Planning the Smart City in China: Key Policy Issues and the Case of Dream Town in the City of Hangzhou

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ABSTRACT

This paper offers a brief review of basic literature on smart cities to outline research issues in this field that require further attention from a governance perspective. It then maps the current urban planning landscape in China, a country which puts increasing emphasis on smart cities as a mechanism to promote sustainable development, in order to elicit key policy aspects that need to be considered in empirical analysis when ''planning the Chinese smart city''. The paper concludes by introducing a case of local innovation in the area of digital economy, the so-called Dream Town, undertaken in the city of Hangzhou as an illustrative example of urban China's current efforts on planning for smart city development.

Keywords

Smart city development; Planning; Urban China

1. SMART CITIES AND SUSTAINABLE DEVELOPMENT: AN EVOLVING RESEARCH AGENDA

1.1 The Concept of Smart City: Origins and Key Aspects

The concept of smart city gains prominence internationally in governments, businesses and the academia as a potential policy framework for promoting sustainable urban development. While there is no agreed definition in the scholarly debate regarding the meaning of smart city, or it is even questioned whether it is fruitful from a policy perspective to try and compose an all-encompassing definition for the concept given the diversity of views and initiatives in this field [3], tracing the epistemological origins of the smart city, as well as its mainstream policy agenda, allows mapping its key characteristics and as a result getting a better idea of its core conceptual and practical aspects. On the conceptual part, it appears that smart city thinking is primarily defined by the convergence of two major strands of research: first, the ''digital cities'' which are conceived as open spaces where ubiquitous computing systems are built into the ''hardware'' of the city (i.e. telecom networks; digital control of utility services; sensoring of public space) to monitor and manage urban flows and processes, as well as where mobile computing (i.e. smart phones) can produce data about their users and the urban condition. Such information, which is often produced in large datasets (i.e. big data), is then compiled, analyzed and integrated with the promise

to lead to a better understanding of the city and consequently inform effective public policies [18].

The second key research block from which ''smart cities'' draw upon is the so-called ''open innovation systems'' which are regarded to stem from socio-spatially embedded and structured processes of learning that is generated by knowledge networks between key societal actors such as the government, industry, businesses, funding organizations, intermediaries and the academia. Open innovation systems are perceived to hold considerable potential for catalyzing urban economic growth. Analysis in this area then has focused on identifying and modeling the conditions that define their formulation and functioning in order to inform urban policy with the overarching goal of enhancing the city's economic competitiveness [18]. In the above-described conceptual framework, the idea of smart city refers broadly speaking to the development of urban knowledge economy and local governance that are driven by innovation, creativity and entrepreneurship while the role of ICT in driving forward such processes and outcomes is considered as central [11]. The aspect that unities the above two conceptual strands of the smart city is the promotion of market-led and technological solutions for addressing urban challenges [1].

1.2 The Smart City as a Policy Agenda and Practice

What are the then the main aspects of the ''smart city'' actual agenda within the above-described theoretical framework? One of the first attempts to define key practical characteristics of the smart city is a ranking study of European small and medium sized cities led by the Center of Regional Science at the University of Vienna [7]. This study identifies six characteristics of the smart city, namely the smart economy (competitiveness); smart governance (participation in decision-making); smart people (social and human capital); smart mobility (transport and ICT infrastructure); smart environment (natural resources); and smart living (quality of life). In a similar manner, Neirotti et al. [15] offer a high-level taxonomy of main smart city application domains based on a sample of 74 cities at the international level. By taking as a starting point analytical perspectives of the wider literature, the authors elaborate a classification of six smart city domains (split by ''hard'' and ''soft'') and 25 sub-domains. Empirical regression analysis is then undertaken to assess the importance of various economic, urban, demographic and geographical variables in the smart city planning approach adopted by the sample of the examined cities. In addition, key strategic approaches for implementation of integrated urban and ICT development to develop the smart city have been defined by researchers; for example the ''triple helix model'' which focuses on relationships between government, industry and the academia

in the form of networks of knowledge production or the previously mentioned open innovation ecosystems approach which focuses on the design and commercialization of smart city-related products and services in real settings.

