

THE NEED FOR SUSTAINABILITY IN THE PLANNING AND CONTROL STAGES OF CONSTRUCTION PROJECTS IN NIGERIA

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Abstract

The environmental impacts resulting from fast growing construction activities in the construction industry demands an urgent emphasis on the need for sustainability in construction practices. The study was aimed at emphasizing on the need for sustainability at the planning and control stages of construction projects in Nigeria, by a review of relevant literatures. An appraisal was carried out on the roles of the project managers and the development of a sustainable construction planning system (SCPS) to help solve sustainability issues in Nigeria. It was seen that to meet up the needs of sustainability in Nigeria's construction projects, the project managers have a crucial role to play since they are involved in the planning and control stages of a project. The challenges of sustainability were analyzed and the respective duties of the project managers were highlighted. It was also seen that the SCPS can be integrated in Nigeria's construction industry even as it gives essential information or report on how to carry out sustainable construction, ensuring quality in both operational and economic terms of a project from planning to control stages. It was recommended that project managers be enlightened or made aware of their crucial roles in ensuring sustainability; training programs should be organised to educate professionals on the use of the SCPS, and it should be inculcated into the curriculum of higher institutions studying environment studies.

Keywords: Sustainability, Sustainable Buildings, Project Planning and Control, Nigerian Construction Industry and Construction Projects.

INTRODUCTION

The issue of sustainability has become relevant in recent times that companies have also given priority to its performance for stakeholders, instead of just focusing on the economic performance for shareholders. (Silvius and Schipper, 2014). The same author also noted that, "the recent world crises may even imply, that a strategy focused solely on shareholder value, is not viable". With respect to the certain but discomfoting truth of Algore, a change of mindset is needed since awareness has begun to grow, both on an individual or corporate perspective. "The most important leadership challenge facing business today is the integration of sustainability into core business functions" (BSR/GlobeScan, 2012). The Need for Sustainability In The Planning And Control Stages Of Construction Projects In Nigeria.

The Project Management Institute asserted that the attitude of companies, where they could simply allow sustainability as little more than a "touchy-feely" tactic with little-to-no return on investment (ROI), must come to an end. The aspect of project management will not be left out on the recent global focus that ensures the integration of sustainability in every business side. Since reduced costs, better efficiencies, improved customer and stakeholder satisfaction, and greater competitive advantage are the economic benefits of a well-organized project management process, well-groomed organizations have taken advantage of them. When the sustainability practice is fully implemented, the environmental, social and financial benefits to the business will be enhanced by the companies.

The Building Construction industry greatly affects the environment in all ramifications (Cho et al, 2010). The sources of pollution as noted by Irizarry et al (2012) resulting from construction processes are harmful gases, noise, dust, solid and liquid wastes (Tah and Abanda, 2011). This environmental concern has made construction professionals to strategically adopt the environmental management system, to checkmate the impacts of construction activities (Shen et al, 2010). Zainul (2010) explained that construction experts need

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the awareness of sustainable construction practices as it will help to curtail these impacts on the environment, since the movement for sustainability in the construction industry can majorly be fostered by awareness and knowledge. “The growth of construction and its environmental impacts emphasize the importance of the need for sustainable construction processes and actual ways to manage sustainability measures for sustainable construction. It is very important to predict what the environmental impact of construction is and how it can be prevented before starting an activity” (Irizarry et al, 2012). Delnavaz (2012) noted that participants in the construction industry have gradually started re-evaluating the recent construction of buildings and have concentrated on sustainable construction as the way out of the rising issues. Indeed, this development in the industry during the construction of buildings will not be complete without looking at the various stages of a project.

Sustainable construction cannot be confined only to the state of a project in which ‘building’ actually occurs because many of the actions with the greatest economic, social or environmental implications are a direct result of decisions made earlier in the life of the project - planning stage. The document of the Rio earth summit emphasized that for construction to be truly sustainable, every stage in a construction project must be sustainable – from the choice of a structural option to meet a perceived need, to the location and siting of the structure, the design, selection and specification of materials, site preparations, construction practices, and handling of wastes.

