Analysis of Development Regulation in Chinese Regulatory Planning towards the Main Function Zoning Strategy

Chengzhi Yin¹ and Dongfeng Yang²

1. School of Public Policy and Management, Tsinghua University, Beijing 100000, China

2. School of Architecture and Fine Arts, Dalian University of Technology, Dalian 116000, China

Abstract: China is in a process of rapid urbanization. However, along with the dramatically economic growth, there constantly emerges environmental and social constraints which may be great challenges of China's future sustainable development. In order to optimize the developmental mode, the latest national plan, "The 12th National Economic and Social Development Plan (2011-2015)", is establishing the "Main Function Zoning Strategy", which could be considered as a new prototype of national spatial plan and may cover all Chinese territories. Based on the latest "Main Function Zoning Strategy" stipulated in "The 12th National Economic and Social Development Plan (2011-2015)", the article builds main interlinks between the spatial development strategy and urban regulatory planning. Secondly, regulation factors in Chinese regulatory planning, which may implement the task of main function zoning, have been clarified and categorized. For each regulation factor, its regulation capability is defined by applying a coding method developed by the author. Finally, according to the output of the study, the spatial regulation approaches to implementing the "Main Function Zoning Strategy" in Chinese regulatory planning are analyzed.

Key words: China, Main Function Zoning Strategy, urban planning, development regulation.

1. Introduction

Previously, Chinese national plan might regulate the comprehensive developmental goal, while urban plans and land use plans could work as spatial plans to regulate the physical development. Due to the rapid urbanization in China in order to optimize the developmental mode, the latest national plan, "The 12th National Economic and Social Development Plan (2011-2015)" [1], is establishing the "Main Function Zoning Strategy", which could be considered as a new prototype of national spatial plan and may cover all Chinese territories.

The hierarchy of the Chinese urban and rural planning system can be divided into five levels: the urban system planning, the urban planning, the town planning, the township planning and the village

planning [2]. Urban plans and town plans, which are regulating city development, may comprise the master plan and the detailed plan. The detailed plan has two sub-levels: the regulatory plan and the site plan.

In China, the regulatory plan, which is the urban detailed plan and zoning code, is the main legal basis for building permission. According to relevant laws and regulations at national level, the paper is intended to analyze regulation capabilities of relevant factors, which may be functional in realizing the Main Function Zoning, in order to clarify the spatial regulation approaches to implementing the Main Function Zoning Strategy.

2. Tasks of the Main Function Zoning Strategy

It is stipulated in the 12th National Economic and Social Development Plan of China (2011-2015) [1] that the high-efficient, coordinated and sustainable

Corresponding author: Chengzhi Yin, Ph.D., research fields: urban and regional planning, urban governance and sustainable development. E-mail: yincz@tsinghua.edu.cn.

national spatial development structure should be established by specifying the development order and regulating the development density in accordance with the goals of rational economic development and relevant economic distribution. Therefore, the Main Function Zoning Strategy should be implemented to optimize the national spatial development structure, which means that each part of territory should follow the national spatial development order and be developed according to its main function.

According to the regulation of the National Economic and Social Development Plan of China, physically, local economic and social development plans focus on locating industrial projects. Land use plans regulate the land use of non-built-up areas and urban plans regulate the land use of built-up areas.

The 12th National Economic and Social Development Plan of China (2011-2015) [1] requires that the population distribution, economic layout, national land use and urbanization structure should be planned and coordinated at the central government level, in order to make regions with better development conditions more attractive to citizens (especially farmers who are willing to migrate to cities) and investments, and preserve ecological spaces and arable land. Therefore, a balance among the population, economy and environment could be created. There would be the so-called four main function zones [3]:

- zones of optimization: These zones are regions with dense population, high development density and greatly affected natural environment. They should be developed by an optimized model, that means intensive, smart, energy-saving and environmentally friendly upgrading approaches;
- zones of focuses: These zones are regions with good environmental capacities and economic development basis, as well as ideal conditions for population agglomeration. They should be developed by a focus model, that means the large-scale economic development;
- zones of restriction: These zones are regions of

agricultural production and regions of key ecological functions. Large-scale and extensive industrialization and urbanization should be restricted in these regions;

- zones of prohibition: These zones are legally binding natural and cultural preservation areas as well as other areas which need to be preserved. No development is allowed in these areas.

