

Environmental monitoring and evaluation in Sub-Saharan Africa – a state of the art review

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Abstract

The knowledge and understanding of the environmental related problems associated with development activities has increased rapidly in recent years. Consequently, arise in adoption of appraisal tools for monitoring environmental performance is also evidenced in a number of countries. In Sub-Saharan African (SSA) region, for instance, policy and regulation reform has been intensified over the past two decades demonstrating governments' initiatives in addressing environmental, social and economic aspects of sustainability. This paper reviews the extent of contribution the policy instruments make in monitoring and evaluating environmental impacts related to the building industry in the SSA. Basing on the reviewed literature of an ongoing PhD research, it is noted that there is need for appropriate information and data on which the proposed policies are to be based. Also different building stakeholders, researchers and the public sector need to participate not only in the policy formulation but also in defining sustainability in the local context and be considered as the basis for policy formulation.

Keywords: building sector, developing countries, environmental policy, sustainability

Introduction

The building industry is considered responsible for a wide range of environmental loads. Du Plessis (2001) and others describe it as a "40% Industry" because of the extent of impacts contributed at global level. For example, the industry and its related processes utilise almost 40% of energy and raw materials respectively. It also consumes approximately 25% of the total wood required for various development works around the world (CIWMB, 2000; Raynsford, 1999). Furthermore, it is responsible for about 40% of the total waste created at global level (Du Plessis, 2001; CIWMB, 2000) as well as 50% of carbon dioxide emitted into the atmosphere. Furthermore, it contributes to habitat destruction and ecosystem disturbance (Ahn & Oanh, 2009; Singh & Asgher, 2005) although these are not easy to quantify. It should be noted though that the environmental attributes vary significantly from one region or country to the other due to a number of factors. These include climatic conditions, technological advancement as well as cultural beliefs, most of which also play a major role in the determination of building types in a particular region.

In spite of the variation in the extent of contribution, the increasing knowledge and understanding of the environmental related problems associated with development activities has led to the advancement in use of

appraisal tools for monitoring environmental performance since the past few decades (Mkandawire & Arku, 2009). According to Halliday (2008), the tools are categorised in accordance to their usage. They include policy instruments most of which are employed to raise awareness to the society on environmental issues. The policies also direct stakeholders in the selection of appropriate interventions to be taken into consideration in order to meet certain set goals. The labelling systems on the contrary are considered useful for marketing promotion in business companies and institutions whilst checklists and regulations are appropriate for benchmarking. Other tools employed for planning purpose include critical paths and the life-cycle assessment techniques (Halliday, 2008). In recent years, the emerging green building tools are also being adopted in various countries as guidelines for environmental monitoring and evaluation despite their weaknesses highlighted in the literature by for example, Cole, (1999); Ding (2008). Further discussion on these approaches is beyond the scope of this study but they are discussed elsewhere in the literature (Halliday, 2008).

Although there are several methods in use for environmental assessment and monitoring in the literature, it appears that policy and regulatory frameworks are the most commonly used in SSA basing on the policy developments that have taken place over the past two decades as evidenced in the works of Mkandawire & Arku (2009); Kakonge (2006a). Despite their potential to contribute to the promotion of awareness on environmental degradation and the need for close monitoring of the associated impacts, the existing frameworks are hardly implemented in the region. This therefore demonstrates the urgency for further research to find alternative environmental monitoring and assessment in this case, suitable for the construction industry. This paper therefore analyses the problems associated with the policy frameworks and suggest ways for improving the environmental monitoring and evaluation approaches in SSA. This work is based on a literature review conducted as part of an ongoing PhD programme to explore alternative ways of promoting environmental sustainability in the construction industry in SSA.

Global, national and local concern for building related environmental impacts

The interest in monitoring the environmental effects associated with buildings follows the ongoing global concern on environmental degradation which continues to appear on the list of the international forum's agenda. Almost two decades after the 1972 'Stockholm Declaration' aiming to inspire and guide people on conservation of the human environment, the Earth summit on Environmental Development (UNCED) (United Nations, 1993) adopted the ambitious Agenda 21 (in Rio De Janeiro, 1992) alongside with the sustainable development concept. Despite its perfect objectives to address the global ecological issues, the ambitious Agenda 21 action plan proposed for different countries to adopt, became unpopular due to its comprehensive list of activities which were not only difficult to follow but also to achieve. Consequently, considering that the Agenda 21 was too broad to act upon, the 2002 World Summit on Sustainable Development (WSSD) raised the need for multi-sectoral actions to encourage regional, national and local agendas to take the leading role. Alongside with the local agendas, an action plan for Sustainable Building and Construction (SBC) named Agenda 21 for Sustainable Construction in Developing Countries (A21SCDC) was adopted in 2002 aiming to provide a guide in addressing environmental issues related to the construction industry (Du Plessis et al, 2002).