The imperativeness of this study is based on the fact that the issue of sustainability for improved project delivery in the Nigerian construction industry is not given much attention especially at the decision-making stage of projects. It could also be seen that project managers have little or no understanding of what to do in order to incorporate sustainability into their projects. Hence, this paper is aimed at emphasizing on the need for sustainability at the planning and control stages of construction projects in Nigeria, by a review of relevant literatures. An appraisal on the role of project managers, and the development and implementation of tools like checklists, models, software and other programming systems, to solve sustainability problems at these stages of projects will be carried out so that the Nigerian construction firms can inculcate them into their various projects.

THE CONCEPT OF SUSTAINABILITY

In 2010, the International Institute for Sustainable Development gave definitions on the sustainable management of organisations: “Adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources that will be needed in the future”. The studies published in recent years (Gareis et al, 2013; Maltzman and Shirley, 2010; Silvius et al, 2012; Turner, 2010; Silvius et al, 2010) offer explanations on concepts of sustainability with regards to projects and project management (Silvius and Schipper, 2014). They are as follows:

“Sustainability in projects and project management is about integrating economical, environmental and social aspects in the management and delivery of projects.

This insight corresponds with the triple bottom line element of sustainability. Integrating sustainability in project management requires the inclusion of ‘people’ and ‘planet’ performance indicators in the management systems, formats and governance of projects (Silvius et al, 2010). In the current project management methodologies, the management of projects is dominated by the ‘triple-constraint’ variables – time, cost and quality (Olawale, 2014). And although the success of projects is most often defined in a more holistic, perspective, this broader set of criteria doesn’t reflect in the way projects are managed. The triple-constraint clearly put emphasis on the profit ‘P’. The social and environmental aspects may be included as aspects of the quality of the result, but they are bound to get less attention.

Sustainability is about both short term and long term orientation.

This has to do with companies coming to a point of realization that the consideration of the long term consequences of their practices will make them more sustainable, instead of just concentrating on short term implications.

Sustainability is about local and global orientation.

The increasing globalization of economies affects the geographical area that organizations influence. The behaviour and actions of organizations therefore have

an effect on economical, social and environmental aspects both locally and globally.

Sustainability is about consuming income, not capital.

Sustainability implies that the natural capital remains intact. This means that the extraction of renewable resources should not exceed the rate at which they are renewed, and the absorptive capacity of the environment to assimilate waste, should not be exceeded.

Sustainability is about transparency and accountability.

The principle of transparency implies that an organization is open about its policies, decisions and actions, including the environmental and social effects of those actions and policies, to stakeholders that could be interested in or affected by these actions. The principle of accountability implies that an organisation accepts responsibility for its policies, decisions and actions, and is willing to be held accountable for these.

Sustainability is also about personal values and ethics.

Sustainable development is inevitably a normative concept, reflecting values and ethical considerations of the society. Part of the change needed for a more sustainable development, will therefore also be the implicit or explicit set of values that project management professionals, business leaders or consumers have and that influence or lead their behavior” (Silvius et al, 2014).

SUSTAINABLE BUILDINGS

Delnavaz (2012) asserted that terms like high performance, green and sustainable construction can be used interchangeably and their definitions as it relates to sustainable development, has become similar as they evolved with time. Kubba (2010) asserted that the term “green building” is recognized in this context and it is a recent development in the construction industry, therefore there is need to obtain a proper definition as it will help to have a clear understanding of its developing process (Delnavaz, 2012).

“The U.S. Environmental Protection Agency (2010) defines the green building as:

The practice of creating structures and using processes that is environmentally responsible and resource-efficient throughout a building’s life-cycle from siting

to design, construction, operation, maintenance, renovation and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability and comfort. Green building is also known as a sustainable or high performance building” (Delnavaz, 2012).

A more expressed definition was given by Robichaud et al (2011) as a winding up of other definitions of green building as “A philosophy and associated project and construction management practices that seek to:

- Minimize or eliminate impacts on the environment, natural resources and non-renewable energy sources to promote the sustainability of the built environment;
- Enhance the health, well being and productivity of occupants and whole communities;
- Apply life cycle approaches to community planning and development” (Delnavaz, 2012).