In accordance with the requirements of the Main Function Zoning Strategy, the regional planning, sector planning and location of major development projects should be coordinated with the Main Function Zoning. Through urban planning, exact functions and spatial structures of main function zones should be implemented. Moreover, development density, environmental capacity and other compulsory indicators attached to each main function zone should be studied and determined [3].

For each kind of main function zone, the regulation task may differ to a large extent. However, any zoning type must be based on the physical planning of spaces. Therefore, the paper builds interlinks between the Main Function Zoning Strategy and urban regulatory planning by considering the spatial regulation factors.

3. Relevant Spatial Regulation Factors in Chinese Regulatory Planning

3.1 Role and Content of Chinese Regulatory Plan

Regarding all planning types, the regulatory plan is the key basis for building permission. Technically, a regulatory plan is to be developed out of relevant master plan [2] and a site plan should be consistent with relevant regulatory plan [2]. It turns the two-dimensional macro control into the three-dimensional detailed control and adopts the concise and clear measures to develop quantitative indicators and control regulations, in order to balance the conflicts between the public interest and the private interest. Therefore, it is clear that a regulatory plan works not only as a primary tool for realizing the intentions of the relevant master plan, but also the basis of relevant site plans. From urban management

point of view, the regulatory plan is the primary technical standard to judge the qualification of building projects. It means that urban physical development can be regulated in fact primarily by regulatory plans.

The regulatory plan could also be a tool of realizing urban design concepts. It is able to implement urban design concepts regulated in the master plan by defining certain indicators and requirements, which may control the formulation of site plans.

The content of a regulatory plan may include designations regarding [4]:

- the boundary of planning area, type of building and land use, and land use compatibility;
- regulation indicators such as the building height, building density, plot ratio and greening rate;
- spaces for public facilities, locations of traffic entrances and exits, capacities of parking spaces, and set-back depths from boundary lines of roads;
- the urban design guidelines such as the building volume, building form and colors;
- spaces for traffic entrances and exits, public parking spaces, public traffic stations, pedestrian zones, and other traffic facilities in accordance with the urban transportation forecast. Boundary lines of roads, sections of roads, intersection forms and drainage measures, as well as coordinates of road control points;
- spaces for municipal utilities, including boundary lines, spatial locations, and diameters of pipelines. Requirements for underground development;
- relevant regulations on the land use and development regulation.

It is also stipulated in the Regulation on Formulation

and Approval of Urban and Town Regulatory Plans enacted by the MOHURD (Ministry of Housing and Urban-Rural Development of China) [5] that regulatory plans should make designations as following:

- type of land use, land use compatibility and other necessary land use control requirements;
- plot ratio, building height, building density, greening rate and other necessary regulation indicators;
- land use areas, scopes and other relevant requirements of infrastructure, public facilities, and facilities for public safety. Control requirements for underground pipelines;
- boundary control lines, including the yellow line (boundary control lines of infrastructure), green line (boundary control lines of green spaces), purple line (boundary control lines of heritage neighborhoods and buildings) and blue line (boundary control lines of water bodies) [6-9].

Regulatory plans work mainly as development guidance. However, some control factors are mandatory, such as the type of land use, building density, building height, plot ratio, greening rate and regulations on infrastructures and public facilities [4].

3.2 Analysis of Regulation Factors in Realizing the Main Function Zoning

Considering the requirements of the Main Function Zoning Strategy and according to the stipulations mentioned above, relevant spatial regulation factors in Chinese urban regulatory planning may be grouped into three categories: land use, development density, and environmental capacity, as shown in Table 1.

Table 1 Spatial regulation factors in Chinese regulatory planning which could implement the Main Function Zoning Strategy.

