

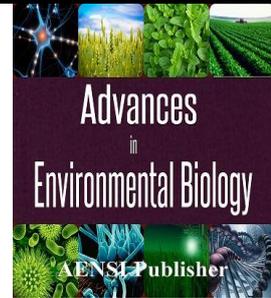


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Determining Critical Success Factors Related To External Factors in Low Carbon Construction: A Review

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ABSTRACT

Several energy related policies implemented since the year 1979 by Malaysia as an initial steps towards sustainable development. Furthermore, Malaysia also signed the Kyoto Protocol of United Nation to restrain the rapid increase of carbon dioxide emissions. However, not much had been done to determine the critical success factors of low carbon construction related to external factors in Malaysia which plays an important role in achieving success in sustainable development and low carbon related project. This studies attempts to review the literatures in relation to critical success factors of low carbon construction and external factors. Previous studies conducted by researchers had revealed that there are four groups of critical success factors related to external factors for low carbon construction which are green environmental requirement, flexible government policies, economic stability and political stability.

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INTRODUCTION

According to Chua and Oh [3], Malaysia started to involve in activities related to sustainable development in the country since the launched of several energy related policies beginning 1979. Besides energy related policies, Malaysia also joined the United Nation Framework on Climate Change in July 1994 and further ratified the Kyoto Protocol on 4 September 2002 [5] as part of improvement steps towards embracing sustainable development in Malaysia. Furthermore, Malaysia also started to explore intensively in sustainable and green development after the establishment of first green building tool named Green Building Index by the Green Building Index Sdn Bhd in the year 2009. Green Building Index Sdn Bhd started using green rating tool by giving certification to Malaysian Energy Centre as the first green building in Malaysia on 24 July 2009. Besides that, to enhance the development of sustainable development, the government also launched the Low Carbon Cities Framework and Assessment System in September 2011 which started the development of several low carbon cities in Malaysia such as Iskandar Development Region, Cyberjaya and Putrajaya.

The objective of this paper is to identify critical success factors related to external factors which will ensure the success of low carbon construction.

Sustainable Development in Malaysia:

According to Brosius [2], there are two main reasons for Malaysia to involve in sustainable development. The first was due to success achieved by Malaysia in economy sector where help to earned Malaysia the respect from developing countries as a leader of group 77. The second factor which drew Malaysia into sustainable development was due to allegation of world communities in Sarawak regarding wanton deforestation. Therefore, Malaysia involvement in sustainable development is necessary to show the concern of Malaysian government towards uplifting nature and environment in the country. As of 15 August 2014, there are total of 243 building certified as green buildings in Malaysia. Besides the launching of green rating tool, Malaysia also started to develop several low carbon cities such as Iskandar Development Region, Cyberjaya and Putrajaya which equipped with fundamental low carbon facilities such as better communication tools, modern airport, efficient public transport, efficient transshipment port, smart hospital, smart school and may more (Siong, 2006). Furthermore, these low carbon cities also contributed big amount of Gross Domestic Product where Iskandar

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Region Development contributed about USD20 billion in the year 2005 which estimated around 60% of total Gross Domestic Product of Johor.

Sustainable Development Globally:

Countries around the world started to contribute efforts towards sustainable development in their respective countries. In Asia, India has started creating low carbon cities such as Bhopal City to reduce emission of carbon dioxide into atmosphere. Bhopal City which has annual energy growth of 10% is committed to reduce 40% of greenhouse gases by the year 2035 [15]. China also has taken proper steps towards sustainable development where established several low carbon pilot projects such as in Tianjin, Chongqing, Shenzhen, Xiamen, Hangzhou, and Shanghai and own green rating tool named Three Star Rating in the year 2011. While, Australia also joined the race in sustainable development by pledging 20% of national energy on renewable energy source by the year 2020, establishment of green rating tool and enforcement of companies to buy carbon tax by launching the Australian Carbon Tax [13]. While, United Kingdom which is one of the leading nation involved in sustainable development has taken sufficient corrective action towards sustainable development by pledging to reduce carbon emission to 26% by year 2020, establishment of BREEAM assessment system for green buildings (Innovation and Growth Team from UK Construction Industry,2010) and implementation of several environmental preservation related acts such as Climate Change Act 2008 to reduce emission of carbon dioxide into atmosphere.

