

# Barriers to Implement Green Strategy in the Process of Developing Real Estate Projects

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**Abstract:** The promotion of sustainable practice in real estate development has more and more influences on the society. However, most of the real estate development projects display few green features. This paper examines 10 typical barriers encountered in the process of real estate development and facilities management by employing questionnaire survey. Case study approach is adopted to investigate how and why the barriers can hinder the implementation of real estate development projects. It approaches the subject from the whole process of developing real estate project, including plan and design, construction and operation and management stages. Research results show that high cost for green appliance and lack of motivation from customers' demand are identified as the two major barriers. The paper concludes by exploring the reasons that these barriers exist and suggesting some ways in which the barriers may be overcome.

**Keywords:** Green strategy, barriers, real estate development project.

## INTRODUCTION

Achieving sustainable mission has become more urgent for all sectors of society. It is also inevitable for real estate industry in China. The promotion of sustainable practice in real estate development has resulted in the development of various green strategies especially for improving environmental performance in the process of Chinese real estate development [1]. The term "green strategy" is defined as the approaches for helping developers achieve friendly environment, ecological responsiveness and social responsibility to improve long-term profitability and gain sustained competitive advantage [1]. Previous study suggests that green features in the building practice provide a cost-effective choice for developers and policymakers looking to reduce the negative environmental effects of development [1, 2]. A wide range of green features, such as green roof technology [3], solar system [4] and HVAC system [5] were identified by previous studies. These green strategies aim to attain long-term real estate performance and sustainability, result in lower operational costs, preserve the health of building residents, and contribute to energy saving. However, it appears that the majority of new residential developments in China incorporate few green features. According to a recent review of green building activity found that a very small proportion of England's building stock can claim to be green [6]. The question "why is so?"

arises when green strategy is under development in China. Given such a strong green environment as well as policy regulation drivers, what is hindering green strategy conducted in the real practice for residential developers in China? The paper is to investigate and advance the foremost question in the green residential industry. The objective is to present a new concept of major barriers for examining the reason why green strategy is not so active in real estate market. The identification of the major barriers then leads to a comparative analysis on the existing barriers among four case studies in the practice of adopting green strategies in China. The paper concludes by making some suggestions about how the barriers could be overcome.

## RESEARCH METHOD

The research was conducted using literature review, existing research reports, questionnaire survey, case study and structured face-to-face interviews with residential project managers [1]. Literature review is adopted to investigate the option list of barriers in implementing green residential projects. A questionnaire survey is employed to investigate the opinions of barriers to green strategies from the managers of real estate developers. Case study is used to demonstrate how these barriers prevent green strategies in real estate project development process in practice. The questionnaire survey and case study are conducted by the team members in one part of the research output in Zhang's study (2011) [1]. This research extends the research findings from the questionnaire survey and case study of Zhang *et al.* (2011).

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**Table 1. Summary of Optional Barriers for Applying Green Elements in Real Estate Projects**

Code	Barriers	Key References
BX <sub>1</sub>	High green appliance design and energy-saving material costs	Williams and Dair, 2007; Wilson and Tagaza, 2004
BX <sub>2</sub>	Insufficient policy implementation efforts	Osmani, and Reilly, 2002
B X <sub>3</sub>	Technical difficulty during the construction process	Wilson and Tagaza, 2004
BX <sub>4</sub>	Risks involved because of different contract forms of project delivery and changed site practices and behaviours	Wilson and Tagaza, 2004
BX <sub>5</sub>	Lengthy planning and approval process for new green technologies and recycled materials can be lengthy	Wilson and Tagaza, 2004
BX <sub>6</sub>	Lack of knowledge and awareness to the green technologies	The Energy and Resources Institute, 2006
BX <sub>7</sub>	Lack of integrated efficiency for the building regulations and byelaws within the green framework	The Energy and Resources Institute, 2006
BX <sub>8</sub>	Lack of motivation from customers' demand	Osmani, and Reilly, 2002
BX <sub>9</sub>	Unfamiliarity with green technologies makes delays in the design and construction process	Eisenberg <i>et al.</i> , 2002; Wilson and Tagaza, 2004
BX <sub>10</sub>	Interests conflicts between various stakeholders in using green measures	Williams and Dair, 2007

## DATA SURVEY

The review on previous works has identified 10 barriers for conducting green strategy when a green building is under construction. These barriers have been addressed in various previous studies [7-9], which can be compiled into a list, as presented in Table 1.