Tasks of the main function zoning in urban planning	Spatial regulation factors available
Land use	Type of land use; land use compatibility; land use boundaries and requirements including that for infrastructure, public facilities, and municipal utilities; boundary control lines
Development density	Plot ratio; building height; building density
Environmental capacity	Greening rate; green line and blue line controls

4. Regulating Effectiveness of Implementing the Main Function Zoning Strategy in Chinese Regulatory Planning

4.1 Coding Method

In order to illustrate the regulating effectiveness of implementing the “Main Function Zoning Strategy” in Chinese regulatory planning, the paper quantitatively defines the regulation capability of each regulation factor in the economic, social and environmental categories through a coding method. Regulation capabilities may be defined as five levels [10]:

- The first level (1 p.m.) represents a regulation factor which is able to completely implement the task of “the Main Function Zoning Strategy” and is also a mandatory legally binding constraint;
- The second level (0.75 p.m.) represents a regulation factor which is able to partially implement the task of “the Main Function Zoning Strategy” and is also a mandatory legally binding constraint;
- The third level (0.5 p.m.) represents a regulation factor which is able to completely implement the task of the “Main Function Zoning Strategy” and is not a mandatory legally binding constraint;
- The fourth level (0.25 p.m.) represents a regulation factor which is able to partially implement the task of the “Main Function Zoning Strategy” and is not a mandatory legally binding constraint;
- The fifth level (0 p.m.) represents that there is no regulation factor to implement the task of the “Main Function Zoning Strategy”.

4.2 Definition of Regulation Capabilities of Regulation Factors

4.2.1 Land Use

The Chinese Codes for Classification of Urban Land Use and Planning Standards (GB (National Standard of China) 50137-2011) [3] defines the urban development land as eight categories, 35 classes and

43 subclasses. It is necessary for the regulatory planning to apply the subclasses. According to the Formulation Criteria of Urban Planning, the type of land use is a mandatory regulation factor, which should be defined as the first level regulation capability (1 p.m.).

The Chinese land classification is in a general mutually exclusive system. In this system, only in residential areas, the residential land use may be compatible with public facilities, roads and green spaces, while the other land use types are mutually exclusive classification. Such approach may facilitate the functional zoning. As a part of the land use type regulation, the Chinese land use compatibility regulation is definitely a mandatory regulation factor and should also be defined as the first level regulation capability (1 p.m.).

Land use boundaries and requirements, including that for infrastructure, public facilities and municipal utilities, should be considered both control of land use types and regulations on infrastructures and public facilities designated in the regulatory plan. According to the Formulation Criteria of Urban Planning, these regulation factors should be defined as the first level regulation capability (1 p.m.).

Boundary control lines, including yellow lines, green lines, purple lines and blue lines, are actually integral parts of the general topic “land use”. The Chinese Ministry of Construction promulgated the regulations that made clear legal definitions and the limits of authority of these four control lines [6-9]. They are working as powerful and practical tool in China’s spatial planning management. Therefore, they should be defined as the first level regulation capability (1 p.m.) as well.

4.2.2 Development Density

In Chinese urban planning, the three primary regulation factors of development density are the plot ratio, building height and building density.

The plot ratio indicates how much square meter of floor area is permissible per square meter of zone

area. The regulatory planning allows one to stipulate the limit or the value of fixed interval of the plot ratio. The plot ratio is regulated by quantitative indicators.

The building height indicates the maximum building height that can be developed on the plot. The regulatory planning allows one to regulate the maximum limit of building height by quantitative indicators.

The building density indicates what portion of the zone area is permissible for building development. In principle, the regulatory planning allows one to regulate the maximum limit of building density by quantitative indicators.

The Chinese building density, plot ratio and building height are mandatory regulation factors according to the Formulation Criteria of Urban Planning. These regulation factors of development density should be defined as the first level regulation capability (1 p.m.).

4.2.3 Environmental Capacity

Regarding the environmental capacity, there are several regulation factors available like the greening rate, green line control and blue line control.

The greening rate is a basic indicator which can reflect the urban greening level. It is designed to regulate the greening proportion on the plot. The calculation formula is:

Greening rate = (sum of green space areas)/(total zone area).

The regulatory planning allows one to regulate the minimum limit of greening rate by quantitative indicators.

The Chinese regulatory planning can regulate the land use types of public green spaces (G1), green buffers (G2) and squares (G3) (Ministry of Housing and Urban-Rural Development of the P. R. China, 2011) [3]. The regulation of public green spaces and green buffers, which is a kind of land use control, may contribute to the preservation, maintenance and development of environmental capacity.

Green line and blue line controls are land use control as well. They can be rigid measures of regulating certain green spaces and water bodies.

