



Research on Rural Industrial Land Renewal with Reduction Guidance: A Case Study of Wujiang District

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Abstract. As cities turn from new area development to built-up area renewal, quality improvement and reduction renewal of rural inefficient industrial land has become focus issues in urban planning academic circle in the face of innovation-driven development and economic upgrade. Existing literature indicates that industrial land renewal is an essential strategy to increase land use efficiency and promote industrial transformation and upgrading, and the investigator's research viewpoints and emphasis on industrial land renewal are changing as well. This study examines the state of rural industrial land renewal in Suzhou City's Wujiang District, identifies problems facing the initiative, and proposes a more practical framework for rural industrial land renewal, which includes how to implement performance assessments for rural industrial land, the classification and guidance of different land types, and design policy mechanisms to support rural industrial land renewal. It is intended to serve as a reference for the reduction-renewal of rural industrial land and policy-making.

Keywords: Rural Industrial Land; Reduction; Renewal; Wujiang District.

1 Introduction

China's urban and rural construction land has increased dramatically since the reform and opening up, and inefficient land use has become the new normal for the development of many regions [1]. The land use indicators are facing "hard constraints" as the amount of construction land available in developed cities approaches the "ceiling", and the stock or reduction of development has become the inevitable choice for the future [2]. In the sphere of urban renewal, the reduction of inefficient industrial land, the upgrading and transformation of industry, and the intense improvement of land quality and efficiency have taken center stage.

In terms of stock or reduction planning, a great deal of theoretical and practical study about industrial land renewal been conducted recently both domestically and internationally. Enhancing land use efficiency and promoting industrial upgrading and transformation could potentially be achieved through industrial land renewal. However, industrial land renewal research focuses on the dynamic and mechanism [3-5], mode and method [6-8], and interests and property rights [9,10] in industrial land

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renewal, and lacks attention to rural industrial land renewal. Additionally, there are fewer quantitative measurement studies synthesizing multi-source data and more qualitative research [11], which makes it challenging to fully reflect the deep-rooted issues in the process of rural industrial land renewal.

Because of this, the study uses Wujiang District as an empirical case and, after analyzing the current situation and problems of rural industrial land renewal, constructs a systematic framework for rural industrial land renewal with reduction guidance. It is hoped to provide reference and decision-making support for rural inefficient industrial land reduction-renewal in the developed areas.

2 Wujiang District's current situation and problems with rural industrial land renewal

2.1 Spatial dispersion and fragmentation

There are 4,780 rural industrial land places spread throughout 45.87 km² in Suzhou City's Wujiang District as of 2020 (Fig. 1). The geographical distribution of rural industrial land in Wujiang District has long been dispersed due to a lack of district-wide spatial supervision and total quantity management. Based on the "land fragmentation index," Wujiang District's rural industrial land has a fragmentation index of 1.04 blocks/hm², much higher than Jiangyin City's (0.16 blocks/hm²) and Wujin District's (0.52 blocks/hm²). This indicates a high degree of land fragmentation.

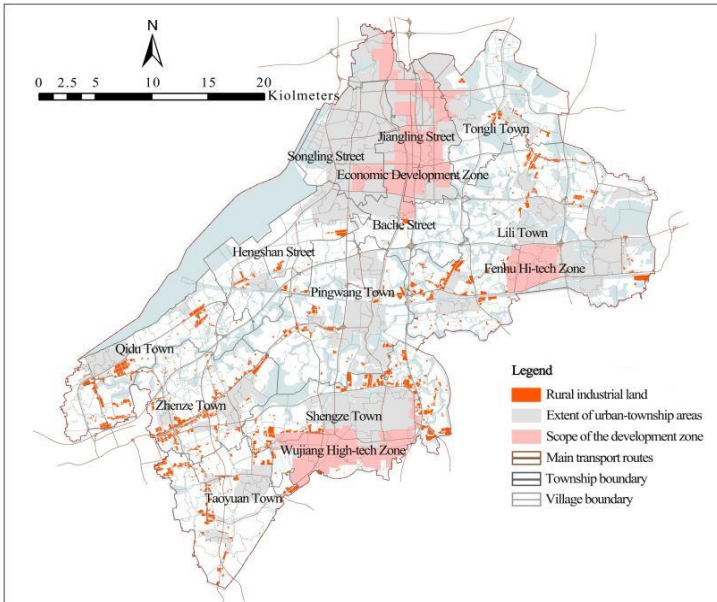


Fig. 1. Spatial distribution characteristics of current rural industrial land.

