss of cultivated land, the conversion into industrial land in suburban areas, the abandoned land far away from cities, and the concentration and reconstruction of rural settlements [30,32,33]. Recent studies have addressed the importance of scrutinizing the land function of villages at the micro-level [17–19]. Liu reported a detailed land use survey of the village of Yucheng in Shandong, China by mapping the functional transition of rural land and by analyzing the institutional forces behind the transition. Xi inspected the process and driving mechanism of the evolution of land use and function in a tourism village, i.e., the village of Gougezhuang in Hebei Province, under the context of the rapid urbanization of China.

On the other hand, an increasing number of studies have investigated the transition of recessive land use and functions. For example, Li suggested that per capita rural housing land is a token of the transition of the property rights of rural residential land, reflecting the relative relationship between the change of rural housing land and the population [29]. Zhu found that de-collectivization and industrial upgrading are the main indicators of recessive morphological transition in rural land use in the suburbs of Beijing [12]. Also, Fang detected that rural social and economic changes affect the configuration of rural housing land and indirectly change the functional pattern inside houses [34]. Jiang focused on the evolution of the inner structure of rural housing land at different stages of industrialization and found that the production function of rural housing has been gradually weakened [8]. Ma found that the function of rural settlements has converted land from residential use only to a mixed function, incorporating industrial use in the suburban rural area of Beijing [19]. His findings suggest that the reshaping of the rural industrial structure, the reallocation of the rural population, and the recovery of rural culture may potentially affect the change of rural residential land use.

In this study, we develop a concept of *de facto* land use. It differs from the concept of dominant and recessive land use as described previously, with an emphasis on land use change driven by informal development. *De facto* land use represents the actual use of land, which usually differs from what is shown in official or formal records. This concept is comparable to the terminology of “*de facto* urbanization” created by Shen and Ma, who observed that, in rural areas with a tendency of urbanization, the actual population moving from villages to cities differs from that reflected in the government statistics of official records [7]. Here, the land use shown in records is officially designated, with legitimacy and uniqueness, while *de facto* land use differs from this official use, often a result of informal industry or the activities under the informal development process.

## 2.2. Factors Driving Rural Land Use Change

Rural development and transformation together are a local process under the influence of exogenous and endogenous factors [28,35,36]. Exogenous forces such as industrialization, consumption upgrading, and information technology development are generally considered as the main factors of rural development and transformation, which thus promotes rural land use transition [7,13,15]. Many studies have confirmed this process; for example, under the promotion of industrialization, a large number of township enterprises, family workshops, and industrial parks have emerged one after another [4,7], changing both the rural structure of the economy and the land use. In recent years, the transfer of urban industry has led to the secondary restructuring of rural construction land around cities, including the appearance of collective industrial parks, the industrial upgrading of rural industries, and the leasing of village space [12]. With the upgrading of the consumption of urban residents, some rural areas have undergone a “post-productive” transformation [13,37]. In rural areas, hotels, shops, and related recreational facilities have begun to appear, and even second homes have appeared in some areas, which has promoted rural space change from being production-oriented to being consumption-oriented [18,38,39]. In developing countries, the development of information technology has an important impact on rural development, which promotes the emergence of banking-, logistics-, and information service-related facilities [15,40,41]. In addition, institutional arrangements and the behavior of the government are also important exogenous factors affecting rural development and transition [36,42].

Compared to exogenous factors, local and endogenous factors play a more significant role in the process of rural transformation and development [43–45]. For example, Zhang and Liu treated the dominant type of rural self-development as a model of endogenous development, including the characteristics of industry, eco-tourism development, and specialized market organization [44]. Based on a long-term survey of several typical villages, Li reported that although it is difficult to assess the impact of endogenous and exogenous factors on village development, those villages with better development are mainly affected by endogenous factors, such as natural and environmental resources, geographical location, economic foundations, and human resources [36]. The impact of rural livelihood, cultural markers, and the function of local actors has also been found in other studies [46–48]. Additionally, it is worth noting that the specialization of a specific industry has become one of the endogenous factors driving rural development in China [9,49].

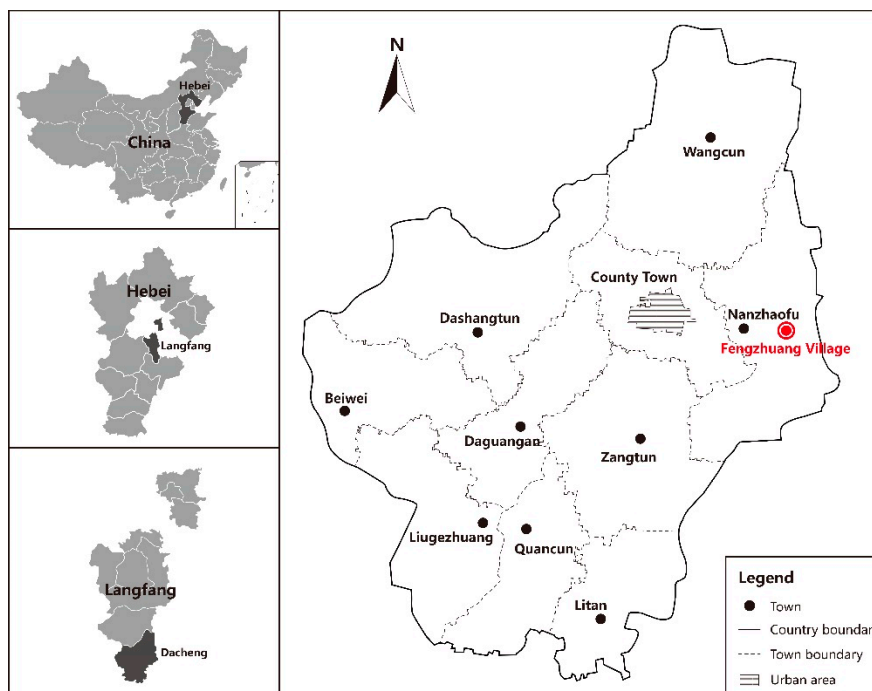
These factors that promote rural development and transformation are generally considered to be formal and positive, because they produce well-developed villages and result in a positive land use transition [36,45]. However, the change of rural land use under the influence of informal factors also needs to be taken into account. In fact, informality is well-defined as being non-compliant, unofficial, and disordered, with informal land use not being registered with a national government authority and being detached from governmental records [50,51]. Due to the urban–rural dualistic structure, the ambiguous land ownership, the deficient regulation environment, and the profit-seeking behaviors of local governments and developers, informality is not uncommon in China [23]. Although informal economic activities have always been active in rural areas [24], compared to the interest shown in urban informality, the informality in rural areas has received less attention in China [22]. Existing studies have focused on the impact of exogenous informal factors such as institutional arrangements and e-commerce on rural land use changes [22,52], while the process of rural land use transition under the influence of endogenous informal factors has yet to be revealed.