Among several things, the A21SCDC aimed to encourage sustainable consumption of resources including energy use in developing countries as previously emphasised by Du Plessis (2001). The framework recommended the technological, institutional and value related enablers which are deemed important for encouraging effective use of the natural capital as well as promoting the social and economic development

activities in the construction industry in developing countries (Du Plessis et al, 2002). Likewise with policies and regulations, the framework aims at promoting awareness and knowledge on environmental effects related to the industry and suggests ways for minimising them. However, not much had been achieved until the immediate past in most countries (Du Plessis, 2007). The framework is criticised to lack targets hence it is not surprising that since the adoption of the A21SCDC almost a decade ago, several challenges continue to affect the promotion of sustainable construction in developing countries (Du Plessis 2007). One of the problems though could be the reason that very little is known on the environmental contribution of the building industry due to lack of empirical evidence in consumption and supply of materials. In SSA for example, the major focus on environmental problems related to buildings is often on indoor air pollution attributed to use of wood energy. Several studies also exist focussing on studies deforestation although there is lack of empirical evidence on the extent of contribution the building industry make relative to wood consumption except for a few examples demonstrated by a few authors such as (Alam & Starr, 2009). Previously, Spence & Mulligan (1995) expressed the urgency for environmental assessment in the building industry in developing countries considering the urban sprawl and its contribution to transport related emissions in the building industry. Among other things, the authors emphasised the need for environmental assessment of the associated impacts caused due to the increasing distances to sources of raw and manufactured building materials. Interestingly though it appears that policy and regulatory frameworks continue to be developed further in SSA for sensitisation on environmental issues yet there still little progress in terms of practical contribution (Mkandawire & Arku, 2009; Kakonge, 2006b).

Environmental legislation and policy in SSA

For the past few decades developing countries, including the SSA, have undergone a radical change in environmental policy and legislation following the actions previously undertaken in developed countries (Mkandawire & Arku, 2009). Since the early 1990s, there had been a radical change in the SSA region to include National Environmental Plan, Agenda 21 action plans and other policies. In countries like Lesotho (Kakonge, 1997) as it is the case in most of the other SSA countries, such policies called for the Environmental Impact Assessment legislation.

Interestingly, although EIA procedures were already in use since as early as 1969 (in USA) the legislation was not adopted in African countries until the early 1990s (Kakonge, 2006b). However by 1997, more than 40% of African countries had EIA legislation. Examples are included in the works of (Mokhehle and Diab, 2001); Kakonge (2006a), Ruffeis et al (2010) and (Oosterveer & Van Vliet, 2010) in Lesotho, Gambia, Ethiopia and Uganda respectively. However, the EIA legislation faces severe criticisms. For instance, it is noted that while in some countries, the environmental legislation changes were genuinely meant to address the proposed intentions in others these were being driven by the special interests other parties had (Mkandawire & Arku, 2009). For example some were carried out to satisfy the conditions by the donor communities in exchange for aid according to (Ruffeis et al, 2010; Mkandawire & Arku, 2009). This being beyond the scope of this study, further insights regarding the challenges and opportunities related to EIA are highlighted by Kakonge (2006b); Ruffeis et al (2010); Mkandawire & Arku (2009) among others.

Despite the weaknesses in EIA legislation, policy changes in energy, industrial, environmental and many other sectors in the SSA countries have contributed to awareness and on environmental related issues different sectors are facing and ways to solve them. In recent developments, the focus is beyond the environmental issues by

incorporating social and economic aspects of sustainability (Davidson et al, 2006). As a result it is increasingly becoming the responsibility of various stakeholders to participate in monitoring and evaluating the environmental attributes related to an activity. However, as previously highlighted by Ruffeis et al (2010); Oosterveer & Van Vliet (2010) further changes are needed in a number of areas affecting environmental policies. Focussing on the building industry in this regard, there is need for incorporation of other appraisal methods to complement the policy tools due to their severe limitations.