Both the greening rate and the green and blue lines are mandatory constraints in accordance with the Formulation Criteria of Urban Planning. However, the regulation of the greening rate does not completely reflect the idea of environmental friendly development. The idea of the greening rate focuses on reserving or creating a portion of plot to build the green space. It is possible to build a valid green space while destroy the ecological environment. The regulation of the greening rate may preserve, maintain or develop the environmental capacity, but it is also possible for the regulation of the greening rate to destruct or degrade the original ecological environment. In this case, regulation factor of the greening rate should be defined as the second level regulation capability (0.75 p.m.), which means that it can partially implement the task of the “Main Function Zoning Strategy” and is also a mandatory legally binding constraint.

For green and blue lines, there are detailed provisions of the preservation and building permission valid for areas encircled by green lines or blue lines. However, there is no provision on protecting the biodiversity, species or animals in the areas. Regarding the environment, only the carriers, like green spaces or water bodies, can be secured by the regulation and management of green and blue lines. Species or animals are not considered integral parts of the environment. Therefore, regulation factors of green and blue lines for environmental capacity should be defined as the second level regulation capability (0.75 p.m.).

In general, the comprehensive regulation capability of each category can be defined by calculating arithmetical average of regulation capabilities of factors. For the category of land use, the comprehensive regulation capability is 1. For the category of development density, the comprehensive regulation capability is 1. For the category of

environmental capacity, the comprehensive regulation capability is 0.75, as shown in Fig. 1.

4.3 Analysis of Spatial Regulation Approaches to Implementing the Main Function Zoning Strategy in Regulatory Planning

Regarding the zones of optimization, the intensive, compact, smart development model should be adopted while addressing the environmental protection and ecological conservation. The legal effectiveness of implementing the future development in zones of optimization will depend on the regulation capabilities of all three regulation categories (land use, development density and environmental capacity). Since land use structures in zones of optimization are mostly formulated, in order to realize healthy and sustainable development, the regulation of development density and environmental capacity would be of the most importance.

Fig. 1 Comprehensive regulation capabilities of tasks of Main Function Zoning in urban planning.

Table 2 Spatial regulation approaches to implementing the Main Function Zoning Strategy.

	Land use	Development density	Environmental capacity
Zones of optimization	○	●	●
Zones of focuses	●	●	○
Zones of restriction	●	○	●
Zones of prohibition	●		●

●: primary approach; ○: auxiliary approach.

Regarding the zones of focuses, it is necessary to promote the large-scale economic development to absorb the industries and investments originally located in the zones of optimization and build new national growth poles. The legal effectiveness of implementing the future development in zones of focuses will be determined by the regulation capabilities of all three regulation categories. Since the economic development would be the main function of these zones, the regulation of land use and development density would be the principal task.

Regarding the zones of restriction, the development of industries and human settlements should be restricted. The legal effectiveness of implementing the restriction strategy will be determined by the regulation capabilities of all three regulation categories, especially the regulation of land use and environmental capacity.

Regarding the zones of prohibition, no development is allowed. The legal effectiveness of implementing the prohibition strategy will be determined by the regulation capabilities of two regulation categories: land use and environmental capacity.

The spatial regulation approaches to implement the Main Function Zoning Strategy can be illustrated as Table 2.

5. Conclusions

The Main Function Zoning Strategy will undoubtedly affect future China's spatial planning to a large extent. As any zoning can only be realized by the arrangement of spaces, urban planning, especially the regulatory planning, could be a powerful and effective tool of implementing this strategy.

The regulatory planning may implement the tasks of the Main Function Zoning Strategy through regulation factors like the type of land use, land use compatibility, land use boundaries and requirements, including that for infrastructure, public facilities, municipal utilities, boundary control lines, plot ratio, building height, building density, and greening rate.

These regulation factors can be grouped into three categories: land use, development density and environmental capacity, in accordance with the tasks of the Main Function Zoning in urban planning.

Based on the provisions in relevant laws and regulations, the coding method shows that the comprehensive regulation capabilities of land use and development density are at the first level, while that of environmental capacity is at the second level. Therefore, in order to optimize the regulation performance, regulation factors of biodiversity and species should be added to the system in the future.

Spatial regulation approaches to implement the Main Function Zoning Strategy in regulatory planning may vary in targeting different main function zones. Primary approaches can be of more importance to realize the regulation of a certain main function.

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