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Comparison of perceived neighbourhood sustainability and liveability among different neighborhoods in transitional China: The case of Chengdu

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Abstract

To further comprehensively advance sustainable neighbourhood development, investigating the residents' perception on sustainability and satisfaction on neighbourhood life are important. In advanced countries, there have been increasing concerns about neighborhoods' context-specific characteristics and the impact of applying integrated sustainability principles to cultivate or evaluate sustainable neighborhoods regardless of their different context. Among the contextual characteristics, the role of residents' perception of their neighborhoods is critical when identifying various local sustainability issues and developing sustainable neighborhood planning. Meanwhile, the relationship between residents' perceptions on neighbourhood sustainability and liveability (neighborhood satisfaction as the proxy) drew growing concerns in advancing sustainable neighbourhood development. However, little research has been done on either residents' subjective perceptions when comparing different neighborhoods' sustainability performance or the association between perceived sustainability performance and neighbourhood satisfaction in this time of transitional China. Thus, this research employed an empirical approach to investigate residents' perceived sustainability performance and neighbourhood satisfaction in three typical and different neighborhoods, including the traditional danwei, resettlement and commodity housing neighborhoods in Chengdu, China. Questionnaire surveys were conducted and interviews with experts and field observation were also employed to understand the respective neighborhood contexts. This research used cross-case analysis of sustainability performance to identify critical sustainability issues from each neighborhood. Logistic regression modeling was also adopted to investigate the association between sustainability and satisfaction. The results demonstrated that infrastructure and public engagement were two common and significant dimensions affecting the overall sustainability of all three neighborhoods. Respectively, contextual and local sustainability issues were identified in different neighborhood. The discussion of the results investigated how the perceived neighbourhood sustainability issues of the three neighbourhoods differed from each other even within the same city. This article also examined whether and how the sustainability issues interact with neighbourhood satisfaction in three neighbourhoods. To better advance sustainable neighbourhood development, adaptive, pluralistic and dynamic sustainable neighbourhood development strategy was advocated to be adopted rather than applying general and non-contextual sustainable planning and development guidelines.

Keywords: Neighborhood, Sustainability, Urban transition, Chengdu, Perception.

1. Introduction

Due to rapid urbanization, urban neighborhoods have experienced profound transitions. Much research had been conducted to interpret the transition, the derived phenomenon and to construct a new framework for evaluating and guiding neighborhood development. With these transitions, both central and local governments in China have begun to advocate for sustainable neighborhoods by issuing diverse policies and guidelines. This advocacy is in line with international consensus (UN-Habitat, 2016) and is reflected in authoritative reports as part of China's promise to fulfil a global agenda. 'Building Sustainable Urban-Rural Neighborhoods' practiced by Chengdu City government as a municipal guideline is the case in point. To cultivate a sustainable neighborhood, a systematic and scientific sustainability evaluation is a critical prerequisite for determining a prototype of a sustainable neighborhood. Practically, many advanced countries have adopted NSA (Neighborhood Sustainability Assessment) tools to evaluate sustainable neighborhood development. But there are some who criticize the lack of context-specificity and who doubt the actual universal effectiveness of NSA application. Some studies have stated that NSA should be a pluralistic practice and the viability of applying global standards to NSA, regardless of local different specificities, location and stakeholders, is questionable (Sharifi and Murayama, 2015). It has been argued that context is crucial to sustainability assessment, since context is the most influential element of the assessment (Conte and Monno, 2012).

To learn from advanced countries and avoid the problems they have experienced, identifying contextual variation and how it interacts with sustainability performance is crucial. In fact, the variations in contextual characteristics comprehensively exist among different cities, even different neighborhoods within the same city. All contextual characteristics can be categorized into two dimensions: Built and natural environment and human dimension. These cover different aspects, including physical, operational, socio-economic, environmental and institutional aspects (Komeily and Srinivasan, 2016；Eschbach et al., 2004；Reisig and Parks, 2000). The neighborhood context is associated with a set of socio-economic indicators.