### 3. Research Area and Data

#### 3.1. Research Area: Fengzhuang, China

The village of Fengzhuang is located in the town of Nanzhaofu, Dacheng County, Langfang City of Hebei Province, approximately 140 km south of Beijing (Figure 1). Dacheng County is the largest production base of mahogany antique furniture and a well-known trading center in northern China, known as the “Hometown of Chinese Classical Furniture.” There are 103 furniture manufacturing enterprises and above 1300 retail stores in the county, with approximately 30,000 workers. Each year, on average, the county produces approximately 800,000 sets of various types of mahogany furniture, with an output value of above 60 billion RMB. The volume of the sales of these products occupies 85% of the northern China market and 30% of the domestic market.

Fengzhuang is the birthplace, as well as the current center, of the furniture manufacturing industry in Dacheng County. The total land area of the village is 3.03 km<sup>2</sup> (approximately 749.03 acres), with 15.13% (approximately 0.46 km<sup>2</sup>, or 113.67 acres) being built-up areas, along with a total population of 2474 in 2015. Although the villagers were mainly engaged in agricultural work in the past, in the 1990s, the manufacturing of mahogany furniture industry became a fast-developing industry. Currently, Fengzhuang possesses a complete industrial chain, ranging from raw material procurement, to machining, display, and sale, and both machining and sale activities occur within the village itself. In 2013, Fengzhuang had an annual output of approximately 2000 million RMB in the furniture industry and in commerce, in comparison to 2.6 million RMB in agriculture. The number of households participating in agricultural work is relatively small, only accounting for 8%, while 83% of the households are involved in non-agricultural production related to furniture manufacturing. Based on the definition of specialized villages [9], Fengzhuang has become a typical industry-dominant specialized village [49].



**Figure 1.** Location of Fengzhuang, Hebei, China.

### 3.2. Data

This study collected data via three steps. First, we used Google Earth remote sensing images with a spatial resolution of 0.6 m to delineate the land parcels of Fengzhuang, along with a field survey and interviews to identify and interpret land properties and conditions. As remote sensing images at the village level exist only in recent years, we integrated the land use planning information obtained from the village authority, for example, the maps and charts in the “Hebei Province Rural Appearance Improvement Plan” in 2013, and created a base map. However, these data are insufficient to represent the whole evolution process of the village, or the *de facto* land use, especially in 1990 when Fengzhuang became a specialized village.

Second, we conducted a participatory rural appraisal (PRA) survey to further elucidate the land use and actual functions of the village since 1990. PRA is an approach to understanding local context and developmental information via informal interviews with farmers in the study area. It is widely used in rural research, especially for tracking rural land use transformation throughout the past [10,53]. In our research, we combined the survey techniques of participative observation, questionnaires, and semi-structured interviews. The semi-structured survey adopted a face-to-face approach to interview the villagers by asking them open-ended questions to recall major construction activities of their own and other buildings in the village, as well as the developmental process of the mahogany furniture industry and their own roles in the process. The interviews allowed us to retrieve the official and *de facto* land use evolution of the village, dating back to 1990. The survey also collected information on households, such as household structure, employment status, and production information, along with housing information, e.g., the year of construction, building area, and usage/function of buildings, as well as the spatial arrangements of production and daily life activities. The PRA survey was carried out from 2014 to 2015, with the researchers living in the village, investigating 1007 courtyards and interviewing 575 households.

