Case Study

Regional Planning Reconfiguration in China Based on Inclusiveness: Examining Development and Control Orientation

Yuzhe Wu[1]; Liping Shan[2]; Sheng Zheng[3]; Shih-Kung Lai[4]; and Bo Xia[5]

Abstract: Promotion of the sustainability and inclusiveness of the economy, society, and environment is important. However, China suffers from different overlapping and conflicting plans, which hinders its ability to achieve sustainable and inclusive development. To resolve these problems, China has made serious efforts to explore the methods for coordinating various planning from theory to practice. Reasonable spatial planning within China's rapid urbanization process will promote the sustainable development of cities in China, balance the relationship between environmental protection and urban growth, and promote the coordinated development of urban and rural areas. Different plans can be classified as either development or control plans, and when conflicts appear between the two kinds of planning in a regional planning context, the two can be analyzed separately. This paper begins by examining the conflicts that arise in development and control planning. Moreover, maintaining an area designated for flexibility between control and development planning makes spatial planning more achievable. This paper takes Yiwu city as a case to identify the "patch–corridor–matrix" spatial planning framework based on control, development, and flexible areas. **DOI: 10.1061/(ASCE)UP.1943-5444.0000578**.

Author keywords: Inclusive growth; Spatial planning; Multiple plan coordination; Control; Development planning; China.

Introduction

China has witnessed rapid urbanization since 2000, seeing a greater than 1% increase in the urban population every year. In 2011, the Chinese urban population accounted for 51.3% of the national population, exceeding 50% for the first time. The percentage climbed to 58.5% in 2017 (Luo 2019). Rapid urbanization has caused, among other problems, underemployment, excessive conversion of agriculture and ecological land into urban construction land, and pollution (Shan et al. 2018; Luo et al. 2018). In China's rapid urbanization process, reasonable spatial planning will promote the sustainable development of cities, balance the relationship between environment protection and urban growth, and promote the coordinated development of urban and rural areas. For inclusive growth, a comprehensive spatial planning system is absolutely essential for China.

Spatial planning is the geographical expression of a regional society, economy, social culture, and ecological policy and is always influenced by the region's history, culture, law, and regime (Dejeant-Pons 2010). In recent years, China's territorial planning has gradually transformed from a single system to a multifaceted one, including development priority zoning (DPZ) led by the State Council, national economic and social development planning led by the National Development and Reform Commission, environmental planning led by the Ministry of Environmental Protection, land use planning led by the Ministry of Land and Resources, and urban and rural planning led by the Ministry of Housing and Urban–Rural Development (Fan et al. 2018; The State Council 2010) (Table 1). Because the distribution of China's spatial development rights is dispersed across different departments, problems exist such as the absence of comprehensive spatial planning, conflicts stemming from the overlap of various types of planning, and conflicting responsibilities between departments (Hao 2018; Wang and Gong 2016), which are contrary to the planning implementation and management.

China's spatial planning was guided by economic development and urban construction with rapid urbanization and industrialization over the past 40 years; excessive farmland conversion, loss of open space, and urban sprawl have been the main consequences (Tan et al. 2009). Indisputably, development-oriented spatial planning has promoted the development of China's cities and regions, and while it has satisfied the need for space to undertake urbanization, it has brought about risks for sustainable development. Different types of spatial planning have different core objectives and different areas of emphasis for space arrangement, although single-oriented spatial planning does not consider other uses of space. In the implementation planning process, there will be different planning uses from different spatial planning at the same space.

As for planning practice, the Chinese government has included the DPZ strategy in the Chinese National 11th Five-Year Plan to integrate different approaches to planning. Moreover, National New Urbanization Planning (2014–2020) proposes the idea of "multiple plan integration" at the county and city level. In 2019, the CPC Central Committee and the State Council promulgated *Several Opinions on the Establishment of a Land and Space Planning System for Supervision and Implementation*. It states that territorial spatial planning serves as a guide for national spatial development and other specific planning, a spatial blueprint of

[1]Professor, Dept. of Land Management, Zhejiang Univ., Hangzhou 310058, PR China. Email: wuyuzhe@zju.edu.cn

[2]Ph.D. Candidate, Dept. of Land Management, Zhejiang Univ., Hangzhou 310058, PR China. Email: shanliping@zju.edu.cn

[3]Associate Professor, Dept. of Land Management, Zhejiang Univ., Hangzhou 310058, PR China (corresponding author). Email: shengzheng@zju.edu.cn

[4]Professor, School of Public Affairs, Zhejiang Univ., Hangzhou 310058, PR China. Email: lai@tongji.edu.cn

[5]Associate Professor, School of Built Environment, Queensland Univ. of Technology, Queensland 4001, Australia; Adjunct Professor, College of Civil Engineering, Hefei Univ. of Technology, Hefei 230006, PR China. Email: paul.xia@qut.edu.au

Note. This manuscript was submitted on August 10, 2018; approved on November 27, 2019; published online on May 21, 2020. Discussion period open until October 21, 2020; separate discussions must be submitted for individual papers. This paper is part of the ***Journal of Urban Planning and Development***, © ASCE, ISSN 0733-9488.

Table 1. Different types of planning in China (Gu and Peng 2015)

Department	Focus	Relevant planning	Planning attribute
National Development and Reform Commission	Economic and social development	National economic and social development planning	Development
The State Council	Development goal	Development priority zoning (DPZ)	Development & Control
	Development strength and efficiency		
Ministry of Land and Resources	Land use regulations	Overall land use planning	Control & Development
	Land use planning and adjustment	Cultivated land protection red line	Control
	Basic farmland, permanent basic farmland		
	Annual output		
Ministry of Housing and Urban–Rural Development	Urban nature, scale and layout	Urban and rural planning	Development
	Construction of new area and urban renewal	Urban system planning	
		Urban detailed planning	
Ministry of Environmental Protection	Environmental quality	Environmental functional area planning	Control
	Ecological red lines		
Ministry of Railways	Transportation and energy supply system	Transportation and transportation development blueprint	Development
Ministry of Communications	Transportation	Transportation and transportation development blueprint	Development

sustainable development and a basis for all kinds of development, protection, and construction activities. However, diverse problems still exist among China's different types of planning, in particular, conflicts between development and environment protection planning, and it will take a relatively long time for the spatial planning system to adjust. To establish territorial spatial planning, it is important to integrate urban and rural planning, land use planning, DPZ, and other spatial planning into unified territorial spatial planning, rather than simply piecing together the contents of different planning. The development-oriented concept of planning has deeply influenced China's spatial planning for many years. To achieve sustainable development, an integrated conceptual framework is needed for future spatial planning to guide its allocation of space and land resources; this is difficult to achieve and needs to be researched comprehensively. This paper aims to establish a potential planning conceptual framework for restructuring the territorial spatial planning system in China that would involve the integration of different types of planning as a means of achieving an inclusive society.

Literature Review

Inclusive urbanization has been described by different scholars and organizations. The World Bank defined it as urban development that "provides all people equal opportunity to benefit from urbanization," where labor is used in the most productive manner for the accumulation of assets and savings, and where all people receive similar quality public services (World Bank and the Development Research Center of the State Council, P. R. China 2014; Gottschalch 2015). The proposed 2030 Agenda for Sustainable Development (United States, 2015) has the central objective that "no one will be left behind." McGranahan et al. (2016), arguing in favor of the approach to urbanization proposed in the 2030 Agenda, noted the need to achieve a flourishing economy, but also social and environmental goals. Zhou (2013) defined inclusive urbanization as adhering to inclusive growth, adopting inclusive means, formulating an inclusive institutional framework, and implementing inclusive measures throughout the complete urbanization process to achieve coordination and sustainability between cities, between cities and the countryside, between urban areas and the environment, and within various parts of a city.

