

A CONCEPTUAL FRAMEWORK OF PUSH FACTORS FOR IMPLEMENTING ENVIRONMENTALLY SUSTAINABLE CONSTRUCTION PRACTICES

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Abstract

Sustainability has become a worldwide cliché as a potential solution for the numerous global problems facing the world recently. The lack of environmental deliberations in the utilization, development and effective management of natural resource lead to the pollution of the environment. However, sustainable construction is becoming increasingly more prevalent as the construction industry continues to intensify its awareness of the necessity to employ sustainable construction practices and their successive benefits. In order to enhance sustainable construction practices, it is prudent to critically consider the push factors that create the desire to implement these practices. This paper sought to identify the push factors for implementing environmentally sustainable construction practices. Comprehensive coverage of these push factors are systematically reviewed through literature with the aim of identifying the drivers for sustainable construction practices. Using the 'Resilience Theory', a conceptual framework is developed to help achieve environmentally sustainable construction. The outcome of this paper will present a basis for practitioners as well as researchers to appreciate the need for environmental sustainability within the construction industry.

Keywords: Construction Industry, Environmental Sustainability, Push Factors, Resilience Theory, Sustainable Construction

Introduction

Sustainable construction does not only provide remarkable cost savings through reduced energy usage but also presents a wider range of benefits through decreased employee turnover, less sick leave, better self-confidence and increased productivity (Blundell, 2010). Baird (1996) highlighted that sustainable projects can improve lives, societies, and culture. This notwithstanding, the construction industries of most developed as well as developing countries have taken momentous pace with its involvement in realizing improved environmental performance. This is highly driven by growing orientation of the government policies towards Environmentally Sustainable Development (ESD).

The United Nations World Commission on Environment and Development (WCED) (1987) indicated that sustainable construction involves construction activities that meet the present-day demands without negotiating on the ability of meeting the demands of generations yet to come. Department of Energy, DOE, (2009) further indicated that these sustainable construction projects designed considering sustainable issues cater for concerns relating to interior environmental excellence and satisfaction of users, productivity and health benefits which are identified as sustainable great performance construction projects. Furthermore, sustainable construction presents an improvement in project complexity compared to the traditional project delivery systems that are normally practiced. To achieve construction

projects that can meet the needs of contemporary times as well as generations yet unborn, it is prudent to discover the factors that drive the implementation of these sustainable practices. Lockwood (2006) and Nalewaik and Venters (2009) suggested a number of motives to invest in sustainability and environmental issues in construction projects. Hoffman (2000) also highlighted that these motives can differ from the ones for sustainability action in firms as well as projects in general. Nevertheless, the drivers often demonstrate the forces that push firms towards implementing sustainability into the construction projects and goals are the results that firms wish to advance from adding sustainability issues into the projects. Eventually, meaningful together with well-designed motives make it easier for a firm to achieve the desired benefits.

The aim of this paper is to present a comprehensive literature review that attempts to identify the drivers for implementing sustainable construction practices.

Literature Review

Sustainability in the Construction Industry

Sustainability approach in the construction industry has inspired many researchers to come up with various definitions and measures to help sustain the construction industry. The first definition of sustainable construction was proposed by Charles Kibert during the First International Conference on Sustainable Construction in Tampa, 1994. Bourdeau (1999) defined sustainable construction as the creation and responsible management of a healthy built environment based on resource efficiency and ecological principles. The Sustainability Journal from the Swedish Research Council Formas (2008) explained that the increasing need for rapid readjustments, renewal, innovation, adaptation to climate changes and restructuring demands a creative, effective, and sensitive construction sector. As a result, the concept of sustainable construction emerged. Nurni (2007) identified sustainable construction as a way forward to improve the performance of the construction industry making it more sustainable.