Researchers have studied the variation of urban context in different countries. However, very few studies have been sustainability-oriented and have systematically reviewed sustainability performance using an empirical study, particularly in China. This issue became even more crucial as the latent divergence between perceived sustainability and liveability was identified as barrier hindering the sustainable urban development. Sustainability calls for adopting an integrated approach by considering a wide range of factors, as well as their relationships and interdependencies (Komeily and Srinivasan, 2015). Previous studies argue that measuring actual users' subjective perceptions or awareness of sustainability issues is very important (Bahadure and Kotharkar, 2015；Wynveen, 2015). But the majority of the neighborhood sustainability assessment tools are evaluated by experts and very few evaluate sustainability performance based on the residents' subjective perception. To further facilitate the sustainable urban development in China, identifying the critical contextual variance in perceived sustainability among different neighborhoods is imperative.

Significant social-political transitions and their derived challenges have occurred since the 1980s in China. Under dramatic economic reform and rapid urban transformation, changes in urban residential areas have taken place. The contemporary neighborhood building is a relatively new concept in China that had been practised three decades only. But the history of traditional neighborhood or community development is longer than that since the foundation of New China in 1949 (Fei, 2002). As the transition from planner economy era to market economy ear, neighborhoods experienced diverse but also unique evolvement which differs the issues in China from other countries. The transformation at neighborhood scale includes increased heterogeneity due to the dissolved 'danwei (work unit)' system, lost social capital in resettled neighborhoods and weakened social cohesion in the emergent commodity housing neighborhoods. As a typical western metropolis in China, Chengdu is a case in point.

Thus, this study aims to research the contextual variations in sustainability performance through an empirical study in Chengdu, China. Some studies find that residential satisfaction has small variations

among residents living in different neighborhoods (Cao and Wang, 2016). But how about the variation in sustainability? This study specifically poses the question: To what extent do people's subjective perceptions of sustainability issues differ from each other between different contextual neighborhoods? Three selected cases were compared to ascertain the contextual variance.

This work firstly builds a theoretical framework by intensively reviewing the four main NSA tools, as well as related literature. A list of common sustainability factors was shortlisted, from which the content of the questionnaire was developed. Information from experts was adopted to optimize the applicability and clarity of the questionnaire survey. Then, a total of 481 respondents from three different neighborhood-types in Chengdu were interviewed to elicit their perception of the sustainability dimensions and neighbourhood satisfaction. The results were supplemented with field study and expert interviews to identify the similarities and variations among the sustainability performance of the three neighborhoods.

2. Background

2.1 Growing Concern of Sustainable Neighbourhood Development

Sustainable development aims to balance overall development in terms of three dimensions: environment, economic, and social. This three-pillar concept was initially directed at national level according to Agenda 21 passed at the 1992 Rio Summit. However, a number of experts have concluded that it is at local level (municipalities, cities) that challenges are better reflected and those involved must be mobilized (Camagni, 2011). This was responded to by several thousand municipalities around the world who adopted the 28th Chapter of Agenda 21, which highlights the importance of actions at the local level (Nations, 2002). By 2004, there were approximate 5,000 local governments throughout Europe that had undertaken local sustainable development processes (Kusakabe, 2013).

After practical reflection and application of sustainability at the 1992 Rio summit, the idea of sustainable development was proposed to cope with the conflict between development and environmental protection. The definition of sustainable development promoted by Gro Brundtland, i.e., "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" has led to a broadly shared agreement of sustainability principles (Devuyst et al., 2001； WCED, 1987) This concept is now embraced by most politicians and decision makers when setting developmental goals (Andriantiatsaholiniaina et al., 2004).

Due to the global issue of increasing urbanization over the recent decades, sustainable development has frequently been discussed at urban levels (MacNaghten, 2001) (Rudlin and Falk, 1999； Bromley et al., 2005). A growing number of theoretical studies and practical tools have focused on building-level environmental sustainability, such as LEED, CASBEE, BREEAM, NABERS, BEAM Plus and others (Goh and Rowlinson, 2013). However, some scholars criticized that because of the complex nature of sustainability, a building-oriented framework cannot adequately assess the degree of sustainable development (Spinks, 2015； Conte and Monno, 2012). As such, it has been advocated that there should be more awareness and constructive effort made at the neighbourhood level towards sustainable development. The pioneer scholar, Jane Jacob, clearly stated that "a sustainable way of living should effortlessly derive from the way we design our sustainable neighbourhoods, as they are beneficial to the community and the individual, as well as the environment" (Jacobs, 1961); this has been supported by New Urbanism (Kyrkou et al., 2011). Choguill (2008) also argued that cities should not be considered sustainable if their component parts, such as neighbourhoods, do not meet sustainability criteria.