Assessments of inclusiveness have been isolated, for example, Yu and Wang (2012) constructed a set of inclusive growth indices to measure the inclusive growth of China from 1990 to 2009. The results showed that China's economic growth was generally inclusive, although the overall level of inclusive growth was low, with slow development and significant income inequality. Comparing the case of the Zhenru subcenter in Shanghai with the Postdamer Platz in Berlin, Lehmann (2012) considered how China's cities could move towards polycentric systems, more resilient urban ecosystems, and more sustainable models of development. Inclusiveness has become the core concept of urban planning in an attempt to solve a range of social contradictions during China's period of rapid urbanization. He (2017) analyzed the noninclusive and unbalanced urbanization of China considering spatial equality.

To realize multiple human rights goals and to achieve broad-based sustainable development, inclusive urbanization must be based on powerful foundations, of which the most important is urban planning. Li and Zhao (2013) argued that the inclusive city concept should be incorporated into urban planning for a more active, moderate urban planning mode. The object of planning has shifted from the people to the individual, and the function has changed from relying mainly on spatial planning to connecting society with spatial planning. Planning is no longer a static blueprint but a political process and a decision-making process using a variety of technological and policy means to achieve complex goals (Shi and Han 2016).

It is of great significance to satisfy a wide range of social, economic, and environmental requirements to achieve a habitable city (Pacione 2003). International and national policies stress the significance of spatial planning to achieve regional long-term sustainability (Elbakidze et al. 2015) and to address urban growth and environment and resource issues (Watson 2009; Sandström et al. 2006; Roosmalen 1997). In 1933, members of the International Congress of Modern Architecture (CIAM) gathered to consider urban problems and established the four functions of a city, that is, dwelling, recreation, work, and transportation (Gold 1998). Later, Lewis Mumford, a founder and leader of the Regional

Planning Association of America (RPAA), pointed out "the imminent disaster of cities" and showed the change in the urban form, with dozens of black and white illustrations (Xin and Yao 2006). Lewis Mumford had a strong influence on humanistic thought in urban planning. He believed that the best way to restore the vitality of the city was to cultivate and care about people. The city is an excellent place for personal development.

Although spatial planning in China has a certain meaning in social and economic development, ecological environment protection, and space and land allocation, it has many incongruities, in particular, a spatial mismatch that causes wasted land resources, disordered management, and out-of-control ecological environment protection (Wei et al. 2012; Fang 2007; Hu 2002). In the traditional planning model, urban planning and land use planning are established separately and lack interaction. The forecast of scale for construction land and the population are not in place, preventing interoperability and coordination (Su et al. 2014).

An increasing number of Chinese scholars and institutions have focused on the problems in coordinating national spatial planning in recent years, and a number of planning coordination policies and practices have been implemented to examine various ideas. First, scholars analyzed the differences and contradictions between land use planning and urban planning, which is described as "two plan coordination" (Xiao 1998; Liu and Guo 1998; Zhu 1999). The conflicts and coordination between land use planning, urban planning, and national economic and social development planning have also been analyzed, which is defined as "three plan coordination" (Zhang and Luo 2015; Huang 2012). China's Law for Urban and Rural Planning in 2008 defined the relationship as follows: "overall urban planning preparation shall conform to national economic and social development, and land use planning" (Shan et al. 2018). "Multiple plan integration" aims to coordinate the planning processes for economic and social development, urban areas, land use, environmental protection, industry, transportation, and tourism. In 2014, a notice regarding pilot work for multiple plan integration in cities and counties was issued in 28 counties (Gu 2015; Jin et al. 2016).

As it develops policies, China has tried practices for integrating different kinds of planning, but these have had less of an effect than expected, and there are gaps between policies and practice. In the implementation of multiple plan integration and the control of space at the city and county levels, multiple stakeholders are involved, including the central government, local governments at the county level, township governments, functional departments at the county level, enterprises, and the public, and there are complex game relationships between these stakeholders (Lin and Qiao 2017; Lin et al. 2011). Each department is accustomed to its own administrative philosophy and practices, and once a practice involves departmental interests, there is less possibility for compromise (Zhang 2017). Since the Plan for Deepening the Reform of Party and State Institutions was issued in 2018, super ministry reform has been advanced, and the Ministry of Natural Resources has been established to create a spatial planning system and supervise its implementation: research on China's spatial planning system has developed quickly from both theory and practice.

In conclusion, scholars have discussed the history (Zhang and Chen 2014) and problems (Hao 2018; Lin et al. 2015) of the diverse planning processes in China and offered strategies for integrating different planning processes or restructuring China's spatial system (Xu et al. 2017; Xie and Wang 2015). There are different reasons for the problems stemming from the multiple types of plans in China: confused planning periods, data collection, and technology (Li 2014; Su and Chen 2015), a lack of unified planning concepts and methods (Ding 2009), and an undeveloped legal system for spatial planning practice. However, existing studies rarely consider the nature of different planning systems, with the exception of Wu (2015), who classified planning as encompassing the control, development, and flexibility of areas and developed the "point–line–area" spatial planning framework based on landscape ecology. The lack of theory design and case studies has given birth to the current research.

Spatial Planning Framework: The Concept of Multiple Plan Integration

Control and Development Planning in Spatial Planning

Spatial planning should consider the relationship between time and space and effectively combine planning and problems (Hopkins 2001). Many scholars agree that it is not possible to have a general theory for planning (Rittel and Webber 1973; Mandelbaum 1979). Donaghy and Hopkins (2006) proposed a coherentist approach to planning in response to the impossibility theorem of planning. They thought a plan should be in accordance with local conditions rather than supporting universally unified planning. Traditional expected utility theory considered utility to be an absolute invariant concept; in fact, utility will change with the policy decision situation, and it is thus always known as contingent utility. All decisions aim to maximize contingent utility, which can be explained as frame rationality.

Planning, as one means for allocating resources, has characteristics distinct from market mechanisms for allocation, and under the condition of sufficient information, the planning behavior for any type of planning in a single space can be locally rational (Wu 2015). However, when the logical consistency of a single plan in the unit space encounters other types of planning, there could be irrational. Therefore, a variety of types of plans within a unit space can generally be categorized as partial rational-whole rational, partial rational-whole irrational (discordant), and partial rational-whole irrational (opposing). Under the condition of sufficient information, when the established responsible departments, purposes, contents, and principles of various planning processes are integrated or coordinated, this leads to partial rational-whole rational planning. Discordant attributes between various types of planning processes triggers partial rational-whole irrational (discordant) planning, while opposing attributes of various planning processes result in partial rational-whole irrational (opposing) planning.

In general, the pattern of spatial planning can be classified into a development mode and a control mode. The former pattern aims to maximally develop and delimit the regional space by orderly planning methods and to determine the development goals, development types, and strength and timing of development. The latter focuses on ensuring those areas that need to be protected or that will have a negative effect if developed will not be developed (Wu 2015); this approach is similar to the "negative planning" concept, which prioritizes control of the nonconstruction area when engaging in spatial planning (Yu et al. 2005; Yuan and Tang 2015). For instance, the delineation of water conservation areas in environmental protection planning is control planning, while the delineation of a development zone in the overall urban plan aims to support urbanization and regional development.

The most basic uncertainty in land use planning can be addressed by attempting to predict the future and by correcting errors to adapt to future circumstances; this requires the planning process to be flexible enough for sensitive areas that affect planning (Wang and Wang 2012). As shown in Fig. 1, control planning and development planning can coexist in some spaces but not overlap. If they overlap, it will produce discordance and conflict, diminishing

the original effective use of the plan. If there is no blank area, representing the range of flexibility between the control plan and development plan, then competitions between the two designs for spatial planning will reach their peak at the border, which will create irrationality in the different plans. Therefore, a situation in which the control plan and the development plan are practiced across the total area is not supported. Specific circumstances in which there is no flexible area and in which there is a flexible area can be seen in Figs. 1 and 2. Fig. 2 shows a context in which the control plan and the development plan do not cover the total area; there are ranges of flexibility. When defining the functions of government departments, then the environmental protection department, farmland protection department, and the culture protection department can implement a regulatory plan, while social welfare, national economy, and other related departments create the development plan. There must be a scientifically reasonable flexible area between these two different plans. This flexible area is a buffer for future changes, and the government can establish short-term planning in this area based on land use demand (Wu 2015; Wu and Shan 2018). It is important to note that the area designated by the regulatory plan and development plan will be strictly fixed. Therefore, scientific methods of predicting which regions need protection and development is very important.