The concept of sustainable construction has sparked numerous debates in academic circles with differing interpretations as well as strategies for its achievement. According to Hill and Bowen (1997), the term was proposed to describe the responsibility of the construction sector in attaining sustainability. Agenda 21 for Sustainable Construction in Developing Countries (SCDC) defined sustainable construction as a complete process that aims to restore and maintain harmony between the natural and built environments and create settlements that affirm human dignity and encourage economic equity (Du Plessis et al., 2002). Kemp et al. (2005) stated that sustainability is best viewed as a socially instituted process of adaptive change in which innovation is a necessary element. Maddi (2003) explained that there is no doubt that construction is a key activity within any economy; it influences, and is influenced by, the nation's gross domestic product (GDP). Parkin (2000) and Chaharbaghi and Willis (1999) also defined sustainable construction as a construction process which incorporates the basic themes of sustainable development. Such construction processes would therefore bring environmental responsibility, social awareness, and economic profitability objectives to the fore in the built environment and facilities for the wider community (Langston and Ding, 2001; Raynsford, 2000; Chen and Chambers, 1999; Miyatake, 1996). Furthermore, Ehrenfeld (2008) defined sustainability as a continuous improvement process that involves managing processes in a way that the environment will continue to support future activities as it presently does. The adoption of sustainable approaches to construction activities means rethinking and restructuring the preconstruction, construction and post construction processes in a way that will improve the economy, protect the environment and improve social responsibility (Carter and Rogers, 2008; Klotz et al., 2007; Shelbourn et al., 2006) through improved environmental quality, energy efficiency and improved health and safety (Lapriski et al., 2006).

Environmental Sustainability

Studies have revealed that early human generations recognized the need to carefully use natural resources and that everything on this planet is equally dependent. Unfortunately, with the revolution of science and technology this philosophy changed to an unsustainable approach to exploit nature as efficiently as possible and to take for granted that nature's services will always be there. Ngowi (2000) posits that with these changes, the way in which buildings were constructed became more unsustainable. However, in the early 1900s, garden cities started to appear all over the world. A key actor in the garden city movement was Sir Ebenezer Howard from the United Kingdom. Howard's study was adapted across the world and as a result, garden cities started to advance in several countries. Howard (1902) explained that the initial idea of garden cities was to ensure self-sufficiency, well-planned communities with balanced areas of nature, housing, industry, and agriculture. In the past decades, sustainable construction practices have evolved remarkably and sustainable construction as a concept has become much more general and comprehensive.

Lockwood (2006) highlighted that several people now acknowledge the relations between economic, environmental and social aspects and also between nature and construction practices. Bourdeau (1999) reported that the first International Conference on Sustainable Construction was held in Tampa, Florida in 1994 and the proceedings of the conference established a definition for sustainable construction as the creation and responsible maintenance of a healthy built environment based on resource efficient and ecological philosophies. However, definitions of sustainable construction still remain ambiguous. International influences such as different legislation and regulations have impacts on both of the concepts. A sustainable building should have as little effect on nature as possible during its total life span (Treloar et al., 1999). The production should use the minimum possible amount of material and energy and the total effect on the environment should be measured during all the phases of the building's construction, lifetime

and demolition (ibid.). The concepts of energy efficient buildings and low energy buildings are often used as synonyms. Energy efficiency in housing is defined by calculating the used amount of energy (in kWh) per year. Nevertheless, the limits of the allowed amounts vary between countries. The concept of passive houses was originally developed in Germany and refers to the heating system, which is based on existing energy inside the house which refers to energy that people and electronic devices produce. Wu et al. (2004) indicated that this works by minimizing leakage of heat and having good ventilation so that the internal energy can be reused. Wu et al. (2004) further indicated that passive houses are among the most energy efficient houses on the market.

Theoretical Framework

Creswell (2009) and Maxwell (2004) defined theoretical framework as the set of assumptions, philosophies, conceptions as well as models that form the basis to the themes recognized in a study which builds up the relationships that exist between them. Cabezas and Fath (2002) indicated that there is the need to underpin studies that relate to sustainability in the construction industry. This was affirmed by Sarkis et al. (2011) in a study that relates to sustainable practices in terms of green supply chain management. It was discovered that the utilization of theories to enhance research works in sustainability had seen marginal assessments. In the sustainable construction, there is therefore the need to utilize theories so as to ensure an advanced study. The resilience theory is therefore adopted to facilitate the proposal of a framework for environmentally sustainable construction. Van Breda (2001) highlighted that although resilience theory is a multidisciplinary theory, it was initially utilized in studies that relate to ecological disciplines.

The concept of resilience has developed into a multidisciplinary concept which could be applied in political, ecological and sociological research works (Hollings, 1973). Folke et al. (2002) pinpointed that sustainable development studies' awareness of the

resilience theory has existed for more than twenty years. Resilience theory addresses issues that relate to communities, families, individuals as well as working environments and their policies (VanBreda, 2001). VanBreda (2001) further indicated that individual resilience relates to the skills, abilities, knowledge as well as insights that accumulate over time as people struggle to tackle adversity together with subduing challenges. The resilience theory is therefore deemed relevant to this study since it requires that consultants possess the skills, abilities, knowledge as well as insights that will help provide sustainability of the built environment. Notwithstanding the external and internal pressures battling against improved sustainability practices, the construction industry should be able to possess resilience so as to adapt its practices to the changing practices which come with the introduction of contemporary environmentally sustainable construction technologies.