1.3 The ''Governance'' of the Smart City

Analytical issues such as those described above, hence, raise questions with respect to the governance of the smart city, i.e. whose priorities are taken into account in the planning of smart city development or what is the potential of such initiatives for producing urban systemic effects across economic, social and environmental considerations [8, 3]. More research then is needed on examining empirically, from a political and economic perspective, the various ways through which smart city applications are designed and developed in diverse urban contexts, and what the relevant role of various stakeholders is in order to better assess ''relations between innovation subjects, actor constellations, methods and outcomes'' [18: 176].

In contributing to this emerging scholarly debate on the policymaking of smart city development this paper offers an overview of the ''planning of the smart city'' in a particular urban context, that of China a country which faces pressing challenges associated with its urbanization process and strives for policy approaches to foster urban sustainability, including through smart city initiatives. In doing so, Section 2 sets the policy framework for the design and development of the smart city in China by offering an overview of four dimensions of urban planning that separately, but also in an interrelated way, constitute key aspects of the current planning thinking and practice for urban development in the country; namely, the ''rational planning'', the ''green planning'', the ''strategic planning'' and the ''collaborative planning''. In this regard, the evolution of the urban planning system to its current form is highlighted while also a few practical examples of planning for sustainable urban development in China are presented. The paper concludes by introducing a particular case of smart city application currently undertaken in the city of Hangzhou.

2. PLANNING THE SMART CITY IN CHINA

2.1 The Re-emergence of the Rational Planning

Over the last four decades, since the introduction of the new regime in China in 1979 and the opening of the country to the world system and economy, the planning frameworks and practice for urban development in the country have undergone significant changes in response to evolving demands of the urbanization process particularly influenced by the transition to a market-oriented system of economy in the context of fast-paced urbanization. To begin with, in response to the needs of modernization, and influenced by the advent in the 1950s of the global paradigm of rationalism in guiding public policy, the Chinese socialist regime adopted the style of rational urban planning as a mean of materializing the objectives of its central economic strategy through localization of state projects under the overarching goal of industrial growth. While rational planning in China was exercised as an administrative task between primarily the central government and planners it also incorporated key western aspects such as a spatial approach to manage land use by means of zoning regulation while traditional planning aspects from the pre-reform period remained relevant during the opening phase, as evident for example in Shanghai's master plans at the

municipal and metro-region level, produced in 1986 and 1995 respectively, which were based on the socialist-era concept of the ''satellite town'' [5].

However, with the deepening of the transition to the market economy a shift is witnessed in the practice of urban planning in China towards a more strategic approach to urbanization as evident in the re-orientation of key aspect of the city planning system and approach in terms of aspects such as aims, functionality, method of plan-making etc. This shift marks the use of the planning system as an instrument to define urban development goals, enhance economic competitiveness and produce policy recommendations for urban development often with the assistance of external actors (i.e. consultants and design institutes) [19]. Yet, despite the emergence of this strategic approach to city planning there is an observed resurgence of aspects of rational planning for urban development in China. In general, they can be discerned on two levels. The first is the effort by the central government to introduce top-down spatial and economic regulation at the urban-regional scale as a response to the problems arising from uncoordinated urban development and fierce inter-city economic competition driven by the dominant model of urbanization. This model, known as urban (state) entrepreneurialism, is based on a fiscally-driven regime of land development where urban land, which in China wholly belongs to the state, serves as a long-term revenue stream for city governments through the granting of land-use rights for development [20]. A common practice by the central government to materialize this top-down ''spatial and economic regulation'' of urban development is through the production of spatial plans at the urban-regional, or supra-regional level, that aim to define patterns of spatial physical development, economic diversification, and area-based differentiated functioning based on the spatial units' development potential. Two main examples of such plans are the so-called National Urban System Plan 2005-2020 led by the Ministry of Housing and Urban-Rural Development and the 2010 Main Functional Area Plan led by the National Development and Reform Commission (NDRC). However, both plans lack a statutory status or implementation mechanism while their making is largely disconnected from the actual political and economic processes of urban development. Nevertheless, given the important role of NDRC, which enjoys the status of nearly a small-level State Council (cabinet) in charge of economic development and resource allocation, its plan could potentially become more influential in the actual urban development process, i.e. through reference when NDRC justifies its decisions over large-scale project proposals [20].