THE ROLE OF THE PROJECT MANAGER IN SUSTAINABILITY

After a proper review of relevant literatures to tackle the issue of sustainability at the planning and control stages of construction projects in Nigeria, it has been seen that the project manager’s role needs to be appraised with emphasis on an effective project management package for them and raising the point of challenges to the project manager in solving the need for sustainability.

Delnavaz (2012) noted that since project managers are generally liable for the actualization of the objectives of construction management, they have effective roles in developing a sustainable building process. Wu et al (2010) suggested an effectualpackage for sustainability in project management, of which the project manager has a crucial role to play in its implementation. The package contains:

- Project management process in the project life cycle to accomplish sustainable construction.
- Delivery of relevant goals to different project parties without missing the sustainability concept at key points in the process.
- Construction management practice during the construction phase to reach the green goals.
- Feedback and documentation of the project life cycle for continuous improvement.

The different phases of a project are being controlled by a project manager, hence there is need to analyze the challenges experienced in each stage of a green (sustainable) project as they would aid in exploring the roles and tasks of the project manager. “Although some of these challenges may also be important to consider in the conventional construction, they turn to a challenge in the sustainable construction because of its long term objectives that makes the benefits of sustainable buildings intangible” (Delnavaz, 2012). As

the challenges to sustainability is being looked at, Delnavaz (2012) simultaneously highlighted the project managers’ responsibilities in order to expose their important roles, in solving the need for sustainability at the planning and control stages of construction projects. The tables below give the summary of the challenges to sustainability and the duties of the project manager:

Table 1: The challenges for sustainable building design process, the specificity of sustainable construction and the project managers’ role for each challenge

Challenges in Sustainable building design	Specificity of the Sustainable Building	Project Manager’s Role
Setting clear goals	Additional considerations like environmental goals and the amount of capital investments toward green initiatives.	Setting sustainable priorities and goals early in feasibility study.
Client Understanding	Long term goals and intangible benefits for clients.	Providing information regarding sustainable building benefits and value added.
End user understanding	Necessity of raising end user’s demand that lead to raising clients’ willingness to change their priorities.	Establishing basic communication procedures by providing useful, objective and reliable information for end users.
Evaluation methods and tools	Different requirements due to the additional objectives that should be monitored and maintained.	Being acquainted with measurable targets and their evaluation tools.
Timing	Importance of considering the right design options in project feasibility to fulfil sustainable building potential.	Conducting charette to establish basic communication among key stakeholders.
Communication and Coordination	Complexity of the green projects that require more interdisciplinary works.	Stimulating collaboration and communication among actors.
		Conducting planning and strategy meetings.
		Being a role model among key stakeholders.
Steering Mechanisms	Importance of innovation and proper	Adjustable role between innovation and

	regulation for developing the sustainable construction	regulation.
	Difficulty of defining performance in the sustainable construction.	Providing in-time and efficient information regarding different regulations
Economics	Higher investment cost and higher risk of unforeseen cost	Providing opportunities for regulatory bodies to participate in the charette.
		Providing a conceptual cost estimate for review by the owner in the charette process.
		Developing strategies for formulating an initial budget and schedule in the presence of an integrated group
Price-focused procurement	More considerations of environmental impacts	Organizing evaluation process for performance based tendering and procurement.
	Difficulty of defining measurable requirement	

(Source: Delnavaz, 2012).

Table 2: The Challenges for Sustainable Construction process, the Specificity of Sustainable building and the project managers’ role for each challenge

Challenges in Sustainable Construction	Specificity of the Sustainable Building	Project Manager’s Role
Environmental Impact	Environmental considerations in sustainable construction as one of the bottom-line considerations	Implementing environmental management system.
	Inadequate impact of construction activities during the construction phase.	Considering potential cost saving regarding reducing waste and implementing waste management system
		Considering energy efficiency in work places.
		Implementing 3Rs (Reuse, Renew and Recycle) during construction phase.
Cost saving	Managing a green project with tighter budget and tighter profit margin due to the high cost perceptions of green buildings.	Controlling risks to prevent the increase of related cost.
		Careful choice of building methods.
Health and Safety	Social considerations in sustainable	Implementing Health and safety

<p>Physical resources</p>	<p>construction as one of the bottom-line considerations</p> <p>Consequently the importance of health and safety for workers.</p> <p>Undeveloped market for green building products due to the youth of the green building industry</p>	<p>Management systems</p> <p>Control the supply chain by negotiations concerning delivery times, checking of factory quality and the conformance with the specification upon delivery and site installation.</p>
		<p>Regular meetings for educating green building practices and objectives for all site work forces.</p>
<p>Training and Education</p>	<p>Sustainable construction as a new approach in construction industry.</p>	<p>Training and education sessions for subcontractors' improvement.</p>

(Source: Delnavaz, 2012).

