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Rural industrial restructuring in China's metropolitan suburbs: Evidence from the land use transition of rural enterprises in suburban Beijing

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ABSTRACT

China's rural areas has witnessed a rapid and far-reaching transition in the past decades, following which thousands of "hollowed villages" in China's traditional agricultural areas has mushroomed. While in the metropolitan suburbs, such a transition has led to the functional evolution and industrial restructuring of the rural settlements. Industrial upgrading and land intensive use in the urban areas, coupled with the tightening construction land quotas, has affected the land use morphology of the suburban rural settlements directly and/or indirectly. This paper explores the rural industrial restructuring by evaluating the land use transition of the rural enterprises in suburban Beijing. Based on the spatial land use data and field work, a clear spatial differentiation of the land use morphology has been found in the study area, which involves not only the dominant morphology like land use structure, but also the recessive morphology like the land ownership and intensification of the production factors. Then, a rural enterprise index which combines three main changes on the land use morphology was developed to demonstrate the spatial combination characteristics of the rural enterprises. The results indicate that with an increasingly open market of collective construction land, Beijing's suburban rural areas have been well integrated with the urban industries and functions spilling over from the central city. This is considered as a process of rural industrial restructuring from endogenous industrialization towards exogenous industrialization. Land use transition of the rural enterprises has released a strong policy demand for the system reform of the rural construction land. The deepening rural land system reform will contribute to the sustainable development of China's rural industrialization and urbanization.

1. Introduction

Rural transformation and restructuring in the process of urbanization is a global issue. Urbanization impacts rural areas in various ways such as landscape structure, function, and farmers' livelihoods, while breaking the productive relations established in the traditional agricultural economy. Rural restructuring has been identified not only in the western world during the processes of the rural renaissance, population turnaround, and counterurbanization (Alger, 1993; Dahms, 1995; Cloke et al., 1997; Mahon et al., 2009; Sofer and Applebaum, 2006), but also in the rural areas of developing countries like China, Indian, and the Philippines (Ahmed, 1993; Su et al., 2011; Gibson et al., 2010).

China's rural restructuring has experienced two major periods. The first period was well known as the bottom-up rural industrialization motivated by the Township and Village Enterprises (TVEs), which realized rapid development of the rural non-agricultural sector and the local transfer of the rural labor force. Due to increased market integration, competition, and official preference for foreign-owned enterprises, TVEs lost their position in late 1990s, while many of them went bankrupt in the following economic crisis. The survivors restructured into private enterprises, and became an important part of the Pearl River Delta's and Yangtze River Delta's private economy.

Recent rapid urban sprawl has resulted in accelerated rural restructuring due to depopulation, agriculture adjustments, and scale management, as well as the spatial territorial and industrial reorganization of rural areas (Woods, 2005; Long et al., 2012; Liu et al., 2014a). Besides the conversion between the urban and rural land, the morphology of the rural settlements has experienced tremendous changes, and were polarized in China's second rural restructuring. Villages in the traditional agricultural areas faced depopulation caused by massive out-migration to urban areas. This led to the abandonment of houses throughout the rural settlements in China, and created many hollowed villages (Chen et al., 2014). However, villages near the urban

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areas gradually attracted a great number of emigrant workers and created the phenomena known as the rural-urban fringe zone, peri-urban area, or urban village.

Considering the fixed position, changes of the land use morphology are easier to track than the flows of capital and labor in rural areas. Land use transition (Grainger, 1995; Long et al., 2009) of suburban rural areas can be a perfect tool to demonstrate the impacts caused by urban sprawl. Massive studies have been conducted on China's rural restructuring and rural land use transition. In the traditional agricultural areas, high attention was given to the rural hollowing. With the exploration of formation mechanisms (Liu et al., 2010b) and the morphology evolution of the hollowed villages (Li et al., 2010), researchers proposed institutional and technical solutions from the perspective of intensive land use and coordinating land and population urbanization (Chen et al., 2010; Long et al., 2012; Li et al., 2014). While on the urban fringe, most studies have focused on the transformation of the urban village, which have ranged from the function of the urban village (Song et al., 2008), land development and management (Qian et al., 2013; Liu et al., 2010a), and the reformation of the administrative management system (Liu et al., 2014b; Lin and De Meulder, 2012). However, few studies have attempted to shed light on the comprehensive study of rural industrial restructuring and land use transition. Characteristics and mechanisms of rural restructuring in China's metropolitan suburbs remain to be explored.

In this paper, the land use transition of the rural enterprises was used to demonstrate the rural industrial restructuring that occurred in suburban Beijing. The aims of the study are as follows: (1) To assess the differentiation and transition of the land use morphologies of the rural enterprises in suburban Beijing. (2) To explore the spatial combination characteristics of the dominant and recessive land use morphologies with an enterprise index. (3) To discuss the characters and implications of the rural industrial restructuring implied from the land use transition. A greater understanding of the rural industrial restructuring and the changing urban-rural relationship was achieved by studying the rural land use transition in China's metropolitan regions.