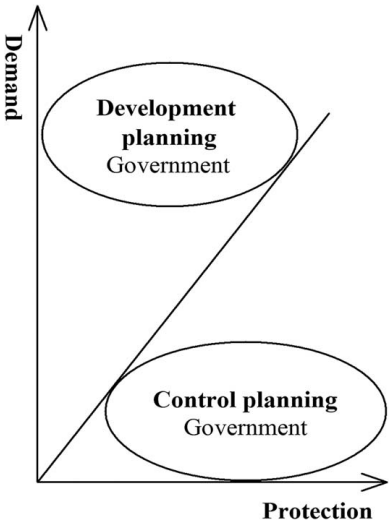

Fig. 1. Analysis when there are only control and development planning in the regions.

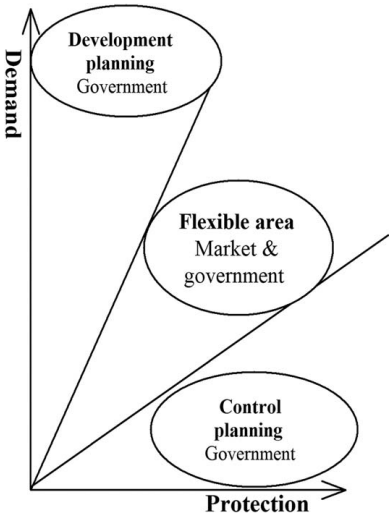

Fig. 2. Analysis when there are control, development planning, and flexible areas in the regions.

"Patch-Corridor-Matrix" Spatial Planning Framework

If the content of landscape ecology is introduced, the spatial planning framework becomes more substantial. In the landscape system, spatial regions or entities with different functions and properties can be transformed into landscape elements of related types using the "patch–corridor–matrix" mode (Deng and Cai 2009). When applied to the spatial planning framework, this mode includes control and development planning. As presented in Table 2, in the "patch–corridor–matrix" spatial planning framework, the choice between control or development planning is the dominant factor and the main focus of the planning. Examining this framework figuratively, at the "patch" level, smaller areas with significant differences from the surrounding areas are taken into account. The size, edge of the patch, and its relationship with surrounding patches can influence the environment of the patch and region. For instance, control planning concerns human and natural landscape areas, while development planning focuses on transport sites and rural settlements. The former needs to be protected by means of reasonable methods, and the latter should be developed as much as possible. At the "corridor" level, the corridor being a bridge connecting the patches with the matrix, control planning includes rivers, greenbelts, and coastlines, while development planning addresses traffic routes, channels, and pipelines. At the "matrix" level, green land, farmland, lakes, mountains, and other areas need to be regulated. Within the development area, the aim is to develop urban and rural areas as much as possible (Wu 2015). Table 2 presents a classification of development and control planning. The green land and farmland can be the corridor and matrix, and the standards and principles for planners to apply when conflicts appear between control and development can be used to determine the main functions, future demand, and environmental carrying capacity of the region.

Case Study

This paper analyzes some of the current planning (urban planning, land use planning, and environmental functional zoning)

Table 2. "Point–Line–Area" spatial planning system in landscape ecology

Landscape elements	Figurative form	Planning attribute	Example
Patch	Point	Control	Cultural landscape district (ancient villages)
			Ecological sensitive area
		Development	Traffic station
			Rural residential area
Corridor	Line	Control	Rivers
			Greenbelts
			Coastline
		Development	Traffic line
			Channel
			Pipeline facilities
Matrix	Area	Control	Green land
			Farmland
			Lake
			Mountain
			Forest
		Development	Urban or rural areas

of Yiwu city. First, the development and control areas in different plans are distinguished, the area and layout of different plans are compared, and the conflicts and overlaps between control and development areas are summarized. Second, the overlaps between control and development plans are analyzed in ArcGIS, and these overlapping areas are removed from all plans at the patch, corridor, and matrix levels. For example, the analysis uses current and proposed construction sites for cultural relics protection, famous scenic sites, and important infrastructure for the point planning; train lines, built roads, and planned roads as the corridor planning; and environment functional zoning, the ecological red line, farmland protection zoning, and urban development zones for the area planning. Finally, because a flexible area is required for the spatial planning framework, some of the control and development patches, corridors, and matrices are removed based on importance, fragility, etc. from the planning for Yiwu city.

Basic Information on Yiwu City

Yiwu city, located in Zhejiang province (see Fig. 3), is a county-level city under the jurisdiction of Zhejiang province. The city covers 1,105 km^2: 34.4% is hilly land area, 23.7% is the lower portion of a valley plain area, 23.5% is mountainous land area, and 18.4% is hillock land area. The development of Yiwu city mainly relies on low cost industry, that is, its small commodity market. This industry model is highly attractive for immigration. In terms of demographic data, Yiwu's residential population has increased quickly in recent years, and most of the population is concentrated in the central urban area. The central urban area of Yiwu city holds the city's main functions, such as commerce, residences, and administrative offices. Thus, the residential population in the central urban area accounts for a larger proportion of the total resident population of Yiwu city (Fig. 4).

Planning Status-Conflicts in Quantity and Layout

Differences in Quantity

The current municipal planning of Yiwu city can be classified into control and development areas, and it is worth noting that the overall urban plan (2013–2030), land use plan (2006–2020), and environmental functional zoning (2015) have their own control and development areas. The type of planning has a strong influence on the designated control and development areas, which leads to contrasting situations between different planning types. This paper mainly uses the three planning types to analyze the differences and overlaps between different types of planning.

In overall urban planning (2013–2030), the ecological red line, the ecological protection zone, and the cultivated land protection area belong to the control areas, while the urban development zone belongs to the development areas. The total control area accounts for 69.4% of the total area of Yiwu city, and the development area comprises 30.6%. In land use planning, the total control area accounts for 76.0%, while the development area accounts for 24.0%; in the environmental functional zoning, the respective percentages are 71.4% and 28.6% (Table 3). Therefore, it can be concluded that the different types of planning are not unified in the amount of the area that they dedicate to control and development aims.

Overlap on the Spatial Layouts

The spatial layout shows that the control and development areas assigned by different types of planning overlap in space. For example, the urban development zone delimited in the overall urban plan overlaps with the control area as defined in the other kinds of plans. As Table 4 presents, the urban development zone of Yiwu city overlaps with the permanent basic farmland protection area, the ecological environment protection area, the restricted and forbidden construction area, as well as the cultivated land protection area in land use planning. The cultivated land protection area in land use planning occupies the largest overlap, of

