

# Research on the Current Situation of Sustainable Development Communities in the New Era of China - - Case Study from Baicheng New Community of Jilin Province

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## ABSTRACT

Since the 1980s, the concept of sustainability has been widely mentioned and recognised as well as been applied to the construction industry. As a country with a high demand for sustainable development, China's present situation in urban space has full research value. Based on the comparison of China's sustainable building evaluation system with BREEM and LEED-ND, this research will focus on case studies of China's new era community projects and constraints in actual society. This paper also adopts the form of semi-structured interviews. The results obtained from these theoretical foundations show that China's current level of sustainable development is still constrained by cost and technology. However, there have been significant improvements and advancements compared to earlier years.

**Keywords:** Community development; sustainable community; sustainable buildings; sustainability; China.

## 1. INTRODUCTION

In the 1980s, the concept of sustainable development which includes a combination of global nature, society, ecology, economy, and resource utilisation, as well as providing the basic guidance and direction for a long-term strategic plan towards worldwide was primarily recognised [1]. Even though the concept proposed by WCED in 1987 was only intended to explain a framework model for economic growth, many researchers still extended the concept of sustainable development to urban space construction especially for communities [2,3].

As Lu stated that, due to the shortage of technology and funds, the sustainability of urban space had developed rapidly since the Chinese government put forward the scientific concept of development in 2004 [4]. As a result, the community development in China was always confronted with a series of barriers, such as the dilemma caused by higher design and construction costs [5], or the deficiency of public participation caused by inadequate publicity and incentive mechanism [6], even with the lack of core technology [7].

Through the analysis and study of various relevant journals, it can be found that most of the literature aims to state or emphasize the importance of the sustainable development of urban space in China. However, very few researchers concentrated on if these projects really worked, whether they could improve people's living standards, and how to achieve a better result with effective strategies. Therefore, the main question of this study can be expressed as "how is the current situation of sustainable communities in China?"

The three sub-questions will be:

A. What are the existing shortcomings of the sustainable community evaluation system in China?

B. What are the differences between current communities and earlier community projects?

C. Does the sustainable community project in China have overcome barriers?

In response to the above research questions, this study will verify their answers through different research methods. Since these questions represent the dilemma in the process of sustainable development of urbanization space in China, the answers with sufficient evidence can

obviously be used as corresponding strategies to make certain contributions to future urban space development.

## 2. RESEARCH METHODS

The data in this study will be collected and evaluated by content analysis through existing literatures, reports and relevant journal articles. Moreover, a case study with a detailed questionnaire survey and a semi-structured interview for the sustainable community of Baicheng City is also an important driver. The combination of these research methods will make valuable contributions to exploring the answers to research questions as well as solving the dilemma faced by China at the community level. Content analysis of relevant literature and journal articles in this study is regarded as the key to evaluating and comprising existing community assessment systems between China and worldwide. However, the case study and its derived questionnaire survey and semi-structured interview will be jointly used as effective evidence to support whether the current sustainable development communities in China have overcome barriers and whether these community projects have truly improved people's quality of life.

### ***2.1. LEED-ND, BREEAM and the manual of Green Low-carbon***

The evaluation system of sustainable communities is a key factor to promote the development of urban spaces, which existed as a standard to measure the environmental performance as well as other indicators such as resource utilisation, climate influence and energy consumption.

The Building Research Establishment Environmental Assessment Method (BREEAM) evaluation system which adopted local conditions and balanced benefits as its core concept was established in 1990 by the UK and is widely used in worldwide [8]. As the earliest community evaluation system in the world, BREEAM is regarded as one of the best practice methods of sustainable building and space design as well as one of the most authoritative international standards, since its promotion, more than 110,000 buildings have been certified. It can not only show the various elements of sustainable communities one by one, but also enable builders and clients to understand the essence of sustainable development space more deeply [9]. Although BREEAM has been able to meet the needs of most spaces' sustainability assessment requirements, with the development and promulgation of LEED for Neighbourhood Development (LEED-ND) evaluation system during 2005 to 2009 by the U.S. Green Building Council (USGBC), the development of sustainable communities has been promoted once again [10]. LEED-ND evaluation standard and system is different from BREEAM, it focuses on the integration of buildings into the community, society and the humanistic relationship

around them which can not only effectively help builders with adopting green and sustainable methods such as energy saving, water saving and air quality improvement, but also reduce consumption as much as possible and simultaneously improve individuals' quality of life as well as environmental efficiency [11].

In China, although BREEAM and LEED-ND are both available community construction evaluation systems, they cannot meet the needs of urbanization according to actual local conditions, which is caused by the differences in geographical situations, culture and other factors. However, there is still not a complete and authoritative sustainable building evaluation system within China [12], so the manual of Green Low Carbon which is currently recognized and used will be regarded as a research object in this study. Green Low-carbon evaluation system was based on current national conditions of China, all six indicators for community assessment, such as residential environment, energy, indoor environment, water quality, materials and resources as well as operation management are clearly described, moreover, in the subsequent chapters it has provided specific strategies for construction of sustainable communities [13].