Factor Related to External Factors:

Factors related to external factors referring to critical success factors based on external factors in a project which will influence the success of low carbon construction.

There are total of 4 numbers of critical success factors identified by authors grouped into factors related to external factors which are;

(i) Green Environmental Requirement

Conventional project are less challenging than low carbon and green construction due to high green environmental requirement by regulators and authorities [9]. Pierce [8] said that issues related to preservation of nature and environment may cause problems and concern for the engineers during construction process. Pierce also commented that aesthetics issues driven by regulation by preservation could create problems to engineers. Therefore, initial planning of fulfilment of green environmental requirement by person in-charge is essential to move towards achievement success in low carbon projects.

(ii) Flexible Government Policies:

Hwang and Tan [6] elaborated that government policies plays important role in ensuring success of low carbon construction where loosen policies and regulation of environment during low carbon or green construction. As summary, existence of flexible government policies will ensure the process of low carbon construction without delay, termination and fines towards success.

(iii) Economic Stability:

Iyer and Jha [12] had mentioned that economic stability in a country may steer low carbon construction projects towards great achievements. Puvanasvaran et. Al [10] supplemented that innovation of green technology for sustainable development may only achieved by strengthening the nation's economy to fund the research and development activities. As overall conclusion, there is a strong tie between economic stability and sustainable development activities towards success in low carbon construction.

(iv) Political Stability:

According to Aisen and Veiga [1] political instability may affect the economic performance of a country and lower the GDP growth. Therefore, country with political instability may need to cope with financial difficulties and not able to sustain research and development of green construction to achieve success.

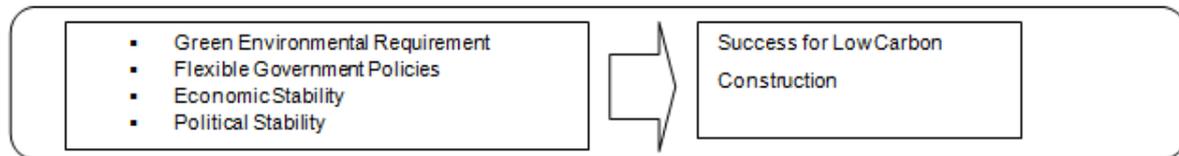
Discussion and Recommendations:

Low carbon and sustainable development started to gain popularity among construction developers in Malaysia and across the developed countries. Identification of critical success factors related to external factors in low carbon construction is vital and becomes one of the most important and less explored elements to ensure great success to green construction.

Figures 1 illustrates theoretical relationship the list of critical success factors and success of low carbon construction. After the literature review have been examined, identified, selected and synthesized. The factors are represented by these variables: (1) green environmental requirement, (2) flexible government policies (3) economic stability (4) political stability.

Table 1: List of critical success factors in low carbon construction related to external factors from previous literature.

List of Critical Success Factors	Pierce [8]	Iyer and Jha [12]	Pulaski et. al [9]	Aisen and Veiga [1]	Hwang and Tan [6]	Puvanasvaran et. al[10]
Green Environmental Requirement	✓		✓			
Flexible Government Policies					✓	
Economic Stability		✓				✓
Political Stability				✓		

**Fig. 1:** Group of critical success factors related to external factors influencing success for low carbon construction.**Conclusion:**

The Government of Malaysia has taken good and encouraging steps in sustainable development in across the country by establishment of environmental policies, green rating tools and development of low carbon cities to improve the condition of the country as par as other leading nation such as United Kingdom, Australia, China and India. Therefore this study may supplement the effort in sustainable development by identification of critical success factors related to external factors in term of regulation and policies which may motivate and help the developers to build and achieving success in low carbon and green building with less hurdles and obstacles.

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