2.2 Low utilization efficiency

Wujiang District's current rural industrial land is underutilized, as evidenced by its low floor area ratio and low average land output. In terms of floor area ratio, the average floor area ratio of rural industrial land is 0.7, which is far from the industrial floor area ratio range of 1.2-1.5 set in the regulatory plan. In terms of average land output, the average output and average tax revenue are 1897.85 and 54.76 million RMB/hm², respectively. The findings show that the economic output benefits of rural industrial land use are relatively low. Moreover, the rural industrial land in Wujiang District has complex property rights due to historical legacy, interest-driven, and low-cost orientation factors [1], which increases the difficulty of renewal.

2.3 Imperfect policy support

Market participation in industrial land renewal needs to be supported by a sound renewal policy system. Wujiang District's industrial land renewal practice is still just in its exploratory phase, and the renewal policy's declaration and project, planning and approval, value-added revenue sharing, and other aspects are still lacking. A whole process and policy framework for the renewal of rural industrial land are desperately needed.

3 Renewal systematic framework for rural industrial land

This study constructs a renewal systematic framework for rural industrial land in Wujiang District from scratch (Fig. 2).

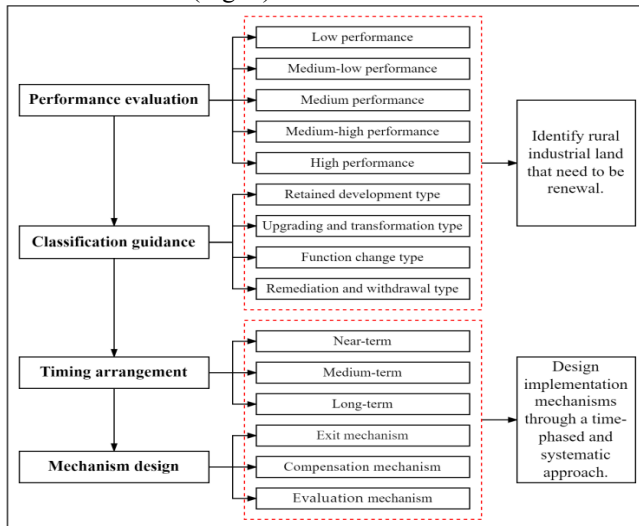


Fig. 2. Renewal systematic framework for rural industrial land.

Firstly, we build an evaluation index system at the parcel-microscale to measure rural industrial land performance. Secondly, we identify rural inefficient industrial land, and categorize and guide the renewal of various types of rural industrial land. Thirdly, we carry out the rural industrial land renewal in chronological sequence and clearly identify the priority areas for renewal. Fourth, we establish a renewal policy framework through the design of supporting mechanisms for land withdrawal, compensation, and evaluation.

3.1 Performance evaluation

Each land parcel's performance level is determined by evaluating the present rural industrial land. In order to measure the performance of rural industrial land in Wujiang District, this study designed 17 evaluation indicators and assigned different weight values using the analytic hierarchy process (AHP) and the entropy method [11]. Since the evaluation takes the form of relative scores, it reflects the actual level of Wujiang District.

We calculated the performance values of the current 4,780 rural industrial parcels and classified the performance values into five grades from high to low according to the Jenks, which are low, medium-low, medium, medium-high, and high performance, and accounted for 26.13%, 18.06%, 13.87%, 21.78%, and 20.15%, respectively (Table 1). The rural industrial land which evaluated as having low and medium-low performance is the key area for future renewal.

Table 1. Performance evaluation results.

Performance Grade	Number of Parcel	Total Area	Area Ratio
Low	1535	11.99 km ²	26.13%
Medium-low	907	8.29 km ²	18.06%
Medium	756	6.36 km ²	13.87%
Medium-high	957	9.99 km ²	21.78%
High	625	9.24 km ²	20.15%

3.2 Classification guidance

This research comprehensively considers the various disposal methods for rural industrial land and whether it has potential for renewal based on the results of the performance evaluation. It is divided into four guiding types (Fig. 3), namely, retained development type, upgrading and transformation type, function change type, and remediation and withdrawal type [11], accounting for 41.94%, 13.87%, 18.06%, and 26.13%, respectively.