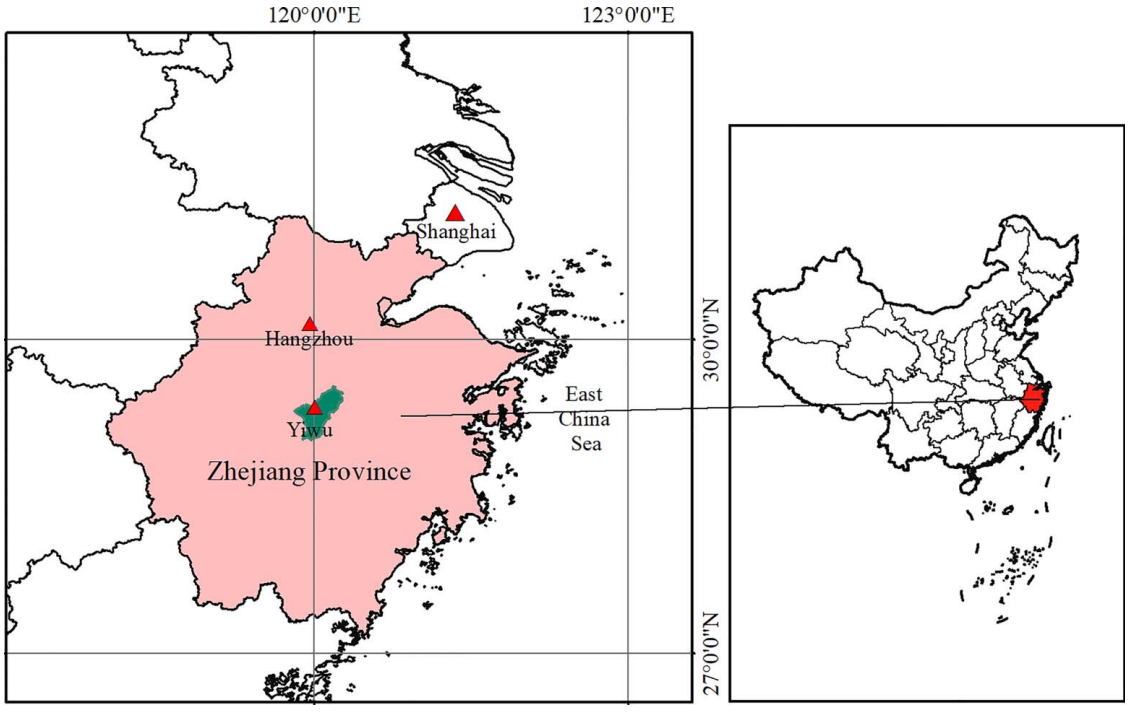

Fig. 3. The location of Yiwu city.

J. Urban Plann. Dev., 2020, 146(3): 05020012

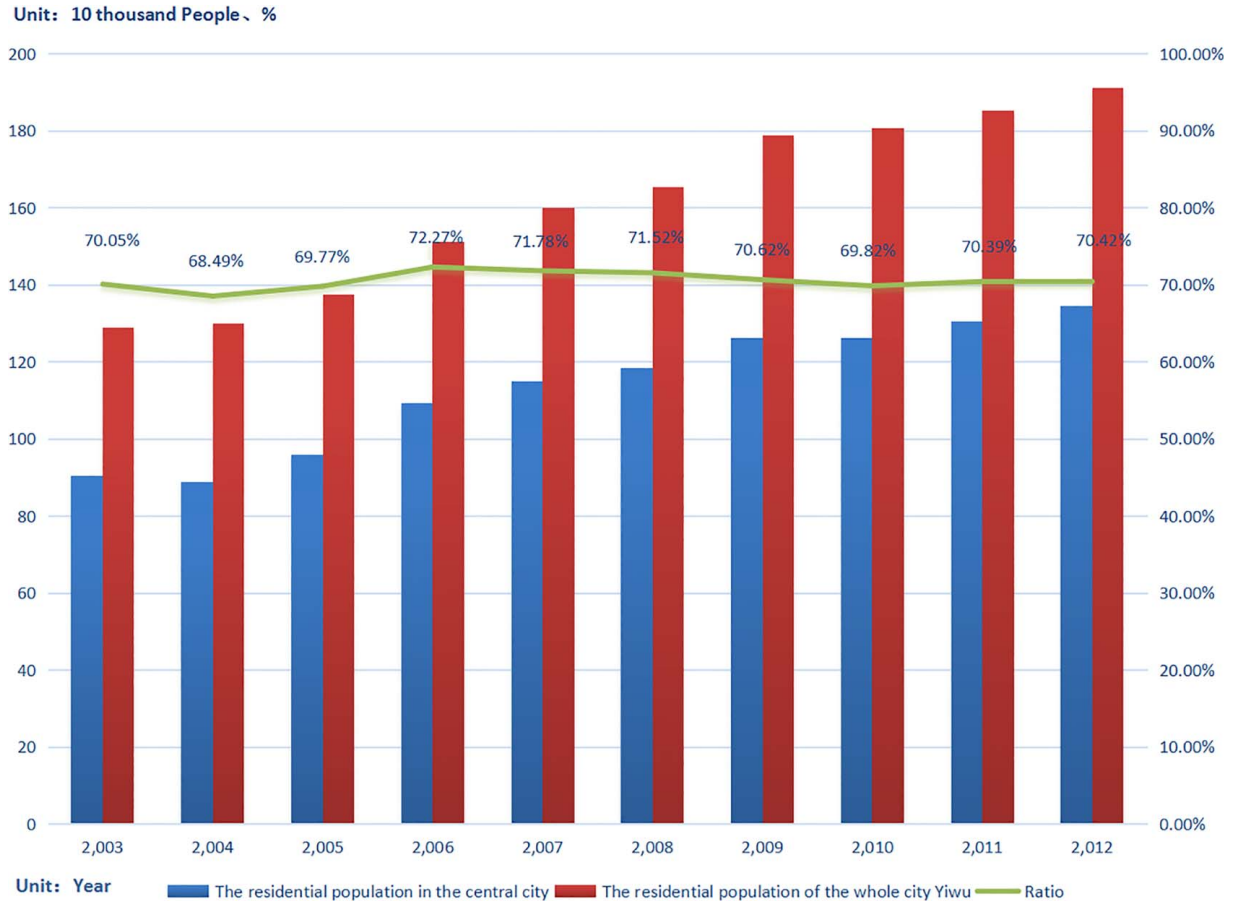

Fig. 4. The residential population in the center and the whole of Yiwu city.

Table 3. Different types of planning have differences in control and development planning in quantity

Urban planning		Land use planning		Environmental functional zoning		Other planning
Ecological red line area 28.2%	Control area 69.4%	Construction restricted area 75.19%	Control area 76.0%	Natural ecological red line area 24.1%	Control area 71.4%	Functional region of grain production 4.4%
Ecological protection zone 31.53%		Construction forbidden area 0.86%		Ecological functional area 27.69%		Ecological protection forest 14.5%
Cultivated land protection area 9.64%		Conditional construction area 4.51%	Development area 24.0%	Agricultural environmental protection area 19.66%		
Urban development area 30.63%	Development area 30.6%	Construction allowable 19.44%		Residential environment protection area 20.76%	Development area 28.6%	
				Environmental protection area 4.28%		
				Environmental key access area 3.51%		

Table 4. Overlap between urban development area and control planning in Yiwu (Unit: hectare)

Overlap (between urban development area and control area in different planning)	Permanent basic farmland protection area to the year 2020	Ecological environment protection (ecological forests, water protection area, ecological sensitive area, area with high incidence of geological disasters and so on)	Land use planning (construction restricted and forbidden area)	Land use planning (cultivated land protection area)
Development planning (using urban development area as an example)	47.33	18.35	1,751.57	2,040.6