Conceptual Model

This paper centers on the frameworks proposed by Du Plessis (2007) and Hill and Bowen (1997) which emphasize on the relationships between drivers, enablers and stakeholders, and captures a broad strategy for wholesome adoption of sustainability with the latter emphasizing on how sustainable construction can be achieved by critically summarizing the need to set up a sustainability policy which sets the desired level of environmental performance. The concept of sustainable development gave rise to sustainable construction which involves the creation and healthy management of a healthy environment that depends on ecological principles and efficient utilization of resources (Kibert, 1994). This paper emphasizes on the environmental dimension of sustainable construction which forms the basis for harnessing sustainable development goals (Ofori, 1998). However, the proposed research framework postulates that drivers as well as principles of sustainable construction create the desire to implement the strategies that lead to sustainability in the construction industry. The proposed research framework is illustrated below:

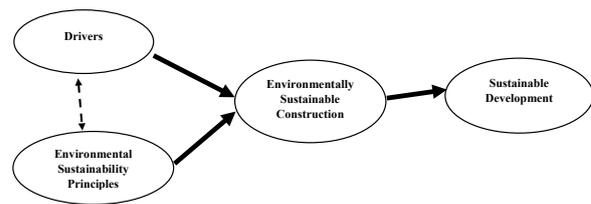


Figure 1. Conceptual Model for Environmentally Sustainable Construction

By this model the desire to ensure environmentally sustainable construction which rests on the pillars of sustainable development can be achieved.

Research Methodology

The review of literature began by delving into primary and secondary sources. The primary literature source was basically dissertations/theses whilst the secondary source comprised of journals, books as well as internet sources. These sources were deemed relevant to the study because they published reliable research findings which relate to the sustainability of the environment. The review of literature was scrutinized giving rise to the development of a literature file. The main push factors for the implementation of environmentally sustainable construction practices which were identified in this study included current business demands, statutory requirements, cost savings, competitive advantage, management of risk, brand building and rising energy costs. These push factors were selected based on previous literature on the drivers for implementing environmentally sustainable construction practices. Precisely, the studies conducted by Miller et al. (2008), Horman et al. (2005), Nalewaik and Venters (2009), Vithessonthi (2009) and Zainul et al. (2013) were utilized for this paper. The compilation of literature was succeeded by critical review of articles with the aim of identifying the push factors for implementing sustainable construction practices in the construction industry.

Findings and Discussion

Review of Push Factors for Sustainable Practices

Current Business Demands

The current business demands on businesses as well as organizations force them to act in a more responsible way. Limits of the natural world, climate change together with rising energy prices are among the most important factors that force firms to change their ways of doing contemporary business. Vithessonthi (2009) opined that the growing number of stakeholders concerned about the environment and social issues as well as the market and competitive forces put pressure on firms. In considering the issue in a broader scope, even mega-trends, such as the ongoing globalization and the rising economic and political insecurity, force companies to act more responsibly and become more transparent and accountable. These contemporary demands work as underlying factors in all the industries which include the construction industry. Horman et al. (2005) highlighted that sustainable building designs boost firm's image as well as support the firm's environmental policies.

Statutory Requirements

Stricter environmental regulation can create more competitive dealings, that is regulations can force corporations to employ the environment as a competitive opportunity. Well-designed regulation can lead to greater innovation, reduce uncertainty and raise corporate awareness on sustainability. Most countries have enacted laws to get companies to contribute to sustainable developments. Boverket (2009) reported that Sweden has its own laws and directives concerning energy efficiency, the aim of which is mainly to conform to the EU directives regarding a more efficient energy use. The regulations that have the most impact on the Swedish construction business are the ones set by an authority called Boverket. Boverket (2009) highlighted that Boverket is responsible for

developing design as well as building regulations and other regulative measures for construction. Furthermore, governments of the various countries have major influence over the development of the construction industry in order to make it more sustainable (Zainul et al., 2013). Majdalani et al. (2006) indicated that government's regulations result in behavioural shift in most construction activities since government is the main customer as well as regulator of the industry.