2.2 Effects of People's Perception of Neighbourhood Sustainability and Liveability

It is commonly recognized that the global strategy of sustainable development can only be realized if the public actually implements the policy or behaves in a sustainable way by following the guidelines. Specifically, neighbourhood sustainability is closely associated with people's action and behaviour as the nearest unit of a city to people's daily life. The association between perception and action has been widely discussed in many studies, particularly the relationship between residential satisfaction and moving out. People's perception of sustainability and sustainable development deeply affects people's actual action in realizing this abstract goal. For environmental and economic aspects, taking the US case as an example, Gardner and Stern (2008) argued that the national energy consumption would be reduced by around 11% if the households effectively implemented all the suggested changes about reducing their contributions to climate change. It was also assumed that citizens had a misperception on the effectiveness of their practical actions (Gardner and Stern, 2008). For instance, it is often suggested that turning out lights when leaving the room will save energy, but the practical energy it saves is very little (Kempton et al., 1985). In the situations in which people have some direct control, a better understanding of how well individuals know about energy consumption will be beneficial in activating demand-side policy responses to climate change, such as encouraging consumers to adopt more efficient technologies (Attari et al., 2010). The social aspect can be critically influenced by a number of public perceptions of the neighbourhood. It is widely recognized that the sustainability of communities is closely related to the collective aspects of social life. Five specific interrelated and measurable social dimensions of neighbourhood sustainability are identified as follows:1) social interaction in the neighbourhood;2) safety and security; 3) sense of place; 4) community stability; 5) participation in collective groups and networks in the neighbourhood. These five dimensions are largely determined by people's perception and are closely related to collective aspects of the resident's daily life and are significant concepts especially at the neighbourhood level.

The definitions of liveability are diverse and while the term invokes various ideas pertaining to quality of life or human well-being, it is recognised as being not only difficult to define, but also to measure (Balsas, 2004; Leby & Hashim, 2010). In general, liveability is defined as "the degree to which a place supports quality of life, health and well-being" (Lowe et al., 2015). At neighbourhood level, it is commonly used to denote the quality of living conditions and interaction between the community and the built environment (Shafer et al., 2000). Neighbourhood life satisfaction is adopted here as a proxy to indicate liveability (Mouratidis, 2018).

Portney (2013) stated that liveability and sustainability are practically indistinguishable. However, Lowe et al. (2015) identified the mismatch among different researcher's investigations on liveability and sustainability indicators and the barriers hindering their transformation to policies in the context of Australia. Leach et al. (2016) argued that sustainability and liveability are not necessarily reciprocal and demonstrated the need for interventions that enhance rather than compromise well-being and leverage the sustainability and liveability of their cities. Generally, the interpretation of their relationship is still yet to be explored and verified d by empirical studies.

2.3 Neighbourhood Transition and Challenges in Contemporary China

Prior to the late 1970s, land use rights in China were strictly controlled by the central government, and urban development was relatively slow compared with that of Western countries. The latter's urban expansion, which was influenced and generated by the effects of the Industrial Revolution, arguably began in the eighteenth century. The turning point for China, however, occurred in 1978 when national leaders made the strategic decision to 'reform" in what has become known as the "opening up" policy. Thereafter, China's fundamental economic institution gradually transformed from a central-controlled planned system to a market-oriented system. Due to the powerful driving force of economic reform, urban development was unleashed and physical construction activities dramatically boosted, subsequent land market reforms were also enacted. As a result of rapid urbanization, the urban population rose from 17.9% in 1978 to 52.6% in 2012 (UNDP, 2013).