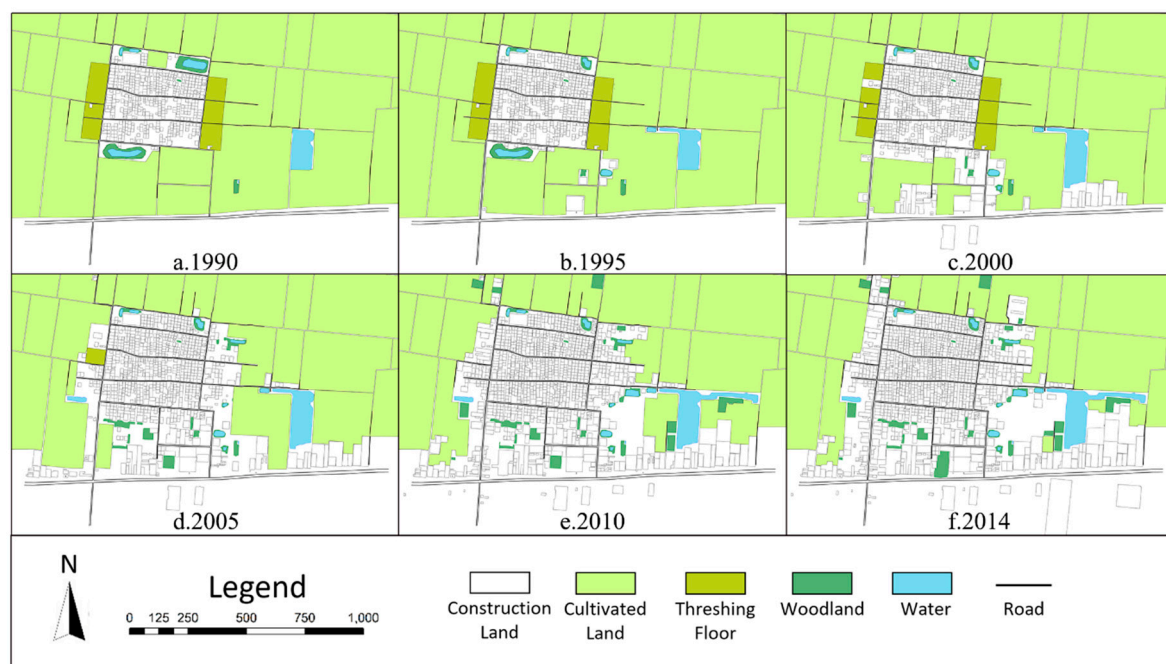
Third, based on the base map created in the first step, we incorporated the *de facto* land use data obtained from the PRA survey to recover the spatial evolution of the village land use from 1990 to 2014. The ArcGIS 10.2 software was used to visualize and analyze the land use changes of 1990, 1995, 2000, 2005, 2010, and 2014, which were used to delineate the process of industrial development and land use transformation of Fengzhuang since the 1990s.



## 4. Results

### 4.1. Spatial Expansion of Rural Construction Land

Since the 1990s, Fengzhuang has experienced significant spatial expansion, with the area of construction land increasing from approximately 80,000 m<sup>2</sup> in 1990 to approximately 460,000 m<sup>2</sup> in 2014, i.e., an increase of approximately five times. Figure 2 shows this construction land expansion, along with the distribution of cultivated land, woodland, water, and road infrastructure in six specific years between 1990 and 2014. Prior to 1990, the village was basically constructed in alignment with the land's original texture, with a rectangular and grid configuration, and expanded along the village fringe. From 1990 to 1995, the increment of construction land was relatively small, mainly located in the north of the village (Figure 2a,b). The overall layout of the village remained a rectangular shape, although some sporadic courtyards emerged in the south.



**Figure 2.** Spatial evolution of the construction land in Fengzhuang from 1990 to 2014.

From 1995 to 2000, in addition to the expected expansion surrounding the fringe, a large amount of construction land discretely appeared in the south, located along both sides of the No. 381 provincial road (Figure 2b,c). From 2000 to 2005, new built-up parcels sprang up in the east, west, and south of the village, with a scattered and disordered distribution (Figure 2c,d). Some relatively large buildings (with larger lot sizes) were erected on the north side of No. 381, showing a tendency toward intensification. As such, the entire configuration of the village changed into an irregular shape. From 2005 to 2010, the newly increased construction land started to fill the vacant lots in the east, west, and south of the village (Figure 2d,e). The original construction part of the village was integrated with the built-up areas along the provincial road, and started to occupy the land of the neighboring villages. From 2010 to 2014, it appears that only a small amount of construction land was added, as well as new courtyards mainly located in the north and east of the village. At this stage, there were only a few land parcels available near the roadside; thus, the north of the village, with its relatively high proportion of vacancies, became a new direction for land expansion.

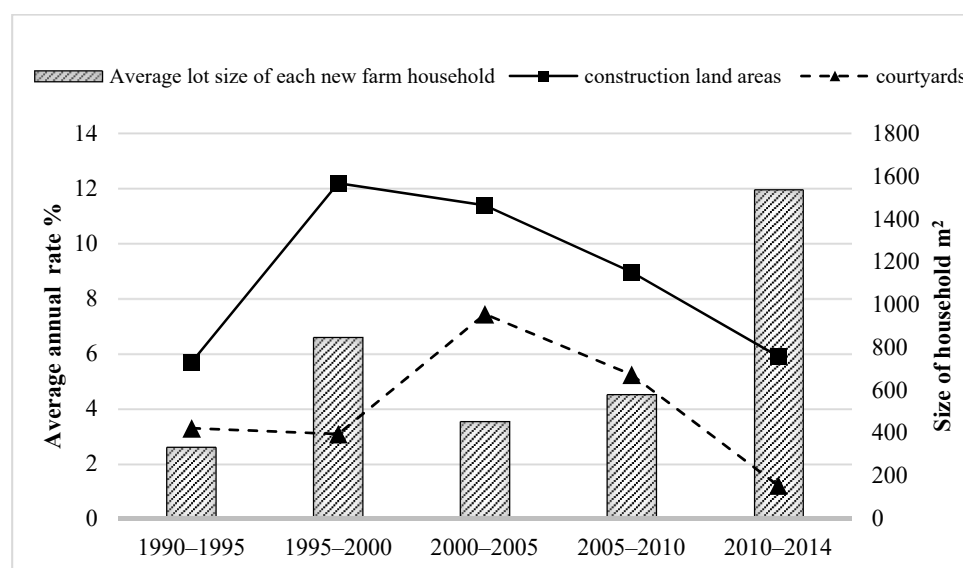
Table 1 shows the quantitative measures of the change of construction land for six periods between 1990 and 2014. The numbers in the table were estimated by ArcGIS and the PRA survey. By comparing the annual growth rates and the number of courtyards, we found that the expansion of built-up area experienced three stages: gentle expansion, rapid expansion, and slow development. For the period of