In order to understand the seriousness of barriers that stopping applying green strategies, a constructive questionnaire surveys has been conducted. In this study, a group of 135 professionals was identified and invited for participating the survey. These professionals include project managers, chief engineers and real estate project supervisors who working in real estate firms for at least 5 years and 45 of them returned the completed questionnaires [1]. The survey was carried out from July to September 2009. The structure of the questionnaire mainly includes the major barriers of applying green elements. The Likert scale is commonly used for rating the relative significance of individual factors through examining experts' opinion [1, 10, 11]. In this study, the respondents were invited to give their opinion on the relative significance of each barrier to hinder the implementation of green strategy during the construction process of the residential building. The respondents were invited to give the significance degree of each listed barrier, with grading "1" as least significant, "2" being fairly significant, "3" being significant, "4" being very significant and "5" as extremely significant. Relative significance value (RSV) is used to analyze the opinions of the respondents. It is considered that the RSV is a typical methodology for identifying the key factors among a number of individual factors [12, 13]. By analyzing the relative seriousness of each of the ten barriers preventing green elements from effective application was identified based on RSV of individual responses, as shown in Table 2. A brief finding on the RSV of the barriers has been addressed in Zhang *et al.*'s (2011) research [1]. It is now extended to demonstrate the details of the findings. The most reluctance degree of barriers includes "high green appliance design and energy-

saving material costs", "lack of motivation from customers' demand" and "insufficient policy implementation efforts".

**Table 2. The Relative Significance of Barriers in Adopting Green Elements for Real Estate Development**

Code	Responses					Mean	Rank
	1	2	3	4	5		
BX <sub>1</sub>	0	0	5	20	20	4.311	1
BX <sub>8</sub>	0	0	6	28	11	4.044	2
BX <sub>2</sub>	0	0	13	22	10	3.978	3
BX <sub>7</sub>	0	0	12	26	7	3.622	4
BX <sub>6</sub>	0	0	16	23	6	3.422	5
BX <sub>3</sub>	0	1	19	24	4	3.4	6
BX <sub>9</sub>	0	0	21	19	5	3.378	7
BX <sub>4</sub>	0	0	23	17	5	2.978	8
BX <sub>5</sub>	0	2	20	19	4	2.956	9
BX <sub>10</sub>	0	1	20	23	1	2.933	10

According to the results, the financial concern is considered as the biggest barriers in promoting green strategy in real estate development process. Previous studies suggest that using green materials would cost between 3 to 4 percent more than using conventional construction materials [14]. In the case study, one general manager mentioned that his company decided not to use the green strategies at the final stage because it would generate higher cost and it was rather difficult to purchase the green materials and appliances for the property building. In fact, costs for developing green buildings do not have to be higher. There is a need for culture cultivation of using green elements in the real estate development process. Besides, even with sound energy efficiency standards, the strong commitment is mainly undermined by the weak monitoring mechanisms in

**Table 3. The Details of the Four Cases**

Case	Company	Location	Construction Area	Year of Completion
I: Vanke city project	China Vanke	Shenzhen	126,000 m <sup>2</sup>	2008
II: City Xinyu project (Phase I)	Jindu Group	Hangzhou	234,000 m <sup>2</sup>	2008
III: OCT Real estate project	OCT Properties	Shenzhen	5130 m <sup>2</sup>	2008
IV: Merchants Tiger Apartment	China Merchants Real estate	Shenzhen	42444.13 m <sup>2</sup>	2004

place and the insufficient legal enforcement. This was also echoed with another project manager of a real estate developer, who was interviewed by us, explaining that the project have encountered with many complex as well as technique difficulty when the project was conducted on site.

### CASE STUDY

In this section, the analysis is given on what barriers encountered when residential project is conducted in real practice. The data used for the analysis are collected from four cases. The cases for research are chosen from the award-winning real estate development projects in the green building rating system in China, which make the cases representative. The details of the four cases will be described in Table 3.