Limitations of policies in environmental assessment

The major limitations emphasised here focus on factors related to policy structure, institutional capacity to enforce strategies, the capacity to monitor and evaluate environmental impacts, data and information availability as well as the issue of sustainability definition. Although the core of this paper is on SSA, a number of issues raised are also applicable to other parts of the developing countries. One of the major concerns of policy use is the way the policies are formulated. It is noted that some strategies are poorly structured particularly where these are adopted from elsewhere (Mkandawire & Arku, 2009). Consequently, there is usually disintegration between the proposed policies and the local agendas due to variation in local conditions and needs (Liso et al, 2007; Halliday, 2008; Ebohon & Rwelamila, 2001). Poorly structured strategies also provide loopholes for misinterpretations by different stakeholders. As a result, societies resolve to use inappropriate alternatives because their actions are justified as not unlawful (GoM, 1994; Davidson et al., 2006). Restructuring of the strategies could be one of the ways to counter such problems as suggested in a review paper on the structure of the Ethiopian Environmental policy (Ruffeis et al, 2010) and elsewhere (Yohe et al 2007, Urge-Vorsatz et al 2007, Liso et al, 2007). However, Halliday (2008) previously commented that such reviews have appeared less effective in well structured economies such as UK.

Apparently, whether the frameworks are appropriately formulated or not, there are also other limiting factors such as the institutional failure to enforce the proposed strategies as noticed by Mkandawire & Arku (2009). It is noted that apart from the governance problems in Uganda for example (Oosterveer & Van Vliet, 2010) the absence of environmental tribunal (Mkandawire & Arku, 2009), enforcement of regulations is not less easy to accomplish in most SSA countries. On the contrary, where the government's scarce resources are to be utilised for other development activities environmental related cases are rarely given a priority (Tisdell, 2005). Beside the institutional failure, the other limitation relates to the incapability of policies to monitor and evaluate environmental impacts (Halliday, 2008). Considering that policy and regulatory frameworks are employed to set strategies as stepping stones to meet particular goals and rarely provide benchmarks, they hardly meet precise targets in environmental monitoring (Davidson et al, 2006). As a result, it is not easy to monitor progress and assess the effectiveness of the policies over a given period of time (Davidson et al, 2006). This is also exacerbated where poor coordination among the sectors departments and within departments exists as observed in the case of Ugandan Environmental policy structure (Oosterveer & Van Vliet, 2010). Thus, this leads to lack of prioritisation in selecting interventions to be employed to meet a particular target.

Although environmental related policy and regulatory frameworks are in place they are rarely based on empirical data in respective countries in the region except where the focus on specific sectors (e.g. Davidson et al, 2006; Tyler, 2010). One of the reasons is because there is lack of reliable data in the region on which the policies being formulated are to base on. Eventually, this leads to adoption of inappropriate strategies or measures for intervention. For example, the Malawi Environmental Policy emphasises on ways for curbing deforestation

(GoM, 2004). Taking the strategies related to the building industry as an example, the government proposed the use of cement blocks as one way of encouraging people to minimise the use of wood for brick making. This is based on the assumption that by switching from wood fuelled burnt bricks to cement products, this will not only curb deforestation but also reduce the release of green house gases attributed to the construction industry through brick making (GoM, 2004). However, these measures appear not to have considered the environmental effects associated with cement production according in the country which relies mostly on raw products from other countries hence increasing the carbon emissions emitted through transportation according to a similar example based on an environmental impacts study of Hong Kong residential buildings (Chen et al, 2001). Therefore, although use of cement could be a sustainable alternative in other regions for some reasons (Asif et al, 2007), it could be different elsewhere. However, comprehensive data and information from which the policy strategies are to be based is a requirement as demonstrated in the South African example in the formulation of energy policy for sustainable development (Davidson, et al., 2006).