Cost Savings

Available literature suggests that thinking sustainable from the early start of a project is less costly than latter changes as well as the adding of green features (Nalewaik and Venters, 2009). Previous projects also show that it is possible to construct energy efficient on a standard budget (ibid, p. 33) but in order to avoid unnecessary deviations from the budget, good planning together with well as defined cost-benefit analysis are of great importance. Lockwood (2006) stated that even though investments in green material, e.g. energy saving lightening systems, have a higher initiative cost, the use of them usually results in a larger return on investment. Savings can also take place through reduction in utilities as well as maintenance spending (ibid). In addition, the right use of material and chosen design can improve the service life and use less equipment replacement. An example of this is efficient waste together with pollution handling that reduces the ongoing management of waste and disposal (Nalewaik and Venters, 2009). Furthermore, there is a great chance that the supply of "green" building material will become cheaper with time when more companies engage in energy efficient building practices, which augments the cost saving possibilities (Lockwood, 2006).

Competitive Advantage

Porter and van der Linde (1995) argue that there are

two main types of competitive advantages; either having lower costs than competitors or to be able to charge higher prices due to differentiated products. Many savings on costs by energy efficiency, source reduction as well as pollution prevention can be made, but in order to create a competitive advantage by using environmentally friendly building practices, companies need to focus on efforts beyond mandatory compliance. One way of propagating this is to consider the whole life-cycle process of a building and include the opportunity cost of the building's environmental impact. By calculating and communicating a building's real value to customers, the company can achieve a differentiated competitive advantage (Ngowi, 2000). Hart (1995) has pointed out that a natural-resource-based view on the firm could lead to several possibilities for a sustainable competitive advantage. Furthermore, the study argued that firms should engage in three different innovative environmental strategies: pollution prevention, product stewardship, and sustainable development. The basis for gaining a competitive advantage through these strategies lies in waste minimization, green product design, green technology and other merging capabilities.

Management of Risk

The concept of risk management refers to a framework of established procedures that systematically manage the uncertainties of firms' operations (Hoffman, 2000). The aim is to lower or eliminate damage to the environment caused by the organization. The first step to accurately ensuring that environmental risk management is effective within the organization is to identify the most critical resources of the firm. The firm must then identify any changes related to environmental risk management that may be a threat to its sustained existence. This kind of proactive environmental management can prevent both the short-term and long-term costs of accidents and environmental damage. Furthermore, proactive measures and effective plans can over the long-term minimize costs occurring from regulatory

penalties as well as other legal procedures and also reduce cleanup costs. Product accountability costs can be reduced by early concern on the product design stage, this can also reduce unpleasant effects resulting from waste and disposal risks. Another aspect of risk management is reduced insurance premiums; by limiting environmental risk lower corporate insurance costs can be achieved (Hoffman and Glancy, 2007; Hoffman, 2000).

Brand Building

A good reputation needs twenty years to build and five minutes to ruin it, if you think about that you will do things differently. Considering this famous statement made by the investment legend Warren Buffet, a company should be careful when managing issues that can harm a business' reputation within a blink of an eye (Kuisma, 2009). A company can, by going beyond legal compliance, be better prepared to handle unpredictable forces in the market and become more attractive to its customers. Requirements from the society are constantly changing and in order to avoid boycotts, companies need to be alert to these changes. This kind of proactive risk management will not only keep the CEO out of jail but also stimulate the brand building (Esty and Winston, 2006).

Rising Energy Costs

Smith and Baird (2007) identified that rising energy costs is one of the primary drivers for sustainable construction in most developing countries. Although the Green Building Council of Australia (2008) highlighted that tenants have become less focused on savings in operating costs, and are placing a higher value on the intangible benefits, such as productivity, staff attraction as well as retention, and reduced sick leave and absenteeism. Miller et al. (2008) estimate the productivity benefits from environmentally sustainable construction designs to be as much as 10 times the energy savings from

green efforts. Hydes and Creech (2000) highlighted that sustainable building costs are normally lower than conventional buildings as well as saving energy.

Conclusion

Environmental sustainability has received remarkable attention as well as deliberations with the construction sector in contemporary times. This study has presented a critical review of the push factors of environmentally sustainable construction practices with the aim of identifying the drivers for implementing sustainable construction practices in the construction industry. This study has identified the push factors to ensure sustainability of the environment so as to ensure a cordial relationship between construction projects and their environments. The identified drivers for environmentally sustainable construction practices should enable practitioners (consultants) to appreciate the need to ensure the sustainability of the environment. The sustained utilization of these push factors will aid practitioners to harness the benefits of ensuring environmental sustainability within the construction industry.

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