Retained development type. In performance evaluation, rural industrial land that is evaluated as having high and medium-high performance is regarded as the retained development type. These lands have high economic scale and output efficiency, good

industrial base. We should reserve the attributes of industrial land, continuously improve production capacity, implement supporting services, and strictly prohibit conversion to other uses.

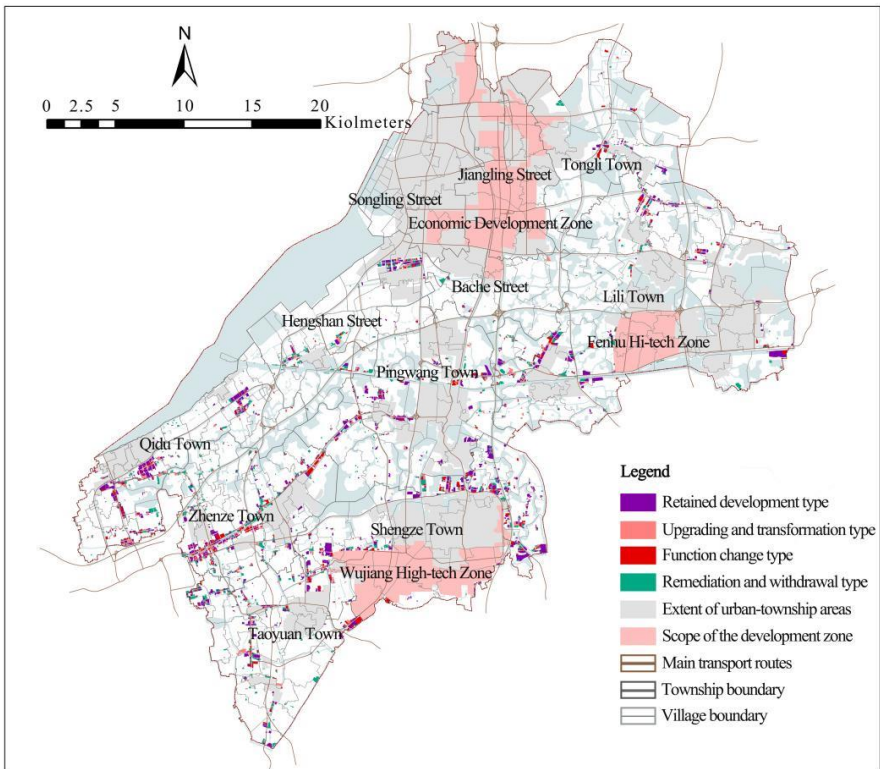


Fig. 3. Classification and guidance for rural industrial land.

Upgrading and transformation type. In performance evaluation, rural industrial land that is evaluated as "medium performance" and has the potential for upgrading and transformation is categorized as upgrading and transformation type. Improve the utilization efficiency or output efficiency of unit land use by means of technological reform, capital increase, and production expansion.

Function change type. In the performance evaluation, it is evaluated as "medium-low performance" grade, and its layout is too scattered and fragmented. It is categorized as a functional change type, with an emphasis on encouraging functional adjustment of land, relocation, and storage of indicators, taking into account the renewal potential of rural industrial land [1].

Remediation and withdrawal type. The rural industrial land evaluated as "low performance" and belonging to "small-scale, low productivity, and high energy consump-

tion" is divided into remediation and withdrawal types, and the withdrawal of industrial land functions will be realized through the relocation of indicators and relocation and consolidation [11,12].

3.3 Timing arrangement

As the study involves a large number of rural industrial lands that need function change, remediation and withdrawal, the local government is required to implement renewal in phases and step-by-step. With reference to the industrial development plan of Wujiang District and the actual situation of each town and street, the study has arranged the implementation time sequence of the above lands in the near-term (within 5 years), the medium-term (within 10 years), and the long-term (Fig. 4). At the same time, it is recommended to select areas with good location, high renewal potential, and sufficient funds as the focus of near-term implementation and give priority to renewal and transformation.

