

SUSTAINABLE CONSTRUCTION IN A DEVELOPING COUNTRY: AN ASSESSMENT OF HOW THE PROFESSIONAL'S PRACTICE IMPACT THE ENVIRONMENT.

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Infrastructure development for developing countries is crucial for economic and social welfare of the people. Construction professionals therefore play a pivotal role of facilitating the delivery of the constructed facilities. Most developing nations, however, experience severe decay of infrastructure arising not only from effects of poor design, poor construction, poor materials but also from decades of indifferent professional's attitude towards acting responsibly with regard to changes in future user-needs, efficient use of resources and minimising of the impact of construction on the environment (Chilambwe 1997). The result has been negative contribution to sustainable development. This research appraises how construction professionals' uphold the principles of sustainable development, and the impact of their practice on the economic, social and the built environment in Zambia.

Keywords: construction professional, impact assessment, sustainable construction.

INTRODUCTION

A strategic approach to adding value to an economy in the 21st century entails – *inter alia* – delivering basic environmental, social and economic services to communities without threatening the viability of the natural, built and social systems upon which they are dependant (Barrow 1997; Link 1996). Construction plays a crucial role in the overall economic development of nations, because it produces the fabric of constructed facilities that in turn facilitate other forms of investment. In an ideal world any decision affecting the resource valuation – *such as construction investment appraisal* – should include all use and non-use values, whether there is an actual monetary value in evidence or not (Commonwealth Australia, 2001). In reality, the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another and generally cope as members of society (NMFS and NOAA 1994) are given lip-service.

This research is an appraisal of how construction professionals are upholding the values of sustainable development amidst harsh economic conditions in Zambia. It concludes that professionals have a negative impact on the social, economic, health and general environment.

SUSTAINABLE CONSTRUCTION IN SUMMARY

Sustainable development is a term used carelessly. Mainstream sustainable development demands the consideration of existing and future, potential hazards or risks and limits, and the adoption of measures to counter poverty (Burrow 1997). Sustainable construction (SC) can be defined as a process by which a profitable and competitive industry delivers built assets; building structures, supporting infrastructure and immediate surroundings, which:

- Enhance the quality of life of people and offer customer satisfaction;
- Provides flexibility and supports desirable natural and social environments;
- Maximise the efficient use of resources while minimising wastage (Watuka and Aligula 2002).

The main emphasis should be on recognising the essential needs of the poor and their - concerns about uneven development while paying attention to the environmental conservation (Shakantu and Talukhaba 2002; Hill and Bowen 1997). Therefore, SC must be centered on promoting appropriate, affordable, safe, efficient and environmentally sound constructed products using processes that are subject to continuous review so as to optimise scarce resources.

Sustainable Construction in the Zambian Construction Industry

Generally, any built environment exhibits very strong positive feedback mechanisms so that tendencies towards non-sustainability are very quickly reinforced by other developments triggered by a prior set of changes (Smith, Whittelleg and Williams 1998). The Zambian Construction Industry (ZCI) is no different. Traditionally, construction professionals are responsible for designing and planning the construction, operation and maintenance of infrastructure necessary to meet the increasing demand for food, water, sanitation, shelter, health services and economic security (Boswell 2002). However, the paradigm shift to sustainable development means a redefinition of traditional roles and responsibilities for most professionals. Therefore, professionals face the challenges of acting responsibly, and find the best balance between their technical performance and protecting the overall interests of communities. The feedback on recent developments such as water supply networks, motorways, industrial plants, and general construction has been negative. Reports suggest that the construction sector has a negative contribution to the overall sustainable development (Phiri 2003).

THE RATIONALE OF THE RESEARCH AND METHODOLOGY

Construction professionals are strategically placed in the overall development cycle such that if they apply techniques and decision making techniques that uphold principles of sustainability they could positively impact people's well being. The objectives of the research were to:

- Assess practices among professionals, with regard to sustainability;
- Examine the impact of their practices in the construction industry.

The motivation for the research emanated from newspaper reports of how developments, such as former mines, have turned into environmental hazards overnight due to various reasons, amongst which professional neglect was

hypothesised. The population for the research is tabulated in table 1.0. A sample size of 62 was extracted from construction professionals and organisations.