THE INTEGRATION OF THE SUSTAINABLE-CONSTRUCTION PLANNING SYSTEM (SCPS) IN THE NIGERIAN CONSTRUCTION INDUSTRY

It was seen that one of the ways to satisfy the need for sustainability in construction projects in Nigeria, is to appraise the SCPS and encourage its incorporation into the Nigerian construction industry by its professionals. Prior to the development of the SCPS by Irizarry et al (2012), the same author noted that studies have highlighted other tools for sustainable construction. The author explained that the Building Information Modelling (BIM) was used in sustainable design and Leadership in Energy and Environmental Design (LEED) rating systems to exhibit methods in which the BIM may be used by designers and planners to achieve sustainability leading to LEED certification (Azhar et al, 2011). Geyer (2012) developed Parametric Systems Modelling (PSM) which serves as a system for parametric geometric CAD/BIM modeling in which the German Sustainable Building Council (DGNB) is being referenced. Wu & Issa (2010) examined the practicability of Virtual Design and Construction (VDC)/BIM to control LEED projects. Baniyas et al (2011) constructed a web-based decision support system named DeconRCM, to boost the users' familiarity on sustainable construction and demolition waste management. Similarly, the use of the semantic web techniques was looked into to stand for sustainable building technologies, and suggest

proper measures in making various decisions for circumstances (Tah and Abanda, 2011).

The SCPS was developed by incorporating construction schedules in Microsoft Project (MS Project) with different databases as it relates to sustainable construction. The SCPS automatically supplies the necessary information required to perform sustainable construction, and for the best of a project, efficiently and economically. The building materials was not a consideration in the development since various materials are being employed in construction. A simplified algorithm was proposed to develop the SCPS. The algorithm consists of environmental impacts and sustainable strategies, which are doled out to respective conventional construction activities. The classification of the impacts based on their risk levels follows, and afterwards, the comparison of the activities will be done and ranked with respect to their risk levels in the environment.

The Visual Basic for Application was used to implement the algorithm that was used to design and build the SCPS. The software used for the database is the Microsoft Excel while the one used for supplying schedule data is the MS Project. Dave et al (2010) noted that the MS Project can be used for project planning. The System is installed conveniently on a Microsoft Windows-based system and made to run in MS Project. SCPS is made up of three main phases: the first, inputs; the next, procedure; and the last, output.

The input contains four databases: Environmental Risk Assessment, Construction Activities, Environmental

Impacts and Sustainability Strategies. Below is a Schematic Model of the SCPS.