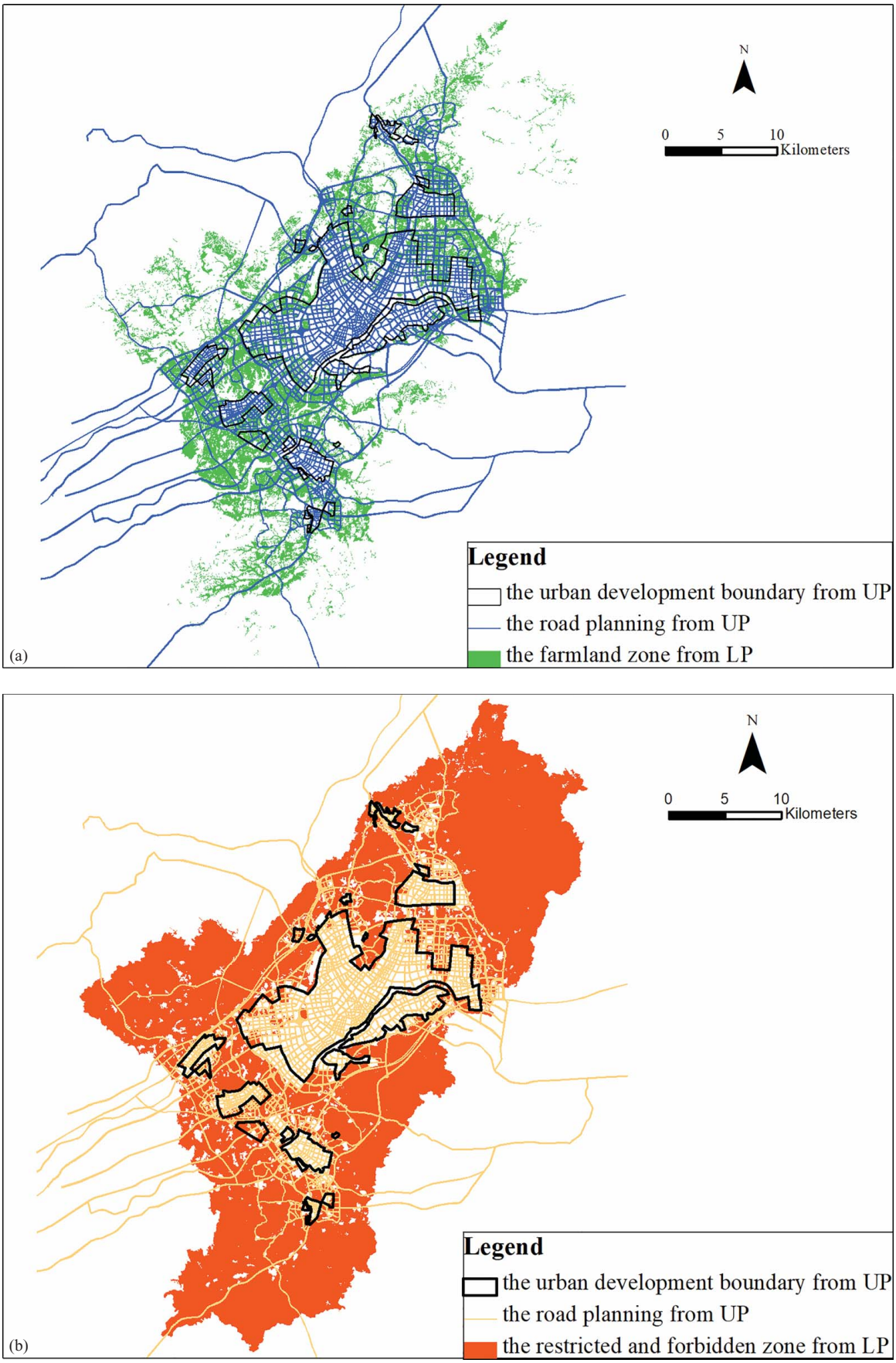

Fig. 5. (a) The layout of the urban development boundary and the farmland zone of Yiwu city (LP: overall land use planning; UP: overall urban planning); and (b) the layout of and the construction of the restricted and forbidden zone of Yiwu city (LP: overall land use planning; UP: overall urban planning).

2,040.6 ha, and accounts for 1.9% of the total area of Yiwu city. From the spatial distribution, the urban development boundary from the overall urban planning roughly matches the city development scope for the year 2020. Figs. 5(a and b) show that road development has exceeded its scope and even overlaps with the restricted and forbidden construction areas in the land use plan. Considering the development area, the restricted and prohibited construction land will limit the expansion and development of Yiwu city; while considering the control area, the boundaries of the restricted construction area, prohibited construction area, and cultivated land protection area may change and retreat with the urban expansion of Yiwu.

At present, the control and development areas of Yiwu city tend to cover the total city, which indicates that a clear understanding of planning is lacking. Planning aims to predict future development, and because future development is uncertain, a spatial plan that covers the whole region will lead to low adaptability in the future. As a result, planning often needs to be modified to adapt to current development demand, which challenges the legitimacy and rationality of the plan. In Figs. 5(a and b), there are regions where

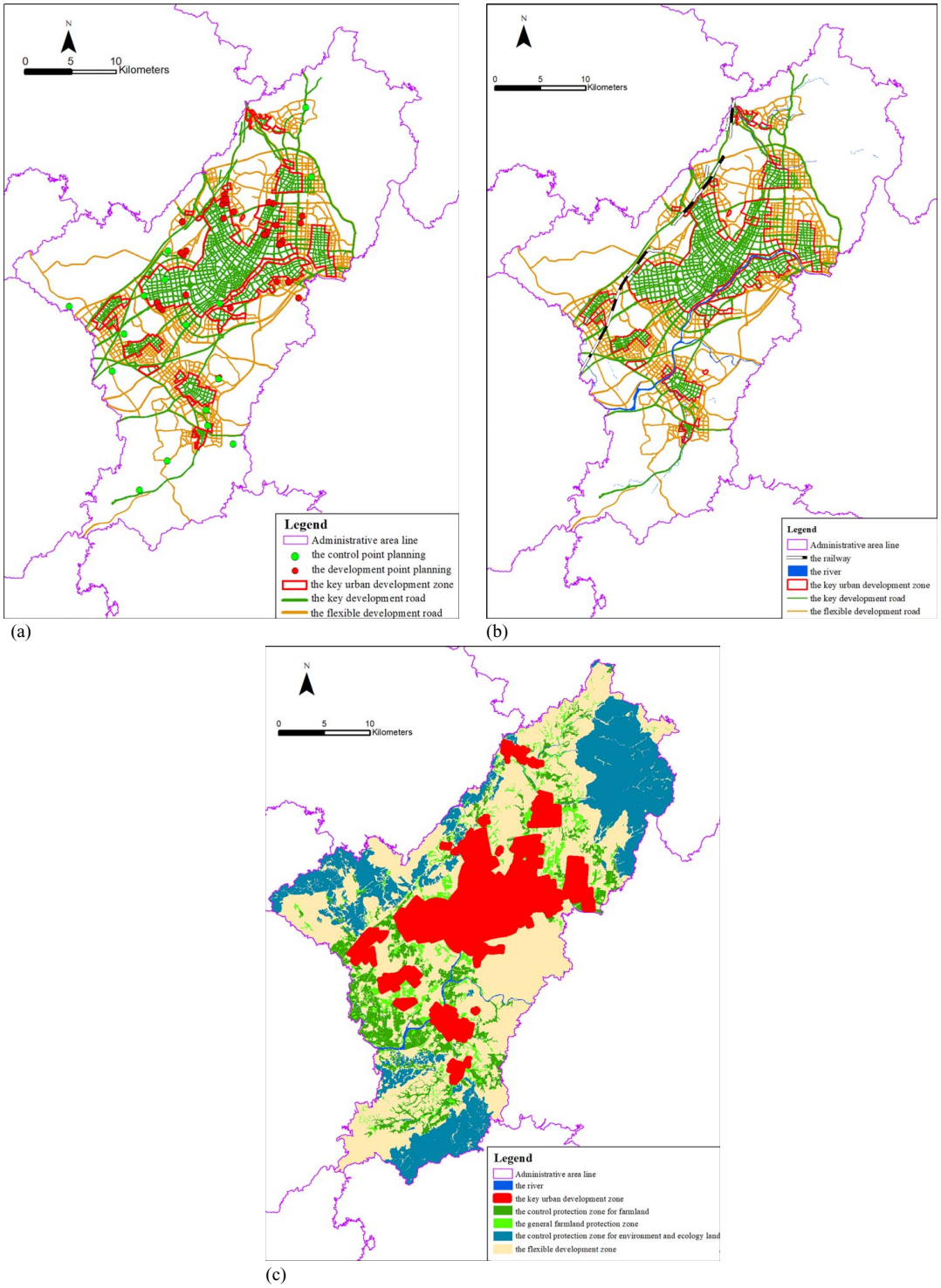

Fig. 6. (a) "Point" spatial planning of Yiwu city; (b) "line" spatial planning of Yiwu city; and (c) "area" spatial planning of Yiwu city.

planned municipal road-intensive areas overlap with farmland protection area, restricted construction area, and forbidden construction area; in the future, it is likely that the direction of city development will lead it to overlap with the control area, making it necessary to revise the plan.