Through the content analysis of the promulgation time, background, purpose, recognition and specific indicators of the above three community evaluation systems, BREEAM and LEED-ND, as widely recognized systems worldwide and based on the great urbanization process of their countries, the indicator frameworks and contents are richer and more stringent. As Li stated, all three indicators have reached a consensus on basic climate, energy, resource utilization, transportation and environmental protection [14]. They all adopt feasible technologies and designs with local actual characteristics. However, in other aspects, for example, from the perspective of infrastructure management, the number of indicators in LEED-ND and BREEAM is more than that of Green Low-carbon, which demonstrates that there are still some shortcomings in the current evaluation system of China. Moreover, through the content analysis of the relevant reports of the three system promulgation departments, it stated that even though the Green Low-carbon system has drawn on the experience and advantages of the other two, it is still biased towards the evaluation of independent buildings, rather than focusing on the community level. Among all its indicators, more than 72 % are closely related to single building [15], which is obviously insufficient compared with the other two evaluation systems.

### ***2.2. Baicheng New Community and Shanghai Thames Town***

In accordance with the Second Five-Year Plan of China, since 2010, China has taken smart and sustainable development as the direction of the urbanization process and has planned 250 prefecture-level cities from 2010 to

2015 which involves social management, infrastructure construction, green technology, policies and regulations, and evaluation system. The ecological new community in Baicheng City, Jilin Province, is a typical sustainable community project, as one of the projects planned during the 12th Five-Year Plan, it has made outstanding contributions to the community development in Northeast China under the call of realizing the integration of ecology and science and technology and creating the integration of culture and economy[16].

In this study, in order to explore whether the sustainable community projects in China have overcome the obstacles of cost and technology, and whether community projects can truly improve the quality of life for people, Baicheng Sustainable New Community will be used as the case to illustrate and describe. Furthermore, it will also be compared with the Thames Town Community Project, which was completed earlier, to ensure that the conclusions of the study are reliable.

Table 1 provides an overview of two sustainable projects.

**Table 1** A summary of projects under this research

|                            | <b>Baicheng New Community</b>   | <b>Thames Town</b>   |
|----------------------------|---|--|
| <b>Project description</b> | Baicheng New Community is a new space of sustainable development oriented by stimulating economy, improving environment and quality of life. It not only has residential areas, but also has various supporting sub-spaces and expansion areas, including markets, manufacturing bases, industrial parks, landscape parks, etc. During construction, the concept of environmental protection runs through the whole process, and its completion has brought remarkable contributions to the urbanization construction in northeast China[22]. | The Thames town is a community built in the early stages of China 's urbanization. It integrates culture, entertainment and other factors from other countries, and embodies the atmosphere of modernization and internationalization with 60 % green coverage and exquisite villas (Shen & Wu, 2012). |
| <b>Time for completion</b> | 2020  | 2004   |
| <b>Community area</b>      | 9.6 km <sup>2</sup>   | 1 km <sup>2</sup>  |
| <b>landscaping ratio</b>   | 35.6%   | 60 %   |

This study will compare the differences between the two community projects using content analysis, with an emphasis on sustainable factors throughout the process. The different purpose of the two community projects is the primary consideration point. As Zhang summarised that, the purpose of constructing Thames Town is mainly from the commercial perspective which is based on the sophisticated infrastructure and beautiful buildings as well as natural landscape to result in the development of consumer culture and tourism industry to promote the local economic growth[17]. In contrast, the construction purpose of Baicheng New Community is more sustainable. As Chen stated, the purpose of the development of Baicheng New Community is to improve the image of the city, create an ecological community, lead the green economy and enhance people’s living standards [18]. Since the residential area in the new

community is built as a relocated building, it cannot be regarded as a commercial project.

In addition to the initial purpose of both communities, this study also takes whether communities adopt evaluation system in the construction process as the second main point of their differences. From Huang’s research, during the process of construction, Baicheng New Community has focused on planning for the distribution of green space and how to connect buildings and communities in a sustainable way, besides that, in the design stage, community evaluation system is also integrated into the process. However, the town of Thames is different due to its completion time is earlier than the start time of sustainable development model in China[19]. Even if there is sufficient consideration for greening and landscaping in its design stage, it cannot be regarded as a complete sustainable community due to the lack of

methods and strategies to integrate architecture, greening and culture in a sustainable way[20]

In this study, the comparison of two different types of communities will be based on their appropriate population categories as the last factor. The Thames town, as a tourist community that drives the local economy, adapts to the vast majority of travellers and a small percentage of the rich which is resulted from its superior geographical location and commercial nature[21]. On the contrary, Baicheng New Community integrates the concept of pension into community culture at the design stage, as Qin emphasised that, as Chinese society enters the aging stage, Baicheng New Community will create a home for the elderly as much as possible by closely linking pension models to local policies [22].