1990–1995, the amount of construction land in the village expanded from 79,000 to 102,000 m<sup>2</sup>, growing at a relatively gentle annual rate of 5.68%. In contrast, for 1995–2000, the annual growth rate peaked at 12.19%, and the total amount jumped up to 163,000 m<sup>2</sup> in 2000, implying a fast-developing tendency during this period. Meanwhile, the number of courtyards (or farmhouses) rose from 409 in 1990 to 549 in 2000, an annual increase of 3.42%. Therefore, the growth rate of construction land was much larger than that of courtyards, especially in the period of 1995–2000, indicating that the average lot size of each new building became larger and larger. In fact, there was a sharp increase in the average lot size of each new rural house from 335.45 m<sup>2</sup> in 1990–1995 to 847.95 m<sup>2</sup> in 1995–2000 (Table 1). As explained more in the following section, the increasing lot size of each building mainly served the need of family workshops related to the furniture manufacturing industry, rather than a sharply growing need for daily living.

**Table 1.** Construction land (CL) and courtyard changes in Fengzhuang from 1990 to 2014.

Years	Construction Land (CL) Areas (m <sup>2</sup> )	Expanded Total CL Areas (m <sup>2</sup> )	Average Annual Growth Rate of CL Areas (%)	Number of Courtyards	Average Annual Growth Rate of Courtyards (%)	Average Lot Size of each New Farm Household (Last Five Years) (m <sup>2</sup> )
1990	79,110	-	-	409	-	-
1995	101,585	22,475	5.68	476	3.28	335.45
2000	163,486	61,901	12.19	549	3.07	847.95
2005	256,615	93,129	11.39	753	7.43	456.51
2010	371,601	114,986	8.96	950	5.23	583.53
2014	459,158	87,557	5.89	1007	1.20	1536.09

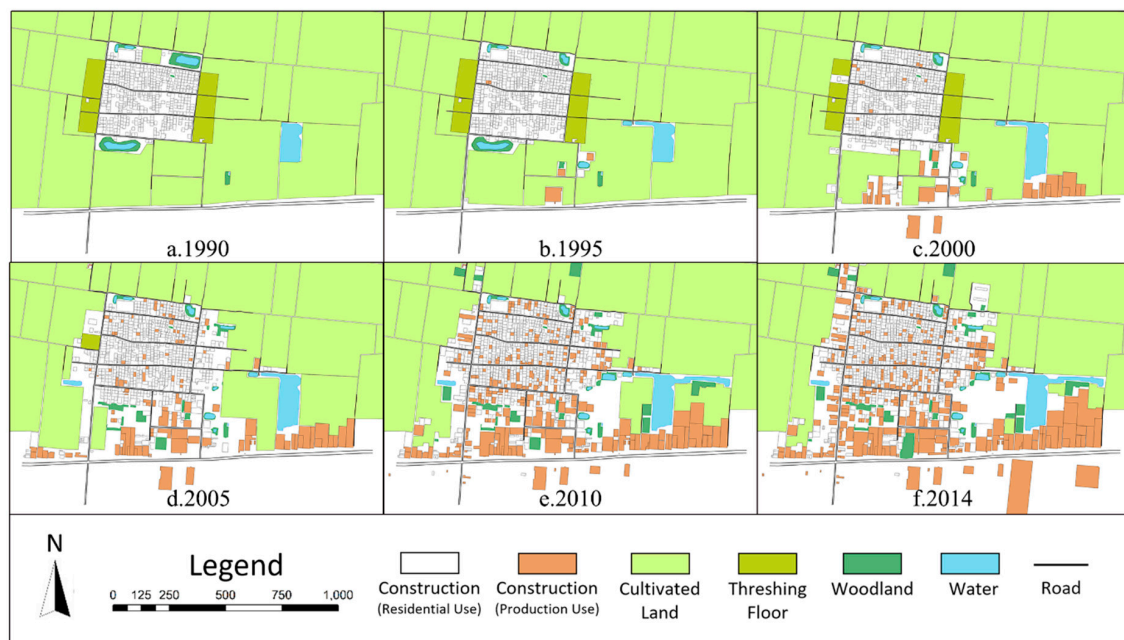
After the year of 2000, the growth rates decreased gradually from 11.39% in 2000–2005 and 8.96% in 2005–2010 to 5.89% in 2010–2014, although the expansion of lots continued to grow to 459,000 m<sup>2</sup>, approximately six times that of 1990 (Table 1). Since 2010, the rapidly increasing trend of land expansion has settled down. However, the number of courtyards presents an increasing trend first and then decreases, reaching a peak of 7.43% between 2000 and 2005. After that, the rate of courtyard growth shows a similar tendency to that of construction land (Figure 3), i.e., a decrease from 5.23% in 2005–2010 to 1.20% in 2010–2014. During this period, a great change took place in the average lot size of each new rural house. After the sharp increase in 2000, it returned to normal, with an average of 520.02 m<sup>2</sup> in 2000–2010; however, it reached a peak between 2010 and 2014, equaling 1536.09 m<sup>2</sup>. This was due to the emergence of large factories in the later stages of industrial development.



**Figure 3.** Average annual rate of construction land (CL) and courtyards (line chart), and average lot size of new households (bar chart) from 1990 to 2014.