Conception-the Framework for Long-Term Spatial Planning

This paper treats the urban development zone of Yiwu city until the year 2020 as the core development area and builds a "patch–corridor–matrix" spatial planning framework. Control planning includes two aims: first to protect the environment and cultural resources and second to prohibit construction on any land not suitable for human residence, for example, areas with ancient villages, cultural relics, and sewage treatment plants or that are used for garbage disposal. As shown in Fig. 6(a), there are more other objects in development planning, including economic development blocks, schools, parks, power stations, and other municipal infrastructure blocks. Fig. 6(b) shows the corridor spatial planning; taking highways, railways, and rivers as an example, planning for highways and railways is part of development planning; it predicts the city's future development direction and infrastructure layout. Therefore, railway and highway road planning can be classified within both the key development line and the flexible line; the former is mostly in the key development zone and the latter is outside the key development zone. When the city scope expands to a certain degree and the demand for expansion reaches a certain level, the flexible line will be developed after determined by new planning. Fig. 6(c) provides the matrix spatial plan that includes regional cultivated land protection, ecological environment planning, and the key development zone as well as the relationship between them. The key development zone, as part of the development plan, encourages the development and expansion of economic, societal, political, and cultural activities, and thus it also expands demand for land when control planning forbids economic

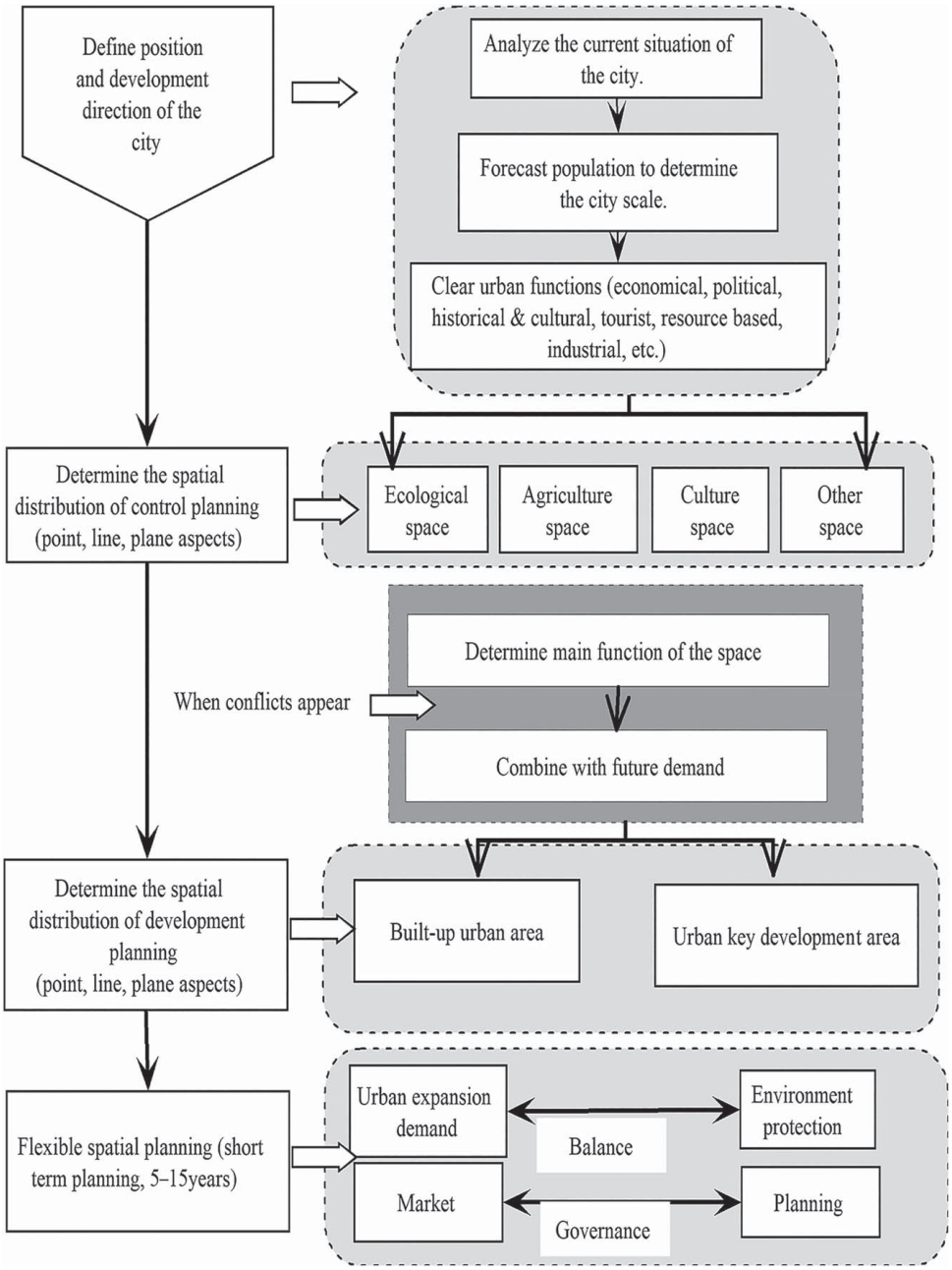

Fig. 7. Flow-process diagram for spatial planning.

development activities that need a large area of land. Between the control and development plans, there is a flexible development zone where the market cooperates with government to determine whether the land supply should be provided for urban expansion or if development should be prohibited (Wu 2004, 2015). Short-term urban plans are mainly concentrated in this area and can generate some periodic expansion planning to ensure the balanced development of economic growth.

Discussion

The coordination and integration of spatial planning are the main components of planning system reform and improvement in many countries; these include the coordination and integration of different departments, of different levels of spatial planning, and of spatial development strategies and specific action planning (Zhang et al. 2005). Japan has always attached great importance to the utilization of land and space and its rational development due its lack of land resources, thus territorial spatial planning is its highest level of planning. Since the enactment of the Comprehensive Land Development Law in 1950, five national comprehensive development plans have been worked out and implemented based on this law and in light of the economic and social situation of the time. In the process of implementing land use planning, the overlapping areas follow the principle of priority land use (Zhai 2009; Hu 2008; Tan and Gao 2018). However, the case study in this paper exams the spatial planning framework for the long term, which includes control, development, and flexible areas that can be replicated in other cities with some considerations.

Since the Ministry of Natural Resources was established in 2018 to create a new spatial planning system and supervise its implementation, China's territorial spatial planning has gradually replaced land use planning, urban and rural planning, etc. The new territorial planning reconfiguration will not overlap existing different types of planning completely, and this paper aims to exam the framework for the integration of the development-oriented and control-oriented planning modes on the same space unit. When it comes to applying the framework in the current context of the new territorial spatial planning in China, the case study defines the planning properties.

It is extremely important to coordinate the relationship between control planning, development planning, and flexible areas to achieve inclusive planning. Here, we propose an alternative property for planning (shown in Fig. 7). First, at the conceptual stage of spatial planning, the orientation and future development direction of the city should be taken into consideration. This includes predicting the population and scale of the city in its current stage and determining the city functions (Wu and Shan 2018) (e.g., an economic or industrial city should provide enough land to ensure city development; a city focused on ecological protection will protect the ecological environment; a city with strong history and cultural protection and tourism will consider balancing the city's ecological, historical, and modern development landscape). Second, the scope of the control plans must be determined, which refers to the theoretical viewpoint of "negative planning." First the city's ecological, agricultural, and other historical and cultural space should be designed to ensure their protection during the development and expansion of the city and to reduce any potential damage, and second, the land for construction should be determined. Third, the city's key development areas (including the original urban built-up area and the areas that truly need construction land for development in the near future) must be identified. Finally, in the control and development plans, there should be substantial space for flexible planning. It is necessary to establish a series of measures to manage the land in flexible areas; the short-term planning for the next 5–15 years within the region will ensure that the land demand conforms to the city development process, and then

Table 5. Classification of control, development planning

Control/development planning	Class	Existing planning to be classified	Competent department
Control planning	Land resources planning	Cultivated land protection planning	Department of Land Resources
		Forest land protection and utilization planning	Department of Forestry
		Grassland protection and utilization planning	Department of Agriculture
		Mineral resources planning	Department of Land Resources
		Water resources planning	Department of Water
	Ecological environment planning	Environmental protection planning	Department of Environment Protection
		Ecological function regionalization	
		Geological hazard prevention and control planning	Department of Land Resources
		Mine geological environment protection planning	
		Soil and water conservation planning	Department of Forestry
		The planning of desert prevention and transformation	
		Wetland conservation planning	
Development planning	Infrastructure planning	Highway network planning	Department of Traffic
		Waterway Development Planning	
		Port planning	
		Railway development planning	Department of Railway
		Electric power development planning	Department of Electric Power
		Pipeline planning	Department of Energy
	Urban and rural development planning	Urban village system planning	Construction Department
		Urban overall planning	
		Urban construction planning in the near future	
		Urban Regulatory Detailed Plan	
		Village (town) planning	
	Other development planning	Overall planning for national economic and social development	Department of Development and Reform

market means, and cooperation with government will be used to allocate land resources in the region (Wu 2015). The government should strike a balance between urban expansion demands and the environment. Regarding the relationship between development and control planning, according to negative planning theory, control planning always takes priority over development planning, and when conflicts arise between them, planners should determine the main function of the space currently, and take future demand for ecology and economic development into account in order to identify the space as a controlled, development, or flexible area.