2. Background: Beijing's urban expansion under the urban-rural dual structure

According to China's public ownership established in 1962, there are two forms of land ownership, state-owned land and collective land. The former applies to urban land, while the latter to rural land (Chan, 2000). The land-use rights of state-owned land can be traded in the market under the leasehold system, whereas the circulation of those rights for collective land is limited to the exchange of contract rights among collective members within land tenure (Zou and Oskam, 2007). Rural land-use rights cannot be traded in the market, and can only be used for urban purposes after being transferred from collective to state ownership. The only valid way of accomplishing this transformation is by a land requisition initiated by local governments (Xu et al., 2011). Given this, the state-owned land and collective land have actually co-existed in rural areas, especially in the near-urban countryside.

There are 2 kinds of urban sprawl which are physical pattern-based and function-based sprawl (Ewing, 1997). Both kinds of urban sprawl have transformed the landscape and function of rural areas in the periphery of the metropolitan regions in China. As the capital of China, Beijing has experienced physical pattern-based sprawl since the late 1980s. Major elements of this period were the shift from the industrial economy to the service economy in the urban areas, transport infrastructure improvements, and dramatic industrial developments in suburban areas (Zhou and Ma, 2000; Zhao, 2010). In recent years, function-based sprawl has been promoted by urban functional zoning and satellite city construction. Along with urban sprawl, land use patterns of the suburban rural areas have exhibited unique characteristics since the new millennium. The traditional suburban rural area was gradually replaced by multistory residential blocks and scattered factory buildings, which is usually defined as peri-urban areas.

Table 1
The land use dynamics in the urban and rural areas of Beijing.

Construction land dynamics	1988–2000	2000–2006	2006–2013
Urban Buildup Area	8.26	141.98	8.50
Rural Settlement Land	23.77	36.84	12.30
Total Construction Land	32.03	178.82	20.80

The data was estimated based on 2 studies on Beijing's urban-rural expansion (Tian et al., 2014; Wang, 2016) and the data of land use change of Beijing in 2001 and 2006. Units: km^2/year

According to Table 1, Beijing's urban sprawl has experienced 3 periods since the late 1980s. Before 2000, the urban buildup area and population grew slowly due to the urban–rural separation created by the Household Registration Policy. In the rural areas, with the aim of making the farmers "leave their agricultural land without leaving hometown" and "move to manufactories without moving into cities", local governments vigorously developed the TVEs (Song et al., 2012). The large amount of the rural labor force, liberated from the Household Responsibility System, promoted the prosperity of the TVEs, and caused the increase of rural industrial land.

From 2000–2006, Beijing's urban area experienced a rapid expansion at a speed of 141.98 km^2 per year. The construction for the 2008 Olympics aroused the construction of the municipal infrastructure, which made great contributions to the growth of urban areas. The accelerated construction of 11 satellite cities, emphasized by the Overall Planning of Beijing City (2004–2020), also caused the extensive growth of new towns and surrounding industrial parks. The rural settlement expansion of this period concentrated in the peri-urban areas, presenting a filling type development situation between the central city and the new towns. This trend has increased the urban physical sprawl like laying a pancake, and destroyed the design of the multi-centered group development. Beijing's rapid expansion under single centered sprawl caused urban diseases such as traffic congestion and environmental pollution. It also put tremendous pressure on the protection of cultivated land resources. In this situation, the municipal government delivered a series of strict policies to control the construction land quota assigned to the local government.

After 2006, Beijing's extensive and physical-based urban expansion slowed and shifted to an intensive and functional-based expansion. Furthermore, the expansion of the urban buildup areas was restricted by tightening construction land quotas. Urban development was required to make full use of the existing construction land according to the Land Use Planning of Beijing (2006–2020). The growth of construction land has slowed especially in the urban areas, 8.50 km^2 per year. Additionally, the large growth of the migrant population brought great challenges to urban land use and carrying capacity, as shown in Table 2. Convenient public transportation and high housing prices along with a relatively low income forced the migrant population to

Table 2
The resident and migrant population in Beijing from 2006 to 2015.

Year	Resident Population	Migrant Population	Percentage
2006	1581	383.4	24.25%
2007	1633	419.7	25.70%
2008	1695	465.1	27.44%
2009	1755	509.2	29.01%
2010	1961.2	704.5	35.92%
2011	2018.6	742.2	36.77%
2012	2069.3	773.8	37.39%
2013	2114.8	802.7	37.96%
2014	2151.6	818.7	38.05%
2015	2170.5	822.6	37.90%

Data source: Beijing Statistical Bureau; Unit: Million.