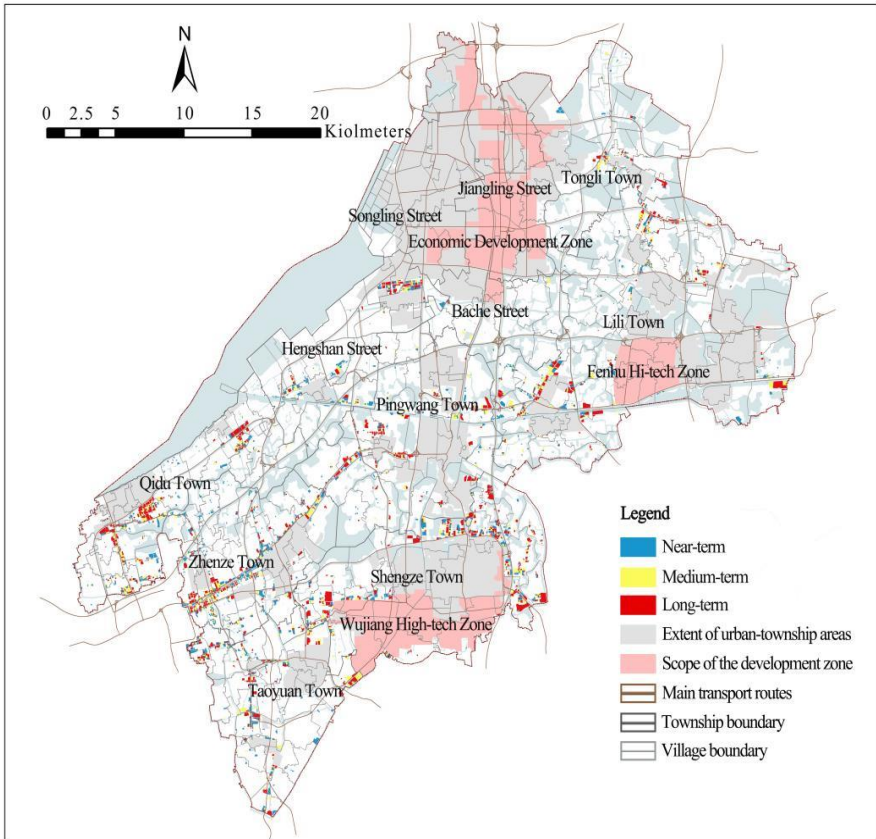


Fig. 4. Timing arrangement for rural industrial land.

3.4 Mechanism design

This study has designed three links as the core policy framework. First, establishing an exit mechanism for rural inefficient industrial land. Specifically, the Natural Resources and Planning Bureau of Wujiang District is the leading department responsible for coordinating with the management departments of development, reform, economics and information, environmental protection, finance, and taxation, as well as the townships and villages, to jointly formulate quantifiable and enforceable assessment standards for the exit of rural inefficient industrial land.

Second, setting up a rural industrial land benefit compensation mechanism. It is necessary to reasonably guide the remediation and withdrawal, and transformation and upgrading of rural inefficient industrial enterprises, reduce the impact on the employment of villagers, study the benefit compensation mechanism under the overall planning of the whole district, and ensure that the rights and interests of village collectives, villagers, and enterprises are not lost [1].

Third, Constructing a dynamic performance monitoring and evaluation mechanism. It is suggested to carry out the "full life-cycle physical examination" and dynamic performance monitoring and evaluation of rural industrial land once every five years on an annual basis to grasp the performance information of rural industrial enterprise land in real time.

4 Conclusion

As cities turn from new area development to built-up area renewal, the reduction-renewal of rural inefficient industrial land has become focus issues in the academic circle. In the face of innovation-driven development, economic transformation and upgrading in the "resource-constrained" stage, it is urgent to establish a land factor allocation optimization mechanism for stock renewal [13].

This paper constructs a systematic framework of performance evaluation, classification guidance, timing arrangement, and mechanism design for rural industrial land renewal in Wujiang District, which can provide a framework reference for rural industrial land renewal in other regions. However, the current situation and problems of rural industrial land renewal in each region are different, so it is necessary to analyze the specific problems and customize the rural industrial land renewal strategy for ourselves. Nowadays, reduction planning is in the stage of continuous exploration and practice. How to make the reduction-oriented rural industrial land regeneration plan really land, really used for the countryside, the future still needs to be summarized and discussed in practice.

Acknowledgments

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