The interview discussions in each case lasted two hours, which includes the discussion with project managers who is responsible for the concerned projects. By engaging the discussions with the project team of the developers (e.g. project managers), a comparative analysis on different priority of barriers is carried out. Summarized from the discussions with various stakeholders in the residential project, major reasons for the barriers occurring are also examined on the basis.

The major barriers in the four cases were identified, which are presented and compared in Table 4. They are listed in order of frequency of citation by the stakeholders in the residential project. Followed by this finding, major reasons for barriers' occurrence are also identified. Each of the reasons is described, in turn, below. In the process of interview, though no relationship should be inferred between frequency and importance of the barrier in hindering green strategy. However, it is interesting to see which barriers appeared most regularly in stakeholders' interviews and written sources.

After the comparative analysis from Table 4, several investigation results are described as follows.

Similar finding has been echoed with Zhang *et al.* (2011) that the significant barriers exist in applying green strategies

in the whole real estate development processes, including plan and design, construction and operation & management stages [1]. The 'high green appliance design and energy-saving material costs' (BX<sub>1</sub>), 'lack of motivation from customers' demand' (BX<sub>8</sub>), and 'insufficient policy implementation efforts' (BX<sub>2</sub>) have been identified from the four case studies, which can be shown in Table 4. According to the discussions over the four cases, all the concerned projects encountered with the same barriers, BX<sub>1</sub> and BX<sub>8</sub>, which have been identified as the top two barriers in the questionnaire survey. This evidence that these two barriers are indeed serious barriers, which has been echoed with the project manager in Vanke City project (Case I). He mentioned that though he would spend more money to implement these elements, and these extra premium would be passed to end-users. Nevertheless, most of the end-users are not willing to pay this extra premium. The conflict of interests between developers and buyers brings about the barrier (BX<sub>1</sub>) to the application of green strategies in the real estate development process in China.

There are also many other barriers that have been encountered to different extent to apply green strategies in real practice. Different real estate companies will choose different green strategies to respond to the barriers encountered.

Nowadays, increasing number of businesses has demonstrated their contribution to green development practices through the adoption of various environmental management systems and waste management programs in both design and construction processes. For example, designers and builders have integrated environmental consideration into the design of facilities to conserve natural resources, reduce emissions and wastes and apply cleaner construction process. The users of construction products have also shown their efforts to contributing to sustainable construction mission by minimizing the adverse effects on water and air quality during the operation of construction products. The promotion of green development practice can help simulate the savings of the limited resources and protection of the environment.

**Table 4. The Barriers Encountered in the Cases**

	Plan & Design	Construction Barriers Encountered (Refer to Table 2)	Operation & Management
Case I:	BX <sub>1</sub> ; BX <sub>4</sub> ; BX <sub>5</sub> ; BX <sub>6</sub> ; BX <sub>7</sub> ; BX <sub>9</sub>	BX <sub>3</sub> ; BX <sub>5</sub> ; BX <sub>7</sub> ; BX <sub>8</sub> ; BX <sub>10</sub>	BX <sub>2</sub> ; BX <sub>4</sub> ; BX <sub>10</sub>
Case II:	BX <sub>1</sub> ; BX <sub>2</sub> ; BX <sub>6</sub> ; BX <sub>7</sub> ; BX <sub>10</sub>	BX <sub>3</sub> ; BX <sub>4</sub> ; BX <sub>5</sub> ; BX <sub>9</sub>	BX <sub>8</sub> ; BX <sub>6</sub>
Case III:	BX <sub>1</sub> ; BX <sub>6</sub> ; BX <sub>7</sub> ; BX <sub>10</sub>	BX <sub>4</sub> ; BX <sub>5</sub> ; BX <sub>9</sub>	BX <sub>8</sub> ; BX <sub>10</sub> ; BX <sub>2</sub>
Case IV:	BX <sub>1</sub> ; BX <sub>2</sub> ; BX <sub>6</sub> ; BX <sub>7</sub>	BX <sub>3</sub> ; BX <sub>4</sub> ; BX <sub>5</sub>	BX <sub>6</sub> ; BX <sub>8</sub> ; BX <sub>10</sub>

Nevertheless, although the business and environment for green practices has been well documented, the cases for integrating green features into residential housing development had not been clearly established until more recently. What is the reason behind these barriers? They are described and emphasized in the following section.