As can be seen in the case study, China currently has various types of planning that can be classified into control or development planning according to its main functions. Table 5 classifies control and development planning based on the existing types of planning and their responsible departments. Land resources planning, including planning for cultivated land protection, forestland protection and utilization, grassland protection and utilization, mineral resources and water resources, and planning for the ecological environment, including environmental protection, ecological function regionalization, geological hazard prevention and control, mine geological environment protection, soil and water conservation, desert prevention and transformation, and wetland conservation all comprise control planning. Infrastructure planning (highway network planning, waterway development planning, port planning, railway development planning, electric power development planning, pipeline planning), urban and rural development planning [including urban overall planning, urban village system planning and urban construction planning in the near future, urban detailed regulatory plans, village (town) planning], and other development planning (overall planning for national economic and social development) comprise development planning.

When delimiting spatial boundaries for living, production, and ecological spaces, the most important issue is to define the nature and the main function of the space. For example, a walnut plantation area has both living space and production space, and walnut forests have ecological functions at the same time. Land use has multisuitability on the same spatial unit, and living, production, and ecological space is mixed. When applying the framework of integrating development and control, a region will be defined as a controlled region because of the ecological functions it has. Within the region, a small amount of construction activities can be permitted in order to improve the output of walnuts and the quality of life of households, but large-scale development and construction activities are not allowed. With the increasing trend of urban–rural integration, the boundaries between urban and rural areas have become more blurred. The definition of the urban–rural boundary can help planners master a city's core development scope and the potential future direction of development. This is also key to determining the spatial boundary of living, production, and ecological space. The definition of the urban development boundary should refer to the existing built-up areas, identified through a remote sensing image-supervised classification method and automation methods such as machine learning.

Conclusions

This paper reviews major varied policies and research aimed at the integration of spatial planning, especially in China. Based on different studies of spatial planning, this paper analyzes the deep reasons for China's spatial planning conflicts, that is, there are control-oriented and development-oriented plans, and they have different aims for the same space. In addition, the framework for control and development planning in China's spatial planning is studied and tested taking Yiwu city as a case. In the case study, there are conflicts between control planning and development planning in Yiwu city, in both quantity and layout. What should the orientation be when planning? This paper gives the properties: the control planning should be determined first, to protect ecologically important, cultivated and cultural land, and analyze the rationality of the flexible area between the two kinds of planning. A spatial integration mode based on "negative planning" and multiple plan integration highlights human demand for sustainable development according to the requirements for a designated ecological, living, and production space by regulating multiple plan integration and optimizing land development, utilization, and usage protection.

Data Availability Statement

All data, models, and code generated or used during the study appear in the published article.

Acknowledgments

This research was funded by National Natural Science Foundation of China (71874155), the MOE (Ministry of Education in China) Project of Humanities and Social Sciences (Grant No. 17YJCZH264); Scientific Research Project of Education Department of Zhejiang Province (Grant No. Y201636214). Moreover, the authors were grateful to Professor Charles Choguill for the help of linguistic improvement of the paper.

References

Dejeant-Pons, M. 2010. Council of Europe Conference of Ministers Responsible for Spatial/Regional Planning (CEMAT): 1970–2010. Torremolinos, Spain: Council of Europe, 113–128.

Deng, Y., and L. Cai. 2009. "Concept and method of urban landscape pattern planning based on sustainable development." *Urban Stud.* 16 (12): 95–101.

Ding, C. R. 2009. "Integration of economic planning, land use planning, and urban planning: Theory and approach." [In Chinese.] *Planners* 25 (3): 53–58.

Donaghy, K. P., and L. D. Hopkins. 2006. "Coherentist theories of planning are possible and useful." *Plann. Theory* 5 (2): 173–202. https://doi.org/10.1177/1473095206064974.

Elbakidze, M., L. Dawson, K. Andersson, R. Axelsson, P. Angelstam, I. Stjernquist, S. Teitelbaum, P. Schlyter, and C. Thellbro et al. 2015. "Is spatial planning a collaborative learning process? A case study from a rural-urban gradient in Sweden." *Land Use Policy* 48: 270–285. https://doi.org/10.1016/j.landusepol.2015.05.001.

Fan, J., Q. Wang, Y. Wang, D. Chen, and K. Zhou. 2018. "Assessment of coastal development policy based on simulating a sustainable land-use scenario for Liaoning Coastal Zone in China." *Land Degrad. Dev.* 29 (8): 2390–2402. https://doi.org/10.1002/ldr.3013.

Fang, C. L. 2007. *Regional planning and space governance*. Beijing: Commercial Press.

Gold, J. R. 1998. "Creating the charter of Athens: CIAM and the functional city, 1933–43." *Town Plann. Rev.* 69 (3): 225–247. https://doi.org/10.3828/tpr.69.3.2357285302gl032l.

Gottschalch, S. 2015. *Meet the need for inclusive urbanization in china: migrants' urban housing demand along their socio-economic transition*. IPE Working Papers 47/2015. Berlin: Berlin School of Economics and Law, Institute for International Political Economy (IPE).

Gu, C. L. 2015. "On the separation of China's spatial plans and their evolution and integration." [In Chinese.] *Geog. Res.* 34 (4): 601–613.

Gu, C. L., and C. Peng. 2015. "A framework of regional development planning based on the "integration of multiple plans." [In Chinese.] *City Plann. Rev.* 39 (2): 16–22.