From the community's perspective, W. Ma and Li (2012) argued that the subsequent housing institution

reform had two major impacts on the community. Firstly, the community profile was transformed when the government stopped providing housing. As more comprehensive urban development and holistic marketization reform took place, together with the cessation of the danwei system, the provision of public housing to residents ceased after 1998. Thus, residences became a commodity rather than a public good. Since staff no longer relied on the danwei, they began to seek new flats in the market. Secondly, the dissolved danwei system promoted labour mobility. As the inhabitants' mobility between the danwei and other newly built residential areas increased, community heterogeneity was consequently enhanced. Since the 1990s, the component and form of urban living space has gradually changed.

On the government side, the change in the socio-spatial process brought about major challenges to neighbourhood governance. W. Ma and Li (2012) stated that one of the major challenges was the disruption of organizational bases for providing social services. The central government started delegating by handing over increasing functions of public service and welfare delivery to local authorities, meanwhile devolving a part of these responsibilities to the private sector, social organisations and citizens (F. Wu et al., 2006). The question of state control arose since individuals had more options and avenues for social and political participation. The government was concerned with the methods to effectively deliver social services and meanwhile to reconsolidate state control over individuals and society.

3. Research Design

In this research, qualitative research was used to capture the sustainability challenges and underlying factors. It can obtain people's perspectives since this study aimed to promote sustainable neighbourhood development that closely relates to residents' daily life and participation. Quantitative assessment and evaluation are imperative for investigating the corresponding sustainability performance and association among sustainability, moving intention and satisfaction degree in three different cases. A range of required actions or steps were designed to effectively conduct the research, including the desired order of these steps (Kothari, 2004). After defining the problems, theories and previous research finding, related documents were reviewed by desktop research. Case study and expert interviews were the main methods adopted to investigate the contextual specificities of neighbourhood sustainability issues. Three typical and different transitional neighbourhoods were investigated for collecting first-hand data in the form of questionnaire survey. Various data analysis methods, including logistical regression modelling, were adopted to analyse the collected data.

3.1 Questionnaire Design

Both qualitative and quantitative questions were designed based on lists of factors included in the following neighbourhood sustainability assessment tools, including BREEAM (Communities), CASBEE(-UD), LEED(-ND), DGNB(-NSQ), TAHER, and Beam Plus ND as well, as shown in table 1, as demonstrated in other academic literature.

Table 1 The neighbourhood-based assessment tools worldwide selected in this study

Framework	**Organizations**	**Country**	**Latest Publication Year**
BREEAM (Communities)	Building Research Establishment	United Kingdom	2012

LEED(-ND)	US Green Building Council	United States	2016
CASBEE(-UD)	Japan Green Building Council, Japan Sustainable Building Consortium	Japan	2014
DGNB(-NSQ)	German Sustainable Building Council	Germany	2012
The Technical Assessment Handbook for Ecological Residence of China (TAHER)	China Real Estate Chamber of Commerce	China	2011
BEAM Plus Neighbourhood (ND)	HKGBC	Hong Kong	2016

It aims to elicit the opinions of selective neighbourhood residents on their degree of agreement on the different criteria for enhancing neighbourhood sustainability. First hand data was obtained to dig out an overall expectation of neighbourhood residents on the performance of neighbourhood development. Likert scale method was utilized to indicate the respondent's degree of agreement on corresponding factors by measuring how they feel about the variables presented in the questionnaire.

The questionnaires were designed to elicit both attitudinal data and demographic data. The attitudinal data is to collect their preferences in the evaluation of sustainability performance while the demographic data refers to demographical background of the respondents, including the age, gender, occupation, duration of living in the neighbourhood, education level, monthly income, and household expenditure. The collected demographic was further used to evaluate the representativeness of the sample and identify the significance of similarities and differences between different groups of respondents (Brewerton & Millward, 2001).

Then eight experts were invited to validate the clarity, relevance and representation of the proposed questions in the survey. They were also asked to review the neighbourhood development of Xingyue (XY), Yulin (YL) and Jinyang (JY) from the four sustainability-pillar perspectives. The profile of the interviewed experts is shown in Table 2:

Table 2: Profile of experts who were interviewed for this study.