#### 4.2. De facto Land Use: Residential Areas Used for Furniture Production

Since the early 1990s, the leading industry of Fengzhuang has changed from agriculture to the manufacturing of mahogany furniture, resulting in a sharp transformation of land use and function. At first glance (Figure 2), a salient increase in the amount of construction land is accompanied by the same amount of loss of cultivated land, and as shown in the official records, this new construction land is used or planned for rural residential buildings. However, based on the in-depth PRA survey, since the early 1990s, villagers have situated their mahogany furniture production activities in their courtyards or farmhouses, participating in particular production links of the furniture manufacturing chain. Figure 4 delineates the *de facto* function of construction land by distinguishing the function of furniture manufacturing from residential use. It is interesting to see that, in fact, many family workshops (i.e., family-run factories) informally transform their own residential space into space for production purposes. This observation is highly associated with the developmental processes of a specialized village, which here are divided into four stages, including the infant stage (late 1980s–1995), the growing stage (1996–2005), the blooming stage (2006–2010), and the adjustment stage (2011–2014).



**Figure 4.** The *de facto* function of construction land in Fengzhuang, with the manufacturing of mahogany furniture becoming the dominant industry.

According to the land use estimation and the PRA survey, Table 2 shows the amount of land converted from non-construction land (NCL) to residential land, as well as the sale and production places for the furniture industry for different periods from 1990 to 2014. Additionally, the *de facto* land use transformation from residential use to industrial use (i.e., sales and production) is emphasized.

**Table 2.** The conversion of non-construction land to residential land in Fengzhuang.

Years/Stages Conversion Type	1990–1995		1995–2000		2000–2005		2005–2010		2010–2014	
	NCL	RF	NCL	RF	NCL	RF	NCL	RF	NCL	RF
To sales place (m <sup>2</sup> )	0	0	6375	0	3240	1025	7340	760	8070	1000
To production use (m <sup>2</sup> )	1968	260	13,390	4110	15,058	4101	11,046	14,189	24,893	2750
To residential use (m <sup>2</sup> )	6835	-	13,632	-	32,161	-	38,677	-	18,015	-
Total (m <sup>2</sup> )	8803	260	33,397	4110	50,459	5126	57,063	14,949	50,978	3750

Notes: NCL represents non-construction land, including vacant and agricultural lots; RF represents residential-function area.



During the infant stage, from the late 1980s to 1995, the classical mahogany furniture industry was introduced to Fengzhuang. This ascribes to the fever of classical furniture collection at that time in China, as well as to the locational advantage of Fengzhuang, which lies in the hinterland of the cities of Beijing and Tianjin, where many mahogany furniture sets made in the Ming and Qing Dynasties had been left. Because very few Ming- or Qing-style furniture items were preserved as being integral, some of the pioneers were first engaged in purchasing and collecting furniture parts and broken pieces, and then in the repairing and assembling of these items of furniture. During this production process, the villagers became familiar with the skills of furniture manufacturing; as such, some of them mastered the skills and built family workshops. Thus, from 1990 to 1995, a few residential areas were either transformed or newly built for furniture production, especially to the south of the village near the main road (Figure 4b). Meanwhile, the conversion of non-construction land, including vacant and cultivated land, for residential use was significant in the north of the village.

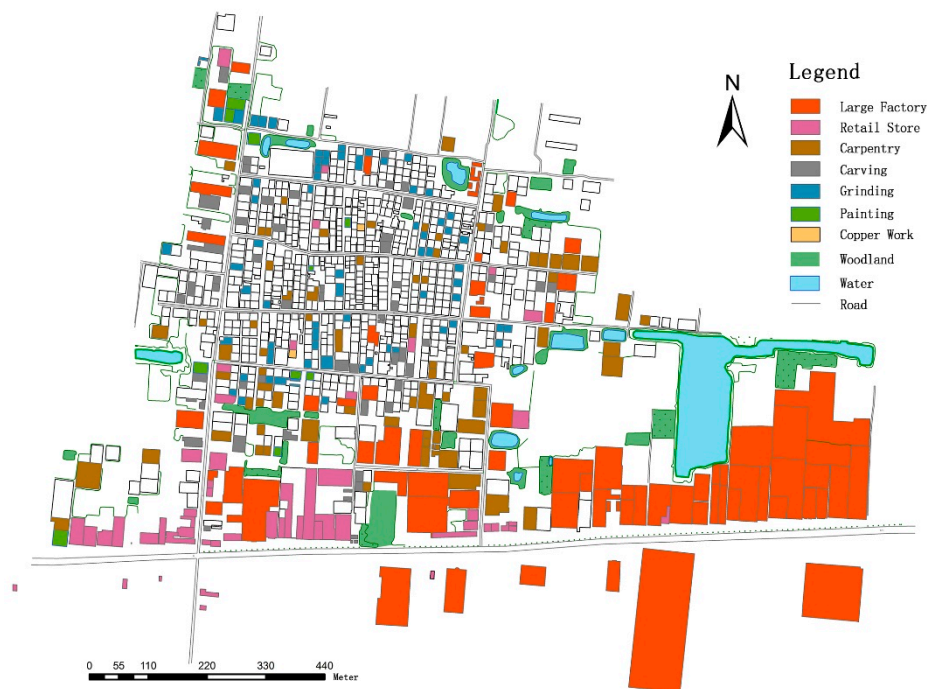
From 1996 to 2005, Fengzhuang entered a growing stage, when the mahogany furniture industry gradually became the dominant industry rather than agriculture. During the infant stage, the pioneers with family workshops and factories had accumulated a certain amount of funding and thus invested in purchasing more land for building additional factories in the village. This also attracted an increasing number of farmers to work in the family factories, especially those of genealogical relation to the factory owners, because at this time, it was possible to earn much more by making furniture than by traditional farming. The emergence of a specialized village largely affected the *de facto* function of construction land in Fengzhuang (Figure 4c,d). For example, a large amount of non-construction land was converted into construction land, which was used for production and residential purposes, while a certain proportion of residential lots were rebuilt or converted for furniture production (Table 2). Particularly, some large-scale factories were constructed along the No. 381 road in the form of “store in the front, factory in the back” (*Qiandianhouchang*). By the end of 2005, 106 courtyards in Fengzhuang were engaged in the manufacturing of mahogany furniture. The total area for furniture production was 49,527 m<sup>2</sup>, of which 9496 m<sup>2</sup> was transformed from residential parcels. During this decade, 100 new production-related courtyards were constructed, accounting for 36% of the newly added courtyards in the village.