### **Higher Green Appliance Design and Energy-Saving Material Costs**

Financial cost is usually considered as the critical barriers for real estate developers who are hesitating whether to develop green real estate project or not. In most of the cases investigated above, though cost differentials had not been identified, developers assumed that developing green real estate would be more expensive. This is echoed with Williams and Dair [8], opined that the cost of proving environmentally green features and developments was significantly higher than for standard schemes. If the construction costs for green real estate do exist, what method can mitigate this conflict of interest? Who is willing to pay this extra cost? For example, in Case II, the real estate project manager argued that even if the developer is interested in and dedicated to building green, the developer may demand or expect that the buyer is willing to pay a premium to cover any potential increase in building costs.

As a matter of fact, cost benefits from implementing green development practices can also be obtained, and these major cost benefits include: cost savings through the more efficient use of energy and resources; increased occupant satisfaction from a productive indoor environment, thus better for promoting business; greater marketability and assurance of good management practice; and enhancement of business profile on environmental friendly performance. In particular, the application of environmental friendly materials or methods in the construction process can encourage the transfer of technology that brings about improved environmental performance and cost benefits. The cost benefits were also identified from Case I, the green technologies can help save as much as 5% of the total construction cost [15].

### **Lack of Motivation from Customers' Demand**

The lack of motivation from the customers' demand occurred frequently when the green market is still at initial stage. In this context, a culture of social responsibility among buyers is around the corner, though most of them still do not realize it. For example, according to the marketing managers in Case IV, opined that people generally felt that a house that was environmentally-friendly was not very meaningful, and therefore not worth any extra costs. This was also echoed with Williams and Dair [8], believed that most were not convinced there is widespread demand for such green buildings. Nevertheless, developers have started to play a significant role in building green and cultivate a sustainable building future. In China, the cases in this research indicate that real estate developers have started to realize the importance of cultivating the green brand reputation. For example, in Case II, by promoting the green residential design, the developer has attracted many high-income buyers at higher sales price [1]. This in turn can tell that high-income buyers are already be motivated by green properties.

### **Insufficient Policy Implementation Efforts**

Another challenge for the green property is the insufficient policy implementation efforts. This is not uncommon in the cases I, II and III, certain project managers were keen to introduce green elements, but had little power to do so because regulations and local policies allowed a less green option. It is generally understood that most of the approach taken by project managers on-site were risk averse, they were not willing to run the risk when there were not sufficient policy or regulations at hand. In this context, it is considered that the guidance and commitments from government can drive and motivate real estate developers to adopt green strategy. For example, by providing expedited permitting, mandate and grant policies, density and tax incentives, affordable housing bonuses, and public recognition, the developers can enjoy benefits and mitigate barriers where green properties are developed.

### **CONCLUSION**

There are various barriers encountered in developing real estate projects across project life cycle, including design, construction and operation of buildings. In this study, the top three critical barriers encountered in practice are highlighted, such as 'high green appliance design and energy-saving material costs', 'lack of motivation from customers' demand', and 'insufficient policy implementation efforts'. With the identification of these barriers, the reason for illustrating why the critical barriers happen is highlighted. Although critical barriers do exist, it is good news to learn that an increasing number of real estate developers in China have started to adopt green strategies in their business activities, such as the four cases applied in this study.

It is identified that a lot of barriers are related to lack of knowledge of green technologies, lack of green awareness and expertise. In this context, an improvement of skills in this sector is required. This suggests that there is a need for policy and regulations on green issues, which may be achieved by the initiatives promoted by government. A number of best practice guidelines are already available, for example, the Housing Forum's guide to improving sustainability in the housing and construction industry. Furthermore, there is another urgent need to stimulate demand for producing green materials in order to increase supplies and enable the developers to purchase green materials more easily. Further research is required to study the barriers identified in this research, and to identify effective strategies to overcome them. It is expected that the green built environment can be built with mitigating the barriers encountered in the process of green development practice.

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