Table 1.0: Sample Frame

Category	Sample Size	Response
<i>Architectural</i>	15	12
<i>Engineering</i>	8	6
<i>Quantity surveying</i>	5	5
<i>Clients</i>	12	10
<i>Construction Firms</i>	11	6
<i>Local Building Inspectors</i>	3	3
Total Administered	62	42

A structured questionnaire was employed for collecting data. Table 2.0 shows a summary of key research indicators relating to the four main categories of respondents. All the nine indicators and their sub-titles were covered on each respondent's questionnaire. The aim was to design it so that it integrates the science of environment analysis with the policies of resource management. The painted marks show a matrix of crucial indicators that were considered fundamental to each category of profession. For instance, it was deemed imperative so assess consultant's ability to use assessment techniques such as whole life economic analyses. Therefore marked areas highlight the cardinal areas that the questionnaire covered with respect to each respondent.

The numerical value in each box mark the response in favour of the question, out of the total number of respondents indicated in the heading of the table. For example, only 14Nr out of 23 Consultants claimed to have sufficient knowledge of sustainable construction. This shows a 60% awareness level amongst consultants. This approach to data presentation is chosen so as to highlight results clearly – without hiding them in percentages.

Table 2.0: A Summary of Key Research Indicators

Key Research Indicators	Consultants 23 Nr.	Contractors 6Nr.	Building Inspectorate- 3Nr.	Clients 10Nr.
Knowledge/Awareness of SD/SC	14	1	3	1
Tools and Guidelines in use:				
▪ Social Impact Assessment;	2	1	3	1
▪ Economic Impact Assessment;				
▪ Environmental Impact Assessment;	●	●	●	
▪ Health Impact Assessment;				
▪ Others;				
Specification:	9	1	3	4
▪ Biased to Importing products;	●			●
▪ Biased to Using local products;				
▪ A hybrid;				
Involvement of Local communities	3	6	3	10
Design for Flexibility:	15	1	3	0
▪ Population Growth;	●			●
▪ Anticipated Challenges;				
▪ Others;				
Recyclable Materials and Tools	0	0	0	0
▪ Discouraging production;	●	●	●	
▪ Encouraging production;				
Enforcement of Existing SC/SD Laws:	4	1	3	1
▪ Compliance in Documents;	●	●	●	●
▪ Compliance on site;				
▪ Attitude of professionals;				
▪ Others;				
Demand for SC/SD Practice on projects	2	0	1	1
Constraints Emanating from SC/SD	23	6	3	10

RESEARCH FINDINGS AND DISCUSSION

(i) Awareness of Sustainable Constructions in the Industry

Results in table 2 show a relatively low level of knowledge of sustainable construction and sustainable development in general. 84% contractors and 90% of clients that responded had no knowledge of principles of sustainable construction. Not until recently most construction, engineering and building subjects in the universities had fragmented sustainability issues in them. The deficiency in SC could largely be attributed to the lack of training in sustainability issues. Therefore this problem compounds the operational constraints faced by contractors and clients.

(ii) Application of Assorted Innovative Tools and Guidelines

When the impact of construction related projects are considered, attention is generally centered on economic benefits, despite the interrelation between social economic factors and the physical environment. Nine (9%) percent of consultants surveyed used any form of tool or guideline with a view to social-economic, health and environmental impact assessment of the proposed developments. Even though the building inspectorate used such tools, they rarely participate in major decisions that are made by consultants. The major reason for the low usage of the guidelines was because clients as well as the building regulations do not make it mandatory to show proof of impact assessments. The Environmental council of Zambia however has

detailed regulations, published on the Internet, that describe how to go about impact assessments, who to involve and the resources required (ECZ 2004).

(iii) Specifications: Biased Towards Local Building Materials?

The building inspectorate encourages specifications that support the local industry. To the contrary, only 39% of consultants used specifications that were deliberately biased towards supporting local industrial base. Generally there is low confidence in the use of local materials because they have no proven scientific record. In general, using local materials is advantageous to the local economy than importing everything. It also ensures preservation of cultural values and heritage, in addition to promoting micro-enterprises, development of human resources and contribution to uplifting communities; hence reducing poverty.

