Research article

A study of best practices in promoting sustainable urbanization in China

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ABSTRACT

In the past twenty years, various sustainable urban development policies and methods had been implemented within China, such that sustainable urbanization is now more widely accepted. Some of these policies and methods have been found to be successful in improving the sustainability of cities in China. Those practices can be defined as the best practices of sustainable urbanization, which can provide useful references for future urban developments. However, few existing studies examine how to learn from these best practices. Combining the methods of content analysis and social network analysis, this paper conducts a comprehensive study on 150 best practices of sustainable urbanization in China. The methods and outcomes of the 150 best practices are identified. The research findings demonstrate the statistics of categories, methods and outcomes of the 150 best practices and the main adopted methods. The achieved outcomes in different regions of China are also presented.

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1. Introduction

China has experienced unprecedented economic growth since the reform and its opening-up to foreign investment that began in 1978 (World Bank, 2014). The three major driving forces for this growth have been abundant labor, low-cost land, and investment in infrastructure construction. This economic growth has been translated into a dramatic trend in ubanization. According to the statistics of the Ministry of Construction of China, the urbanization rate in China was 17.9% in 1978 (Ministry of Construction (2004)). By 2011, China reached an urbanization rate of over 50% for the first time (Zhang and Lin, 2012). It has been predicted that the urbanization rate of China will reach 70% by 2030, so that one billion people will live in urban areas (World Bank, 2014). Although urbanization brings numerous economic and social benefits, the development process itself generates problems such as

environmental pollution and scarcity of some key resources (Shen et al., 2005, 2015; Wu et al., 2011; Ameen et al., 2015). In order to solve those problems, it has been demonstrated that 'sustainable' urbanization is an effective way to promote the sustainable development of China's urban areas (Ma et al., 2011; Li et al., 2009; Enserink & Koppenjan, 2007; Zhao, 2010).

Over the last decade, the Chinese government has adopted various policies in order to implement sustainable urbanization practices (Tan et al., 2016). These methods and policies have already been widely used in both academia and practice to assess and monitor the process of urbanization. Those successful practices can be defined as best practices. For example, The UN-Habitat is one of the official organizations that has initially launched the "Best practices database in improving the living environment" in 1995 (United Nations Human Settlements Programme (UN-Habitat), 2016). The World Bank is another promoter of these best practices. The World Bank provides various technical and financial assistances to developing countries, such as zero to low-interest credits, low-interest loans, and grants to developing countries (World Bank, 2016). Shen et al. (2013) pointed out that these successful sustainable urbanization practices could provide useful references for the future development and thus better guide

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urbanization practices. While it is imperative to share the successful experiences of sustainable urbanization between regions and countries, only a few studies have examined the experiences learnt from those best practices in a systematic way. Therefore, there is a need to develop a method for learning and studying the best practices in the process of sustainable urbanization.

Based on the above rationale, the aim of this study is to learn the best practices of sustainable urbanization in China and to establish the Sustainable Urbanization Practices Database based on the research work by Shen et al. (2013). In this paper, data on 150 sustainable urbanization best practices in China were collected. The identified results of the 150 cases include three aspects: categories, main methods adopted and outcomes of the best practices.

2. Literature review

Previous studies have focused on analysis of existing sustainable urbanization practices in China from different perspectives. Some studies examined the policies and methods implemented in the process of urbanization (Siciliano, 2012; Cheng and Hu, 2010; Chen et al., 2013; Wang et al., 2015; Shen et al., 2016a, 2017; Wu et al., 2016). For example, Cheng and Hu (2010) discussed the practices of an eco-city project in Dongtan, Chongming Island, Shanghai. The project aimed to be a zero-carbon city of Dongtan by addressing the issues relating to water, waste, energy, ecosystem, transportation, and economic and social development. The preliminary development of the project has been encouraging and more similar sustainable development projects are expected in Chinese cities. Chen et al (2013) suggested that sustainable policies, such as: the income and income guarantee level for migrant workers; granting urban resident status to qualified migrant workers; and protecting the natural resources, should be considered by the Chinese government for any sustainable development of cities in China. Wu et al. (2016) examined the practice of hosting mega-events to stimulate infrastructure-driven urbanization in China, using an example of Guangzhou city.