From 2006 to 2010, the mahogany furniture industry in Fengzhuang entered into a blooming stage. Owing to previous development, Fengzhuang earned a certain reputation in the production and sale of mahogany furniture. The demand for mahogany furniture increased rapidly, and many foreigners went directly to the village to purchase furniture. This spurred more factories to compete for occupying land along the No. 381 road their transportation advantages. During this stage, a large amount of non-construction land was converted for residential use, as well as for production use. Also, a large amount of residential space was transformed for productive functions, and the number of family workshops increased rapidly. According to Table 2, during these five years, the area for the production and sale of mahogany furniture in Fengzhuang increased by 33,335 m<sup>2</sup>, approximately double that of 2005. Among this area expansion, 14,189 m<sup>2</sup> of the productive parcels and 760 m<sup>2</sup> of the commercial parcels were transformed from residential land, and in total, 86% of the new courtyards were built for the mahogany furniture industry.

Since 2011, the furniture industry has been negatively affected by the tight supply of the wood manufacturing market around the world and by the adjustment of national policies for fighting corruption. For example, the policy of Eight Rules (i.e., *baxianguiding*) led to a sharp drop in the use of mahogany furniture as official gifts, which typically accounted for a large portion of the sales in the past. As such, the production and sale of mahogany furniture slowed down; therefore, from 2010 to 2014, Fengzhuang encountered an adjustment stage. Although there remained the conversion of a certain amount of non-construction land into industrial land for furniture production and sale, the growth of family workshops slowed down, and only a small number of residential lots were converted into production lots. During this period, a total of 36,713 m<sup>2</sup> of new land for furniture production and

sale was added, nearly twice the amount of land for increased residential lots, while 87.7% of the newly added courtyards was used for the furniture industry.

Through the above-mentioned 20 years of development, Fengzhuang has formulated and nurtured a complete furniture manufacturing production chain at locations of various scales, including large-scale factories with the capacity for independent operation and small factories or family workshops in charge of a link in the production chain. Figure 5 shows the distribution of factories, family workshops, and retail stores for the sale of furniture in Fengzhuang in 2015, based on the PRA survey. The spatial patterns vary with the scale, function, and links of the production chain. For example, large-scale factories are mainly located on the east side of the No. 381 provincial road, small- and medium-sized factories are distributed around the fringe of the village, and family workshops are scattered in the “old” village, which have been there since the 1980s.



**Figure 5.** Geographical distribution of the various links in the production chain of the mahogany furniture industry in Fengzhuang.

According to Figure 5, the village has a total of 325 courtyards that serve the mahogany furniture industry, including 70 factories, 203 family workshops, and 52 retail stores. Family workshops are, in effect, small-scale factories that specialize in production services in specific parts of the entire production process, most of which are labor-intensive, such as carpentry, carving, grinding, painting, and copper work. Most family workshops are engaged in carpentry, carving, and grinding, accounting for 36.5%, 26.1%, and 32% of the totality, respectively. Only a relatively small number (only 4.9%) of them are responsible for painting and copper work.

#### 4.3. Factors Driving De facto Land Use Conversion: Informality, Internal Industrialization, and Loose Government Regularization

Throughout the development trajectory of Fengzhuang from the early 1990s onward, *de facto* land use change has been largely associated with the specification of the mahogany furniture industry and its inherent informality, as described in the previous section. In addition, the process of land use conversion has been driven by bottom-up internal industrialization demands for a specialized village in order to unbind the external disadvantages. Many external factors have restrained the development of Fengzhuang. For example, the village is far away from urban areas and thus gains few benefits from

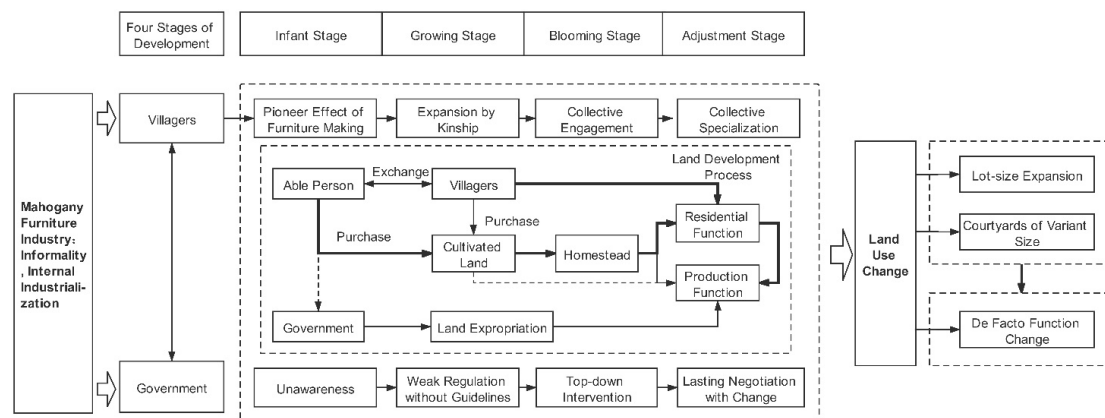
the industrialization of the surrounding metropolitan areas. Also, it lacks competitive resources for traditional industrialization and thus obtains less official support from local and city governments. However, Fengzhuang has completed the transformation from an agricultural village to an industrial village, mainly relying on its own capital accumulation and the development of the manufacturing industry based on family workshops. This has resulted in a mixed configuration, that is, “the village is not like a village and the factory is not like a factory.” This section further discusses how the driving forces—including the informal production of the furniture industry, the informal bottom-up process of land development, and the evolution of government regulation—lead to (*de facto*) land use conversion.