Expert	Field of Expertise	Affiliation
1	Sustainable neighbourhood building project	University, Chengdu, Sichuan, China
2	Neighbourhood affairs	Neighbourhood Residential Committee, Chengdu, Sichuan, China
3	Neighbourhood development and governance	Neighbourhood Residential Committee, Chengdu, China
4	Social institution and community affairs	NGO, Chengdu, Sichuan, China
5	Neighbourhood development and community sense	Government, Chengdu, China
6	Neighbourhood development and governance	Neighbourhood Residential Committee, Chengdu, China

7	Urban planning and neighbourhood planning	Professor, University, Sichuan, China.
8	Sociology and community development policy	Professor, University, Sichuan, China.

3.2 Case Study

The city of Chengdu was selected for this study. This is not only because of its cultural and environmental representation as a traditional Chinese western metropolis, but also because of its outstanding political and pioneering position in contemporary urban development and its prestigious image as the 'most liveable city in China'. after reviewing many neighbourhoods in Chengdu, Yulin East, Xinyue and Jinyang, as shown in figure 1, were selected for the subsequent empirical study of residents' perception of sustainability issues. They are typical neighbourhoods but vary in their periods of construction, size and location within the city.

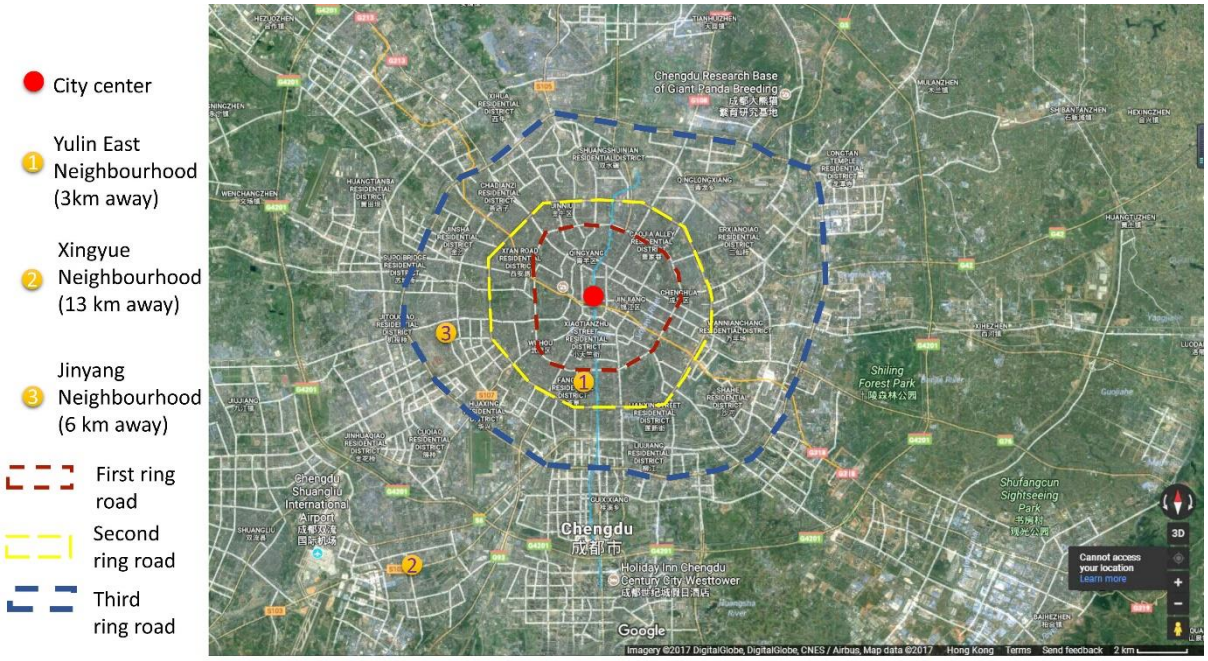

Figure 1 The location of the three neighbourhoods within Chengdu. Source: Google map.

3.3 Data Collection and Analysis

The total of 510 questionnaires were distributed in the form of on-site interview within the Yulin, Xingyue and Jinyang neighbourhoods in Chengdu between April and September 2017. The questionnaires survey was conducted in the sequential order of Xingyue in April 2017, and Yulin and Jinyang in September 2017. During the surveying process, the respondents were shown a list of the criteria of sustainable neighbourhoods identified from the literature review and orally asked to rate the degree of agreement with each statement. Likert-scale was adopted to formulate the choices for respondents to indicate. Each interviewee was allocated 20 minutes, including briefing the research background, marking his/her indication on the 1-5 Likert-scale on all 33 questions, and recording their social-economic and demographic characteristics.