The second aspect of rationalization refers to the use of scientific methods in urban and regional planning, a core part of which involves the use of statistical methods, indexing and large volumes of urban data. For example, the 2010 NDRC Main Area Functional Plan is based on a ''scientific geographical approach'' where an indexing system which includes 10 index terms, 28 factors and nearly 100 variables is used to define the spatial units that are assigned to one of the three classified categories of function (prioritized, constrained or optimized development) while for the ''forbidden development area'' the boundaries follow those of the national natural protection zones [20]. In addition, an increasing importance of the use of big data in urban management is observed as evident in projects such as the Beijing City Lab, an online research network including urban researchers, planners, architects, geographers, economists and policy analysts which produces and collects data about Chinese cities in a systematic way. Up to date, the network has shared over thirty

nationwide datasets which cover various aspects relevant to urban planning such as block boundaries, land-use mixes and levels of population exposure to environmental pollution [14].

2.2 Strategic Planning

In response to the accumulated challenges stemming from the dominant model of urban development, Chinese cities increasingly adopt a strategic approach to urbanization in the context of two key processes of urbanization both of which are placed within a context of China's increasing integration to the world economy that has been set in motion since 1979, for example as witnessed in the designation of special economic and technological zones throughout the country or China's joining of the World Trade Organization in 2001. Chinese cities which are at the center of this new internal social and economic terrain constitute the engines of the country's new economic realities and quest for growth. As noted, in such a more open environment with a view to globalization, Chinese cities, particularly the largest ones located in the coastal areas, are evolving along two major ''metropolization processes'': the first refers to internal processes of territorial restructuring centered on localization strategies towards households and firms which lead to a spread of urbanization and new urban spatial specializations; the second has a more global character and refers to the development of a system of metropolises in the context of generalized economic competition [5]. While mega cities like Shanghai, Beijing and Hong Kong are the prime examples of the strategic approach to urban development, a wider body of Chinese cities is increasingly adopting a clear orientation to globalization with the goal of becoming central nodes in the world economic system [5, 20].

A key aspect of the pursued strategic planning approach in urban China is the opening of the development process to the private sector in terms of decision-making, resources' pooling and implementation (i.e. through public-private partnerships for service management and investments). What then emerges is a policy system for urban development that is dominated by certain actors such as the local political elite, property owners which in the case of China involve the holders of land use rights and other fixed assets, and organizations able to raise capital and labor. In essence, this model resembles much of a ''growth-coalition regime'' which has been critiqued on the grounds that promotes special interests in the governance of cities in order to primarily facilitate economic growth [5]; leaving, nevertheless, less space for addressing wider urban challenges present in Chinese cities such as the use of large amounts of urban space exclusively for transportation, the resettlement of poorer residents far away from the city center or the replacement of older neighborhoods with expensive and uniform new constructions [2]. It is then questionable the extent to which this new wave of strategic urbanization attempted in China leads, or holds potential to contribute, to fundamental solutions of pressing urban problems as opposed to serving primarily as a mechanism to promote a place-based marketization of the city in the quest for new economic resources and international recognition in order to fulfill the aspirations of the urban growth coalition regime [5]. Up to present, it appears that such strategic plans mainly serve the logic of the entrepreneurial model of urban development that has fueled the expansion of Chinese cities, nevertheless at significant socio-economic and environmental costs [20].

2.3 Green Planning

Since the early 1990s, the central government of China has undertaken efforts to steer cities towards greater sustainability as a vehicle to promote quality of life but also wider policy goals such as economic competitiveness and the development of a ''harmonious society'' [13]. Sustainable development is hence a matter of national importance for China as also portrayed in the 12th Five-Year Plan for National Economic and Social Development (2011-2015) which includes explicit directions for resource efficiency and environmental sustainability, as well as targets on reductions of the carbon intensity of the economy which will be required to be downscaled by provinces and cities with corresponding indicators in their local Five-Year Plans [17].