Hao, Q. 2018. "The construction of spatial planning system under the background of institutional reform." [In Chinese.] *Geog. Res.* 37 (10): 1938–1946.
He, M. J. 2017. "Logical starting point, value orientation, and formulation mode of inclusive planning." [In Chinese.] *Planners* 33 (9): 5–10.
Hopkins, L. D. 2001. *Urban development: The logic of making plans*. London: Island Press.
Hu, P. H. 2008. "Enlightenment of Japan's territorial planning on promoting regional coordinated development in China." [In Chinese.] *J. Shijiazhuang Univ. Econ.* 31 (6): 31–34.
Hu, X. W. 2002. "The development trend and the problems faced by the regional planning in China." [In Chinese.] *City Plann. Rev.* 2: 23–26.
Huang, Y. J. 2012. "Institutional reform and plan integration-observation and thinking of domestic three plans' integration." [In Chinese.] *Modern Urban Res.* 27 (2): 10–14.
Jin, L. X., H. M. Zhu, and Y. Liu. 2016. "Review of practice and researches on multiple-planning integration of spatial planning." [In Chinese.] *Hunan Agric. Sci.* (3): 100–103.
Lehmann, S. 2012. "Can rapid urbanisation ever lead to low carbon cities? The case of Shanghai in comparison to Potsdamer Platz Berlin." *Sustainable Cities Soc.* 3: 1–12.
Li, D. Q. 2014. "Local government three plans integration efforts and innovation." [In Chinese.] *Planners* 30 (9): 65–69.
Li, Y. C., and H. Zhao. 2013. "Rational tolerance: re-discussion on value orientation of China's urban planning under the context of new-type urbanization: based on the view of suboptimal theory of the economics." [In Chinese.] *Urban Dev. Stud.* 20 (8): 29–33.
Lin, J., S. H. Chen, C. Y. Xu, and C. Wang. 2015. "Game analysis of spatial planning." [In Chinese.] *Urban Plann. Forum* (1): 10–14.
Lin, J., X. Chen, and X. Wei. 2011. "Coordination problems of spatial planning in China: International lessons and experiences." [In Chinese.] *Mod. Urban Res.* 12: 15–21.
Lin, J., and Z. Y. Qiao. 2017. "Research on "multiple plans integration" based on the game theory" [In Chinese.] *China Land Sci.* 31 (5): 12–19.
Liu, J. M., and W. J. Guo. 1998. "Three views on the connection of "two planning."" [In Chinese.] *China Land* (11): 30–31.
Luo, J., X. Xing, Y. Wu, W. Zhang, and R. Chen. 2018. "Spatio-temporal analysis on built-up land expansion and population growth in the Yangtze River Delta Region, China: From a coordination perspective." *Appl. Geogr.* 96: 98–108.
Luo, J. J. 2019. "Study on the barriers and mechanism of industrial land intensive use: A stakeholder-based analysis." [In Chinese.] Hangzhou: Zhejiang University.
Mandelbaum, S. J. 1979. "A complete general theory of planning is impossible." *Policy Sci.* 11 (1): 59–71. https://doi.org/10.1007/BF00143837.
McGranahan, G., D. Schensul, and G. Singh. 2016. "Inclusive urbanization: Can the 2030 Agenda be delivered without it?" *Environ. Urban.* 28 (1): 13–34. https://doi.org/10.1177/0956247815627522.
Pacione, M. 2003. "Introduction on urban environmental quality and human wellbeing." *Landscape Urban Plann.* 65: 1–3. https://doi.org/10.1016/S0169-2046(02)00231-1.
Rittel, H. W., and M. M. Webber. 1973. "Dilemmas in a general theory of planning." *Policy Sci.* 4 (2): 155–169. https://doi.org/10.1007/BF01405730.
Roosmalen, P. K. M. V. 1997. "Chapter: London 1944: Greater London Plan." In *Mastering the city: North-European Town Planning 1900–2000*, edited by K. Bosma and H. Hellinga, 258–265. Rotterdam, Netherlands: NAI Publishers/EFL Publications.
Sandström, U. G., P. Angelstam, and A. Khakee. 2006. "Urban comprehensive planning–identifying barriers for the maintenance of functional habitat networks." *Landscape Urban Plann.* 75 (1–2): 43–57. https://doi.org/10.1016/j.landurbplan.2004.11.016.
Shan, L., Y. Wu, and S. Zheng. 2018. "On territorial planning reconfiguration in China: A critical review of the existing planning system." In *Proc., 21st Int. Symp. on Advancement of Construction Management and Real Estate*, edited by K. Chau, I. Chan, W. Lu, and C. Webster, 1055–1063. Singapore: Springer.
Shi, N., and K. Z. Han. 2016. "Reshaping the planning value system under a context of inclusive development and the transformation of the planning profession." [In Chinese.] *Urban Plann. Forum* (1): 9–14.
The State Council. 2010. "National development priority zoning." Accessed June 30, 2011. http://www.gov.cn/zwgk/2011-06/08/content_1879180.htm.
Su, H., and H. Chen. 2015. "The essence "multiple plans integration" and planning compilation" [In Chinese.] *Planners* 31 (2): 57–62.
Su, W., Z. Xu, and Y. Xie. 2014. "The theory and practice of three-plan coordination and policy suggestions on multiple-plan coordination in China." [In Chinese.] *Urban Plann. Forum* (6): 85–89.
Tan, R., V. Beckmann, L. van den Berg, and F. Qu. 2009. "Governing farmland conversion: Comparing China with the Netherlands and Germany." *Land Use Policy* 26 (4): 961–974. https://doi.org/10.1016/j.landusepol.2008.11.009.
Tan, Z. B., and H. G. Gao. 2018. "An overview on Japan's national land use planning." [In Chinese.] *Urban Plann. Int.* 33 (6): 1–12. https://doi.org/10.22217/upi.2018.146.
Wang, Q., and W. M. Wang. 2012. "Uncertainty and land use planning." [In Chinese.] *China Land Sci.* 26 (5): 88–91.
Wang, X. D., and J. Gong. 2016. "The reconstruction of the planning system in the perspective of "multiple plan integration" in China." [In Chinese.] *Urban Plann. Forum* (2): 88–95.
Watson, V. 2009. "'The planned city sweeps the poor away…': Urban planning and 21st century urbanisation." *Prog. Plann.* 72 (3): 151–193. https://doi.org/10.1016/j.progress.2009.06.002.
Wei, G. J., W. Dong, and H. Sun. 2012. "A review of researches on spatial planning coordination." [In Chinese.] *Urban Plann. Forum* 1: 76–82.
World Bank and the Development Research Center of the State Council, P. R. China. 2014. "Urban China: Toward efficient, inclusive, and sustainable urbanization." Washington, DC: World Bank.
Wu, Y. Z. 2004. "Is land use planning a control plan or a development plan?" [In Chinese.] *Chinese and Foreign Real Estate Times*, (0Z2): 14.
Wu, Y. Z. 2015. "The "multi planning integration" framework based on control planning and development planning." https://wenku.baidu.com/view/8adce8dedc88d0d233d4b14e852458fb770b38d0.html.
Wu, Y. Z., and L. P. Shan. 2018. "Land space optimization-development, protection and renovation." [In Chinese.] *Land Sci. Dev.* (6): 8–11.
Xiao, C. D. 1998. "Discussion on the relationship of "two planning."" [In Chinese.] *Urban Plann. Forum* (1): 29–33.
Xie, Y., and W. Wang. 2015. "From multiple-plan coordination to the reform of the spatial planning system." [In Chinese.] *Urban Plann. Forum* (3): 15–21.
Xin, L. P., and Y. F. Yao. 2006. "A brief introduction to the development of the western humanism planning." [In Chinese.] *Urban Prob.* (7): 85–88.
Xu, J. Q., C. Shen, T. X. Hu, S. Du, and X. M. Zhang. 2017. "General concept and main tasks of building spatial planning system in China." [In Chinese.] *Planners* 33 (2): 5–11.
Yu, K. J., D. H. Li, and X. L. Han. 2005. "On the "negative planning"." [In Chinese.] *City Plann. Rev.* 29 (9): 64–69.
Yu, M., and X. Wang. 2012. "China's inclusive growth: Measurement and evaluation." [In Chinese.] *Econ. Rev.* 3: 30–38.
Yuan, L., and Y. Tang. 2015. "Technology integration mode with regard to "multiple planning integration" province." [In Chinese.] *Nat. Resour. Econ. China* 8: 47–51.
Zhai, G. F. 2009. "Evolution and implication of Japanese spatial planning." [In Chinese.] *Urban Plann. Int.* 24 (4): 85–90.
Zhang, J. 2017. "Research on the comprehensive planning reform, multi-plans coordination and planning control system development: A case study of Yongjing County, Gansu Province." [In Chinese.] *Shanghai Urban Plann. Rev.* 4: 94–100.
Zhang, J. X., and H. Chen. 2014. "Spatial governance: Political economy of China's urban and rural planning transformation." [In Chinese.] *City Plann. Rev.* 11: 9–15.
Zhang, S. K., and Y. Luo. 2015. "Comprehensive path of realizing "three plans integration": Experimental cities in Guangdong province." [In Chinese.] *Planners* 31 (2): 39–45.
Zhang, W., Y. Liu, and Y. Liu. 2005. "The new trends of spatial planning research and practice in developed countries and their inspirations to China." [In Chinese.] *Prog. Geogr.* 24 (3): 79–90.
Zhou, Y. M. 2013. "The case study on incisive urbanization, returning industrial transfer and space structure optimization." [In Chinese.] *Urban Dev. Stud.* 20 (11): 20–26.
Zhu, C. B. 1999. "The coordinating mechanism for urban planning and land use planning." [In Chinese.] *Urban Plann. Forum* 4: 10–13.