The collected data was analysed by a number of statistical techniques as well as several different software. It included Descriptive Statistics, Correlation Analysis, Mean Score Ranking, Independent T-Test, Reliability Analysis, and Logistical Regression Modelling. IBM SPSS Statistics 19 English

version was the primary software employed for dealing with the raw data.

4. Discussion and Conclusion

The complexity and diversity of both neighbourhood contexts and residents' perceived sustainability factors and neighbourhood satisfaction within even the same city was demonstrated in the table 3. It revealed that sustainable neighbourhood development should be guided by sustainability principles but individually pluralistic and dynamic rather than fixed and standardized practice in China. The uniformity mainly lies in the sustainable objectives and action principles at municipal level, while the differences lie in planning preparation, responsible bodies, implementation, and policies of various neighbourhoods with different locations, socio-economic characteristics, and development stage. In this sense, unlike other statutory planning in China, sustainable neighbourhood planning would play a better role as non-statutory planning at the grassroots level of the national urban planning system. From the perspective of people-orientation and public participation, it also supplements traditional physical planning by better engaging and empowering citizen so that convergent and favourable actions can be taken collectively towards a more sustainable future.

Neighbour hood type	**Case Name**	**Common poor sustainability performance**	**Respective different socioeconomic and sustainable threats**	**Sustainability factors associated with residential satisfaction**
Danwei traditional	Yulin East Neighbour hood	• Often participating in collective activities. • Occasionally visiting the neighbours. • Will attend the economic activities within the neighbourhood. • There is a chance to attend and express myself in the neighbourhood management meeting.	Highest heterogeneity Largest aging population Poorest air quality methods of information publicity; Poorest satisfaction on proposed solution from CRC after reporting the issues to them.	'sense of security', 'Preference on neighbourhood's collective lifestyle', 'satisfactory fresh air', 'solution got by reflecting the problems to CRC' and 'Acceptable variation of property management policy on local and non-local residents'.
Resettleme nt	Xingyue Neighbour hood		Longest 1) Job-housing and 2) home-transport station commuting time; Lowest sense of security; Lowest satisfaction on difference of neighbourhood policy between local and non-local residents;	'Sense of security', 'Regard myself as a member of the neighbourhood', 'Night lighting within neighbourhood' and 'solution got by reflecting the problems to CRC'
Commodity housing	Jinyang Neighbour hood		Lowest participation degree in collective activities Lowest usage rate of public open space; Highest moving out intention; Poorest; Lowest participation in economic activities and satisfaction on economic training workshop.	'sense and habit of energy saving', 'clean internal roads and adequate garbage bins', 'responses from the CRC' and 'benefits of engaging external parties in neighbourhood development'

Table 3 Key identified factors of three neighbourhoods in Chengdu

To pursue sustainable neighbourhood development, neighbourhood development in China should adapt

the internationally recognized sustainable standards and indicators into local context. Regarding updated academic literature, sustainable neighbourhood planning should arguably promote not only sustainability but also liveability if sustainable development is expected to move forward by engaging citizens in acting collectively. Residential perceived satisfaction with neighbourhood life has commonly been used as a proxy for liveability (Mouratidis, 2018). Cultivating sustainable and liveable neighbourhoods epitomises the crucial nexus between urban planning, sustainable development, built environment and public perception. Thus, how the involved factors are addressed in the process of framing sustainable neighbourhood planning is therefore critical in fostering sustainable and satisfactory neighbourhoods. Amongst all framework elements, parameters are important because they provide benchmarks against which to monitor progress towards policy reform; and to make comparisons between and within cities (Howley et al., 2009b). Based on the findings of this research, the significant parameters associating sustainability with residential satisfaction on neighbourhood life vary by typology of the neighbourhood even within the same city. These findings provided substantial evidence why sustainable neighbourhood planning should be pluralistic by considering contextual circumstances in transitional China to promote sustainable neighbourhood development. Contextual variation exists not only among different countries but also different neighbourhoods within the same city of the same country.

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