The mahogany furniture industry in Fengzhuang has some inherent characteristics of informality, with features of small-scale operations such as family workshops, and is highly labor-intensive. Due to its bottom-up and spontaneous nature, the manufacturing of mahogany furniture is mostly an underground industry without legal acknowledgment. This industry relies on many small-scale factories and family workshops, which are free of governmental regulations. They deal with business in cash transactions, usually without invoice certificates, in order to avoid tax payments. Thus, the government cannot regulate the transaction amounts and can only obtain very limited taxes from the mahogany furniture industry in Fengzhuang.

Figure 6 summarizes a conceptual framework of the land development process in Fengzhuang under the influence of informality, internal industrialization, and government regularization. Affected by the informality of the mahogany furniture industry, the reactions and behaviors of the local government and the villagers have continuously changed. At the early stage of development in the 1990s, the government was unaware of the development of the furniture industry. This resulted in rapid growth of the mahogany furniture industry in the village. In the infant stage, some of the pioneers were engaged full-time in furniture manufacturing in place of traditional farming work. In the growing stage, an increasing number of farmers were introduced to the furniture industry, especially through kinship, whereas governmental intervention remained weak and no guidelines were given, thus nurturing a free and hidden market akin to *laissez-faire*. In the blooming stage, furniture manufacturing work became the pursuit of the entire village collective, thus dominating and replacing the position of farming. Fengzhuang eventually formulated a complete production chain of the manufacturing of mahogany furniture and became a typical specialized village, with furniture manufacturing as the dominant industry. Since this stage, the local government has started to set up a positive role in guiding and intervening the development of the furniture industry and the corresponding land development, and some land use regulation strategies have also been tried. The entire specification process of the furniture industry and the games between local authorities and villagers generate “two tracks” of land use change: one is the officially recorded land use conversion, showing a significant conversion from non-construction land to construction land, i.e., the rural residential land in department statistics; the other is a complicated *de facto* land use change by converting land of residential use into that with a hidden production function in order to serve specific links in the furniture manufacturing production chain.

In fact, the local government has made efforts to regularize informal economic and development activities by bargaining with the villagers and factories in Fengzhuang. For example, negotiation between the local government and farmers has always existed, ever since the beginning of the industrial development in the early 1990s. Following the Land Management Law of China, enacted after the reform and the opening regime in the 1980s, the local government allowed villagers and township enterprises to convert collective land for production use by applying for permits, which is referred to as “state-levied land.” However, by the end of 2014, only six land parcels were officially confirmed as “state-levied land,” while the rest of the land used for furniture production and sale was officially recorded as rural residential land, or “homestead.” *De facto* land use functions are, in effect, barely observed, relying on official statistical data or only remote sensing data. Fifty-six percent of the total land used for production was converted from cultivated land under the label of “homestead,” and a small proportion was directly transformed from existing residential lots, although

such conversion behaviors are prohibited in principle. This informal land circulation strategy could be conceptualized as a process of “cultivated land–homestead–production land.” Most villagers adopt such an informal land circulation strategy to seek land for expanding their family workshops or factories. The government has relatively weak regulation as a result of adopting a semi-acquisitive attitude or by intervention via penalty, especially back in the 1990s. This relationship between the government and farmers leads to and aggravates low-cost land expansion for furniture manufacturing activities in Fengzhuang, and formulates an “invisible marketization” that pushes the bottom-up specialization of the furniture industry.



**Figure 6.** A framework of the land development process in Fengzhuang under the influence of informality, internal industrialization, and government regularization.

The land contract system implemented in China, in effect, stipulates that rural contracted land must not be traded.<sup>1</sup> In Fengzhuang, as the collective land has become the core economic element and spatial carrier for industrial development, the informal, private trade of land between villagers is unavoidable. According to the RPA survey, most of the land in Fengzhuang and its surrounding rural areas was first traded in private (bound by a morality with contract), and then a certain fee was paid to the village collective (or the village authority) to obtain “permission” for building a new house. In this way, rich villagers are able to buy a large amount of land for building factories. Such land is often adjacent to the buyers’ existing factories or family workshops, as well as the main roads, such as No. 381, to benefit from lower transportation costs. With an increasing demand for land, land resources in the village are becoming gradually scarcer, while the compensation for land trade-off is gradually improving. In 2005, the compensation price per acre was approximately 240,000–300,000 RMB, whereas in 2010 it was approximately 600,000–1,200,000 RMB. By 2014, due to the extreme scarcity of land, land compensation increased to 2,400,000–3,000,000 RMB per acre. The increasing price for land also prompts villagers to bid for land in their neighboring villages in order to purchase more contracted land for production.