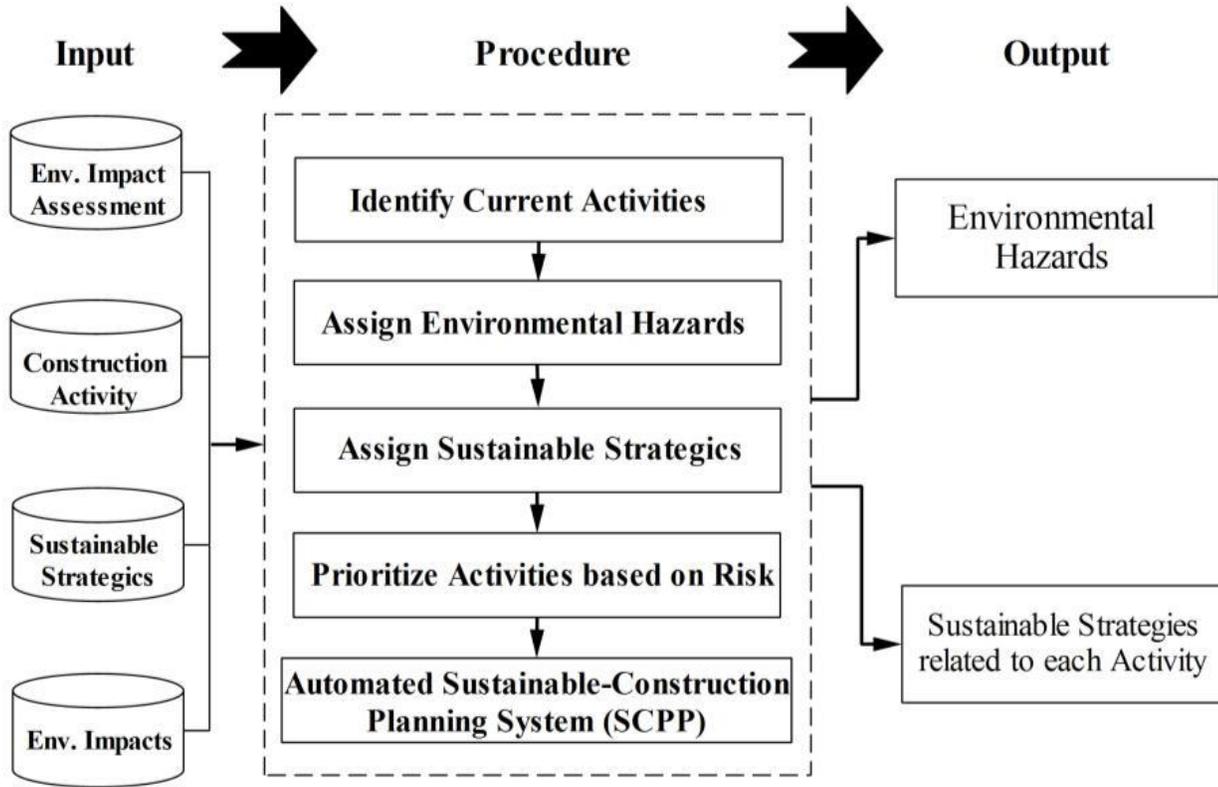


Figure 1: Schematic Model of the SCPS (Source: Irizarry et al, 2012).

The SCPS operates on two modes: automatic and manual mode. As the name implies, the former automatically gives the report, which contains the environmental impacts and suggested sustainability measures as related to the current day's activities. But in the latter, the report is opened for customization to enable operators select the sustainable strategies needed; it can also aid users in entering the needed measures for sustainability in each task, into the MS Project file (Irizarry et al, 2012).

CONCLUSION AND RECOMMENDATIONS

The need for sustainability at the planning and control stages of construction projects in Nigeria cannot be over-emphasized. It was seen from the reviewed literatures that cost, quality and time, which are the main focus of consideration in the construction industry needs extra considerations like the reduction of resource depletion and environmental degradation,

and the health of the built environment in order to achieve sustainable construction. The construction professionals especially the project manager has a crucial role to play in implementing these extra considerations since he is an indispensable professional from the planning stage to the control stage of construction projects. The challenges which could also be barriers to satisfying the sustainability need in Nigeria was appraised, with the project manager's role, highlighted, to give every knowledge and understanding, the Project managers in the Nigerian construction industry need to implement the construction of sustainable (green or high-performance) buildings in Nigeria.

The Sustainable Construction Planning System (SCPS) is a useful tool that could be integrated in the Nigerian construction industry to satisfy the sustainability need. It was seen that in developing the SCPS, risk assessment results, from a study of the environmental impacts of construction processes, were used; this

ensures that sustainable construction is automatically planned. The SCPS generates the results in time which aids in time and resources management. Hence, this serves as a sufficient tool for sustainable planning of construction projects.

The following recommendations are discernible:

- (i) The awareness of construction professionals should be created on the roles of the project manager in ensuring sustainability.
- (ii) Training programs could be imbibed or organised by institutes, societies and regulatory bodies concerned, on the use of the Sustainable Construction Planning System (SCPS), to enlighten the professionals on its importance and usage.
- (iii) There is need to inculcate the study of these tools like the SCPS into the curriculum of departments under environmental studies in Nigerian higher institutions.

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