(iv) Involvement of Communities

Clause 7 and 8 of the ECZ regulations stipulate that communities should be included in project appraisals. All contractors and clients surveyed indicated that they involved local communities in all their projects. Contractors argued that they acquire labour from local communities, while clients reasoned that their ultimate business comes from communities. However, any business driven relation is arguably fragile in that should the community have no economic value to the client and or the contractor, they are never involved in project decision-making. For instance, only 13% of consultants embraced community participation in their projects. Construction professionals lacked consistency in involving the communities/stakeholders at planning and design stage as such their practice has negative impact on socio-economic development in many communities.

(v) Designing for Flexibility to cater for Future User-need Changes.

Sixty five (65%) percent of consultants argued that design flexibility criteria were one of their primary design considerations having observed a high rate of physical and economic obsolescence in facilities. The key factor to obsolescence of structures has been the cyclical down fall of the mining industry and the economy at large in the 1990s, which in turn drove users to change their needs. Clients are, as a result, forced to change the use/function of facilities. Consultants should strive to create multi-purpose spaces that could be adaptable to various use, design flexibility and functionality criteria in construction projects to enable continual review of projects. This is critical to technical sustainability. However, most public projects show poor design flexibility to cater for future needs. Water and water treatment plants, road networks and general waste disposal mechanisms are but few of the critical examples of ill designed facilities in most cities.

(vi) Use of Recyclable/Re-usable Building Materials

Generally, recycling is non-existent in the Zambian construction industry. Therefore no one specified recyclable materials. Opinions on the use of such materials varied. Consultants argued that clients significantly influence the choice of materials on their projects. The industry does not benefit economically and environmentally from the savings of waste reduction and reuse.

(vii) Enforcement of Existing SC/SD Laws

Policing construction developments depends on factors such as the type of the client (private or public), the jurisdiction in which the project is located (within the municipality or otherwise) and the type of a project. Only 17% of consultants met the

legal requirements of impact assessments. This was because they were required to by the project. Enforcement therefore is easier if the client stipulates the need for holistic impact assessments for proposed developments. However, with only a single client out of ten [10%] reporting knowledge of legal requirements with the Environmental council of Zambia, it is evident that most clients would not facilitate the enforcement of laws that they are not aware of. Therefore, professionals can easily cover up errors. Lack of compliance checking systems therefore stifle sustainable construction.

(viii) Demand for SC/SD Practice on projects

Nine (9%) percent of consultants had worked on a project that the client demanded some form of tangible sustainable construction practice. However, both demands were related to economic benefits of the project, as opposed to environmental, social and health benefits to the community. One local authority also demands impact assessments for public oriented projects, even though they may be funded by the private sector. Since clients do not demand sustainable practices from the industry, professionals feel they are not obliged to offer such services. This approach has contributed negatively to sustainable development.

(ix) Constraints Faced in Applying SC practices

All respondents reported constraints in applying Sustainable Construction practices in construction. Constraints that were identified by respondents are as follows:

- Lack of facilitative regulatory framework in the industry;
- The decision making process in construction largely remains traditional;
- Uninformed clients;
- Inability to identify appropriate systems for a specific environment;
- Lack of a database on local materials, tools and techniques;
- Erratic nature of construction business affects efforts to implement sustainable construction practices, and;
- Lack of resources to expend on R & D;
- Poor public awareness.

CONCLUSION

The research has shown that construction professionals have an indifferent attitude towards sustainable construction in Zambia. Despite the availability of environmental regulations, little is being done in terms of applying sustainable development principles. Additionally, findings clearly indicate that professionals have not fully integrated SC systems in their practice. Sustainability is just another buzzword that professional use for accessing funds when bidding for projects; paying a lip service to the power of sustainability principles.

THE WAY FORWARD FOR SUSTAINABLE CONSTRUCTION

Based on the findings and conclusions drawn, the following recommendations are crucial for sustainable construction in Zambia:

- Incorporate holistic guidelines of impact assessment in the planning permission of all projects, to be submitted to the Environmental Council of

Zambia as opposed to submitting assessment papers to local authorities. This would unify the enforcement procedures of the environmental council and that of local authorities;

- Make Social-economic, health and environmental assessments compulsory to developments using graduated thresholds;

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