In 2007, the local government tried to make a plan to build an industrial park near the village for concentrating, replacing, and accommodating scattered furniture factories and family workshops, aiming to regularize the mahogany furniture industry, to make it legal, as well as to foster an agglomeration economy. However, regularization and legalization are associated with an increase in taxation cost; thus, most farmers and workers refused to move their factories and workshops to the industrial park, and chose to maintain the status of the informal economy. Moreover, Fengzhuang has a complete production and trading network from raw material procurement to the sale of products. The vertical links in this production chain closely connect small factories and family workshops. This

<sup>1</sup> In China, rural land belongs to the collective, and farmers have the right to contract the land by the collective. In this paper, rural contracted land refers to cultivated land.

close connection ascribes to geographic proximity (e.g., all workshops are located in proximity to one other within the village) and social proximity (e.g., family workshops are intimate due to kinship relations). Thus, it is not easy to make attractive any spatial regulations to separate two factories or workshops. As a result, it was to be expected that the local government would have to finally abandon the plan of an industrial park, as well as of the control and management of the furniture industry, allowing the village to develop independently. Meanwhile, local authorities rarely provide resources, such as land, funding, and policies, to support Fengzhuang's development and planning.

## 5. Discussion and Conclusion

This paper investigated the land expansion of Fengzhuang from 1990 to 2014 by examining officially recorded and *de facto* land use changes. By developing the mahogany furniture industry, Fengzhuang gradually transformed from an agricultural village to an industrial village, realizing the economic restructuring of the village. From 1990 to 2014, Fengzhuang experienced four stages of industrial growth, namely, an infant stage, a growing stage, a blooming stage, and an adjustment stage. The area of construction land expanded from 80,000 to 460,000 m<sup>2</sup>, a rise of approximately five times. The village mainly expanded along the provincial road of No. 381 due to a "road economy," with the advantages of low communication and transportation costs, as well as high accessibility, especially for large factories and furniture retail stores. *De facto* land use change is reflected in the actual functions of various plots of construction land that serve as various links in the furniture manufacturing production chain. Essentially, many villagers use their own housing to participate in furniture production, transforming the officially recorded residential function to a production function. In order to unbind the regulation of local or national land use interventions, many villagers convert cultivated land into homesteads first, and then build houses and use them for family factories. This *de facto* land use change gradually reshapes the configuration of the village, as per the saying "the villages are not like typical villages and the factories are not like typical factories." In addition, the construction of the built environment of the village has also been neglected, and the spatial restructuring of the village seems to have met challenges.

The informality of the mahogany furniture industry, the bottom-up industrialization, and the loose efforts in regularization are the three major driving forces leading to *de facto* land use change in Fengzhuang. The contradiction between the land supply (primarily for residential use) and the demand for industrial development spurs villagers to adopt tricky strategies and constitutes an invisible land transaction market. The government fails to properly guide the development of the furniture industry, gradually loses control and regulation over the furniture manufacturing activities, and finally, only provides loose regulation for industrial development in the village. The dependence on informal governance and the lack of formal governance in rural China may be a key interpretation [54].

The case study of Fengzhuang can enrich the debates on the planning and governance of informal settlements around the world. While the existing literature mostly focuses on informality in cities, little attention has been paid to rural areas [23]. Our findings suggest that, in the absence of effective local and village-level governance, informal industry and economy could also bring challenges to rural land use and spatial development [22]. Also, although the government can formalize such informal industry by implementing administrative approaches concerning the market's tools, the potential cost is huge. When facing these problems, several strategies could be adopted by local governance, with a focus on the negotiation with villagers on land use and tax collection. For example, a possible strategy is that local government persuade villagers to move their family factories to the government-led industrial park in return for some economic regimes, such as reducing land or production tax rates and providing additional subsidies for moving and production processes. This strategy can consolidate the land for the production of the village. Alternatively, it is also an option to formalize the industry by permitting the existing rural land, officially only for residential or agricultural use, to be transferred to industrial use in the village. In this case, the way in which to break through the institutional arrangements and to realize the transfer of rural construction land is a critical problem for the government. In recent years,



the state has begun a new attempt to allow rural collective construction land (including homesteads) to enter into the market [55]. This new rural land policy may provide an opportunity for the formalization of land with current informal use, such as that in Fengzhuang.

From a national perspective, the diversification of rural development policies and the strengthening of local governance initiatives need to be addressed. Since 2000, the central and state governments have made great efforts to motivate rural development and have introduced a series of laws and regulations to instruct stable development in rural areas [56]. While these regulations and policies have had a significant effect, they are mostly designated to protect farmers, cultivated land, farming activities, and agricultural production. For non-agricultural villages, the direction of development is often contrary to the logic of traditional village planning in China, which results in a mismatch between the top-down land management system and land use demand for bottom-up industrial development [57]. Despite the fact that some local governments take the initiative to adjust plans and institutional systems to guide the development and transformation of villages [58], there remain many bottom-up informalities in the process of land development and land use practices [33]. Thus, on the one hand, the government should fully recognize the nature of different villages, formulate land use laws and regulations for nurturing various development patterns in these villages, and avoid traditional strategies without clear classification, referred to in Chinese as “one size fits all” [29]. Also, the local government should be more empowered to make local plans and regulations in light of local developmental conditions and contexts. On the other hand, institutions should respect bottom-up practices and experience and employ them to improve corresponding rural planning and regulations.

Some limitations exist in this study. First, the PRA approach was adopted to elucidate the land use and expansion history of Fengzhuang from 1990 to 2014; however, the PRA approach may not be able to accurately detect the evolution of non-construction land, especially when some unpredictable land use changes occur. More complementary data, for example, multi-year, high-resolution remote sensing images and nighttime light data, are needed in further studies. Second, it is always difficult to distinguish land use and functions when there is mixed use. For example, most of the early family workshops and factories were a mix between residential and production use. Lastly, we need to conduct a comparative case study of multiple villages in the future to compare the *de facto* land use change in different specialized villages and to obtain a more convincing interpretation for policy suggestions.

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