By comparing the initial purpose of the two communities, the adaptation population and whether to use the community evaluation system, it can be intuitively obtained what kind of differences exist in the communities in different periods.

### **2.3. Semi-structured interview**

Whether the community projects are still facing the problem of negative factors is an important point in this study. Since Baicheng New Community is an official government project, it is necessary to communicate with the official personnel involved in the design and construction process to collect reliable evidence. Therefore, semi-structured interview, as a research method for collecting data through communication will be adopted in this study. Eight officials with different responsibilities involved in community construction and development projects were selected through stratified sampling, including two cost managers, two designers, two architects and two maintenance staff.

Subdivide and simplify the research problems that need to be solved by semi-structured interview method are also conducted, so as to avoid guidance and aversion: (1) Do you think there are obstacles in the design, construction and maintenance life cycle of Baicheng New Area? (2) What are the impacts of these factors on the development of new areas? In addition to the question design, the interview duration will be controlled between 40-60 minutes, and the overall outline design content is extensive to ensure that the interviewees can express their true opinion. After the interview, the records will be saved as soon as possible, and the experience and inspiration from it will also be recorded immediately which providing a reference basis and evidence for subsequent analysis stage.

The results of semi-structured interviews will be transcribed verbatim and classified in the form of coding. The coding results of the interview are summarised as:

A)“The high construction cost of sustainable projects is an inevitable obstacle in the process of project development. Due to budget constraints, we usually need to prepare three or more schemes to ensure the smooth progress for the project, which increases the workload and difficulty of cost estimation.”

B)“How to integrate sustainable concepts with the community is a challenge, but there is no impediment to this stage by drawing on and following existing sustainable community projects in China and worldwide”

C)“Due to the economic level of Baicheng City is not developed and there are no similar projects in the local area, the actual construction of Baicheng New Community is a challenge for the local government, which requires us to continuously introduce talents from advanced cities such as Beijing and timely train local workers involved in the project. This result will inevitably lead to cost increases, but it can also quickly drive the local construction industry and market, help to improve the level of urban space development in Baicheng City.”

D)“Shortly after the completion of Baicheng New Community, there will be limited places to be maintained and no restrictive factors that are difficult to solve.”

Through repeated comparison, analysis and evaluation of the interview results, it can be concluded that cost factors and technical factors are still inevitable obstacles in current sustainable development in China. However, the existence of constraints not only shows their negative influence, but they can also promote the speed and level of local development in the construction industry, which helps the process of subsequent urbanization.

## **3. ANALYSIS**

After exploring and analysing sustainable communities through three different research methods, the corresponding research questions raised in this study have been answered. As for the first question, the data collected and analysed by content analysis method show that China does not have a mature, complete and widely adopted community evaluation system at present. Green Low-carbon, as a recognized evaluation system, has a significant gap with BREEAM and LEED-ND, which is caused by the late start of sustainable urbanization. However, in the future, since China has solved the living problems for public and the process of rapid urbanization has not stopped, these gaps will eventually narrow.

From the perspective of the second research question, in this study, the answer is also obtained through the combination of case study and content analysis method. By comparing the community projects before the popularization of sustainable concept with current sustainable community projects, it can be found that not

only in the purpose of community construction and response to the crowd, but also in the adoption of community evaluation system, such as Baicheng New Area and other sustainable community projects have obvious advantages which shows that the current urban space development in China is on the right path.

The last research question is related to the current national conditions in China and relevant obstacles to community development. As Zhang mentioned, cost and technology are always the main obstacles that China must face on the road of community development. [23] In this study, through the analysis of the Baicheng New Community project in 2020 and the data collected through semi-structured interviews, it is found that technical problems have been alleviated, but high costs have remained as obstacles to urban space development. This phenomenon is caused by several factors, since China is a developing country, its economic level cannot reach as that of the United States. Moreover, due to the influence of COVID-19, construction activities will inevitably require more costs. Therefore, it is reasonable to believe that in the future development of urban space in China, the problem of costing will eventually be solved with economic growth.

#### 4. CONCLUSION

This study summarises the overall process of sustainable development in the world, at the meantime, also compares the urban space development status in China with it which is helpful for describing the various barriers caused by technology, cost and public participation. On this basis, through the form of case study, it gradually answers a series of research questions that can contribute and help to future urban space development in China, including what the shortcomings of current sustainable evaluation system are; what the differences between China's modern sustainable development community and early years are; and whether the sustainable community projects in China have overcome all obstacles. These questions are all answered and will be used as the evidence and theoretical basis for evaluating the status of China's sustainable community development.

This study has limitations, which not only includes the transformation of semi-structured interviews from face-to-face to online mode due to the tense environment caused by COVID-19, but also includes a limited number of reports and literature due to the relatively backward level of local economic development and popularity in Baicheng City.

Due to the fast iterative speed and high frequency of construction projects, the future direction of this study will focus on the analysis of representative new projects in the form of cases to ensure that it can grasp the real-time state of sustainable development status in China and

hope to make contributions to China ' s urbanization development based on the study.

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