Furthermore, different approaches have been used to study the urbanization issues in China, such as water utilization, land use, environment management, or energy utilization (Wang et al., 2008, 2013; Ren et al., 2011; Bao and Fang, 2007; Wang and Feng, 2003; Si et al., 2010; Chen et al., 2008; Halleux et al., 2012; Liu et al., 2011; Tang et al., 2008; Li et al., 2016). For example, Wang et al. (2013) developed a comprehensive environmental assessment framework with integration of Pressure-State-Response (PSR) and Balanced Scorecard (BSC), and examined the impact of urbanization on the air environment of Shandong Province from 2005 to 2009. The results showed that the sustainable development level of Shandong is low and can be further improved. The ecological degradation of urban sprawl on eco-environment has been examined by Ren et al. (2011) by using remote sensing, GIS and forest inventory data. The findings indicated that the influence of urban sprawl is negatively correlated with the distance from the urban core. Wang et al. (2008) studied the variations of surface water quality in Shanghai between 1982 and 2005. The result showed that the surface water quality has spatial pattern, which is related to the level of urbanization. The correlation between surface water quality and economic growth in Shanghai was presented as an inverse-U-shaped curve. Bao and Fang (2007) established a logarithmic relationship model to illustrate the correlation between total water utilization and urbanization level, based on the case study of the Hexi Corridor, an area in Northwest China. The results indicate that the urbanization process will be slowed down by the water resources system if the urban scale exceeds the water resources carrying capacity. Si et al. (2010) examined the environmental pollution due to coal mining activities and established an environmental evaluation system for the mining city. Taking the Qijiang area in Western China as an example, the sustainability of coal mining has been evaluated from various angles, including resource protection, environmental situation, economic benefit, etc. The results show that relevant sustainable practices should be adopted for a sustainable development in this area, such as the integrated reuse of coal gangue, forestation and greenbelt.

However there are few existing studies on how to learn and share sustainable urbanization best practices. These best practices exist as a disparate resource about the reality of Chinese urbanization: such knowledge can be found within news, academic articles, reports and publications issued by different organizations. In order to collect and better make use of these best practices, a method is needed for 'experience mining' of those best practices. Shen et al. (2013) developed an Experience Mining System (ExMS) for effectively extracting previous urbanization practice experiences. Through this extraction process, knowledge representation, data mining and knowledge sharing principles and techniques were used in the ExMS to extract valuable experiences from existing sustainable practical cases in sustainable urbanization. The major components of ExMS include a Sustainable Urbanization Practices Database (SUPD), a Refinery process, and a Mine-sweeper. However, the research work of Shen et al. (2013) mainly focused on the concept and framework of the Experience Mining System. The SUPD is the initial work for learning and sharing the best practices. The Database includes the fundamental information of the practices, such as which category (economic, environmental, social, and governance) that the practice belongs to, what kinds of methods that the practice adopted, and what outcome that the practice achieved. Therefore, this paper reports on this study, which is the extension of the research work of Shen et al. (2013) and focuses on experience learning from the best practices of sustainable urbanization of China.

3. Research methodology

3.1. Coding a practice case

The Sustainable Urbanization Practices Database (SUPD) is the storage space for the collected practice cases (Shen et al., 2013). According to Shen et al. (2013), three types of codes should be established for coding a particular existing practice case: (1) the category of the practice, (2) the method adopted in the practice, (3) the outcome achieved by the practice. Based on the literature review and interviews with experts, the coding system for a practice case has been developed in this study.

3.2. Content analysis

Content analysis was used in this study to extract information from the collected sustainable urbanization best practices. Content analysis became widely recognized as a research tool following the work of Berelson in the 1950s. The method was defined by Berelson as "*a research technique for the objective, systematic and quantitative description of the manifest content of communication*" (Berelson, 1952). Based on Berelson's definition, several alternative definitions were offered by other researchers. Budd, Thorpe and Donohew defined it as "*a systematic technique for analyzing message content and message handling*" (Budd et al., 1967). Krippendorff defined the method as "*a research technique for making replicable and valid inferences from data to their context*"(Krippendorff, 1989).

The general procedure of content analysis can be divided into five steps: (1) formulate research questions or hypotheses; (2) selection of samples, which can be represented as the research questions; (3) define categories for the coding; (4) code the content