At the central government level, there are two main ways for promoting urban green development in China. The first is the awarding of demonstration projects and best practices to incentivize and encourage cities to develop sustainability policies; for example, the low carbon development pilot program at the provincial and city level established by the NDRC or the eco-county, eco-city and eco-province pilot programs by the Ministry of Environmental Protection [17]. The second is the development of green policies through the circulation of governmental documents and specifications such as the definition of carbon emission reductions targets, policy standards and mechanisms, and the provision of financial support for sustainability projects [17]. Through governmental policy guidance, local initiatives and cooperation with international partners, China is now a place of active fields for experiments on sustainable urban development [13]. In addition to efforts by the central government, municipalities take on sustainability initiatives; for example low-carbon towns are pursued by various city governments as a way of developing low carbon industries to spur new jobs, and improve urban infrastructure [12]. Further to the above-mentioned sustainability concepts, the ''smart city'' is emerging as a promising policy approach in China with the central government putting forward a number of pilot programs such as the 2013 Smart City Pilot Program which includes over 190 local governments and economic development zones as official smart city project sites [10].

At the intersection between urban planning and sustainability, preliminary indications from early experiments suggest that mixed outcomes might be expected from China's approach to green urban development. For example, Dongtan eco-city on Chongming Island was one of the first eco-city projects in China. The planning of the project was assigned to Arup, a London-based design and engineering firm that offered a concept of ''integrated urbanism'' for an area of 80 square Km. The first part of the project was planned to host over 10,000 people and serve as a showcase at the World Expo 2010 that would take place in the city, and eventually to host half million population that would form an entirely new city outside the Shanghai proper. Let alone various criticisms on environmental grounds and doubts over its likely contribution to balanced territorial development [5], the project failed to be implemented, and have not been rescued so far, partly due to a poor planning approach including a lack of a viable business plan and contextual understanding of the site's location [20].

Contrary to the Dongtan case, the fate of another early eco-city experiment in the country, the Sino-Singapore Tianjin Eco-city, which is a collaboration between the Chinese government and the government of Singapore, reveals more chances for materialization. Planned to be developed on a 30 square Km unusable land area outside the urban core of Tinajin, this is a mixed-use project of residential and industrial sites that adopts a range of technological fixes and sustainability components such as

green buildings, renewable energy, public transportation and waste treatment. It is primarily driven by housing development with large property owners having taken position to develop housing estate in the area. However, given its large distance from the center of Tianjin it remains to be seen whether the residential properties of the area will be sold or not. In general, these two eco-city examples, but also the bulk of the currently pursued eco-city initiatives in China, raise questions on the extent to which they promote genuine sustainable urban spaces that balance social, economic, and environmental attributes for better urban quality of life as opposed to re-producing the business-as-usual model of urban development in the guise of ''green urbanization'' which (model) at least in theory they aim to fix [20].

2.4 Collaborative Planning

The presented urban examples raise then the issue of whether the current practice of sustainable urban development in China incorporates in substantial and procedural terms the views, inputs and interests of a wide range of actors or tends to promote the agenda of specialized groups when designing the ''sustainable city''. In a similar vein to Western countries, China appears in general to be of no exception to the manner in which it applies the dominant paradigm of urban planning theory, that is the collaborative or communicative approach, by revolving at best around activities such as public NIMBY protests but still furthering from depicting more inclusive forms of public participation [5]. For example, notable efforts on web-based public participation in urban affairs in China have been observed recently. That was the case in the late 2010 with the creation of participation sites for social mobilization regarding violations related to property development in the mainland China and environmental issues in the Hong Kong area. These attempts signify new ways of public engagement in urban affairs, often termed as ''urban planning processes 2.0'', that may hold potential to re-configure the role of the wider public in the management of the city; for example, by giving rise to new forms of collective intelligence or infusing bottom-up agency to formal processes of urban planning. In addition, the internet is increasingly seen as a new communication tool for enabling the opening of the decision-making process in urban planning. With respect to the Chinese case, however, it is still not clear whether such new types of ICT-based social and policy activities can surpass the level of opposition or consultation and substantially influence the actual decision-making process of urban development [6]. What is more, issues of citizens' participation and free provision information versus risks of social control and censorship need to be adequately addressed in the context of these alternative forms of planning and participation [6, 11]. As things stand at present, it seems that the urban planning system and practice in China are more geared to support the dominant politic-economic structures that have consolidated the current model of large-scale urbanization rather than attempting to achieve a negotiation of, and collaboration between, various actors with a stake in urban development [20, 2]. Hence, a latest report by the World Bank and China's Development Research Center of the State Council identifies ''inclusive urbanization'' as one of the three main reform goals for the country's future urbanization pathway [9].

The above review of urban planning styles and practice in China in combination with the literature on Smart Cities presented in governmental support, large area-based companies like Alibaba provide in the site support for start-ups. This company also plays a leading example for prospective start-ups in the Dream Town by

Section 1 suggest that there is a need for more empirical research on the planning of the smart city in the context of China's urbanization in order to get a fuller picture of the types of spatial dynamics, policy frameworks and actor constellations that are decisive with respect to smart city development in the country. Within such an analytical framework, Section 3 introduces a case of innovation in the area of Internet undertaken in the city of Hangzhou that could serve as an illustrative example of China's current approach to planning the ''smart city''.

3. THE DREAM TOWN CASE STUDY OF SMART CITY DEVELOPMENT IN THE CITY OF HANGZHOU

The ''Dream Town'' is a policy initiative that was launched in March 2015 in the area of the digital economy in the city of Hangzhou, the capital of the Zhejiang province in the Southeastern part of China, which over the last decade pursues a strategic approach to urbanization for promoting sustainable forms of spatial and economic development at the local-regional level. For instance, this is manifested in policy plans such as the Hangzhou Master Plan for the Development of Ten Major Industries (2011-2015) which aims to foster scientific and innovative development in various urban sectors including ICT, energy and transportation [4]. A key direction of such plans, which also reflects the city's wider vision for future development, is predicated on the development of technological and economic innovation which is seen as essential for improving the city's future prospects and drive economic growth. In this context, the city government of Hangzhou leads efforts to instigate local economic and industrial restructuring also through the development of new and high-technology industries. A key approach to bring this change for the city is the designation of special scientific and technological areas (i.e. ''zones'') which incorporate aspects such as the clustering of resources and services, support for technology-based enterprises, local financial innovation, and professional training and skills' development. One such key initiative which is in-progress in the city is the so-called ''Zhejiang Hangzhou Future Sci-Tech City'', one of the four peer pilot projects assigned to Chinese cities by the central government, located at the north-western Yuhang District. This is a master-planned area of 113 square kilometers that aims to serve as a growth pole for innovation-driven sustainable development at the city-regional level and set policy and innovation standards to be replicated at the national level.

In its diverse pool of participating enterprises, the Future Sci-Tech City hosts large companies from the ICT and e-commerce sectors like Alibaba, the Chinese version of Amazon, and China Mobile. In addition, it focuses on small companies including start-ups particularly in the areas of e-commerce and the Internet of Things. One of the three main mechanisms through which the City promotes its innovation agenda is the so-called ''Dream Town'' platform, a specially designated site which acts as a ''public space'' for the promotion of small start-ups, which are driven by graduates of Universities of the Zhejiang province, in the areas of internet and finance. At present, Dream Town hosts nearly 300 start-ups with the goal of reaching 10,000 and attracting over 300 billion RMB (equivalent to over 45 billion USD) of investment within the first three years of its operation. Other than

serving as a role model of innovation for young professionals. In addition to promoting entrepreneurship, Dream Town aims to serve as a new model of urbanization extended on an area of 3.5

square Km master-designed by NITA Design Group, a large European engineering consulting company with Chinese headquarters in Shanghai, by integrating historical and future urban elements, protecting existing water channels and farmland, and creating a space of car-free social activities [16].

The Dream Town initiative can then be regarded as an illustrative example of state-led urban development driven by innovation in a city that may lacks the global status of mega cities of the country (i.e. Shanghai, Beijing, Tianjin) but has the aspiration to become an important economic and technological node both internally and at the international urban system through, among other activities, the development of the digital economy and high-tech industries. In turn, such an urban pathway is seen by the local and central political system as holding the promise to improve the urban quality of life and set structures for a viable urban future, potentially serving as an example to be followed across China. Looking, therefore, more closely from a governance perspective at initiatives like Dream Town could be fruitful in terms of gaining insight on the types of spatial configurations, institutional settings and economic arrangements, as well as role of diverse actors, that influence the planning of the smart city in the nexus of local innovation and space use within a particular context, urban China. In addition, such research task could offer a critical assessment regarding the extent to which undertaken policies and initiatives for smart city development signify a truly new, and more sustainable, approach to urban development that bear the potential to create a better urban condition at large.

4. ACKNOWLEDGMENTS

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