Finally, the unclear definition of the term sustainability in proposed statements appears to be an emerging problem related to policies for environmental assessment and evaluation. The term sustainability or sustainable development (sustainability) has been one of the driving forces for policy and regulatory changes alongside with Agenda 21 Action plan for over the past two decades as mentioned earlier. The WCED report (1987: chapter 2, page 43) defined sustainable development (sustainability) as *“the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs”*. However, there are ongoing debates in the literature related to its application. Despite this being one of the most appearing phrases in policies formulated for local, national, regional and global use, the definition of the term is continuously becoming more and more misleading (Bartlett, 2006). Basing several other views, (e.g. Du Plessis, 2007), Marshall and Toffel (2005) cautions that sustainability definition becomes meaningless if defined more broadly because it lacks direction for prioritising. Yet on the other hand, the authors comment that an extreme narrowness in the definition limits the incorporation of other important factors. Therefore, the policies and regulations based on such unclear definitions are misleading and difficult if not impossible to implement (Mkandawire & Arku, 2009).

To conclude, basing on the existing literature, it is noted that in a number of developing countries, policy and regulatory frameworks appear to be the most commonly used approach employed in environmental assessment in SSA. However, until now there is still a lot to be done as lamented by various authors in their reviews related to policies and the environment in SSA (e.g. (Oosterveer & Van Vliet, 2010; Ruffeis et al, 2010). We conclude this paper by bringing to light a few suggestions for improvement relative to the building sector.

Suggestions for improvement relative to the building industry in SSA

As building materials continue to change with the technological innovation and exacerbated by the rising demand, the building industry also needs to consider ways for minimising the associated environmental impacts. So far, the policy instruments are the commonly used approaches considered for use for environmental monitoring in SSA. Basically, it appears that have been useful in bringing awareness on the need to find ways for improving or maintaining the environmental status in the region though this is not easy to assess. However, their incapability to quantify the environmental effects, set precise targets as well as failure to prioritise of development activities with regard to their environmental impacts, calls for the need to come up with alternative approaches to complement them.

Here we suggest the use of quantifiable measures which can be used by the building and environmental professionals as benchmarks at different levels of the building process alongside with the existing measures. However, these need to be based on appropriate information and data as suggested previously by Ebohon & Rwelamila (2001). In view of this, comprehensive research to gather appropriate information on which the policy strategies are to be based in SSA is highly recommended. Further, it requires governments' participation to encourage and support scientific research in environmental assessment particularly in sectors not given much attention to this far such as the building sector. Furthermore, the building stakeholders/professionals need to take a leading role in using appropriate building methods though these ought to be based on thorough research at local level or jointly conducted by different institutions in the region. However, enforcement of certain measures would reduce the notion business as usual although this is difficult to apply in the building industry in SSA where informal sector dominates most activities. Finally, further contribution from researchers in the building industry to clarify the term 'sustainability', relevant to the building sector and, focussing on local context is also a prerequisite. However, for consistency there is still need to embracing the globally used definitions existing in the literature. It is noted that despite the ambiguity in the definition of sustainability, different approaches being taken at various levels of development are making a significant contribution as guiding principles in promoting the social, economic cultural and physical dimensions of sustainable development. It should be known though that problems such as the problems in measuring sustainability will always remain. Lastly, from a marketing point of view, other measures such as the labelling systems and awards need to be introduced despite the problems on who would finance them. The construction councils for instance are the potential organisations to initiate such moves despite their financial deficiency as compared to government led programmes in developed countries. On the very last note, assessment tools and methods which are user friendly by the building professionals are needed to complement the existing policies and action plans to promote environmental sustainability whilst promoting the efficiency.

Conclusion and acknowledgements

The concern on environmental impacts attributed by various development activities continues to be an important topic on the agenda at the international forums. For the past few decades developing countries including the SSA, have experienced a radical change in policy and legislation following the actions previously undertaken in developed countries. The environmental appraisal approaches employed in different sectors vary depending on the purpose they are needed for. They are also used relative to the interests of the initiating stakeholders. This paper has analysed the limitations related to policy instruments in environmental monitoring and evaluation. It is noted that, the tools currently in use are important in setting goals for future and current developments. Yet, on their own, they are not adequate for assessing the impacts as well as evaluating the effectiveness of the strategies set. Although it is becoming the practice to involve different stakeholders to contribute in policy formulation, there is still urgency for further work based on available local information. However, this requires governments' support alongside with the bilateral organisations and the civil societies to work together to ensure that the strategies proposed are for the best interest of the community. For the construction industry in particular, the first step required is to recognise the environmental impacts at local and regional level. However, there is need to work alongside with other departments and sectors to establish the relevant indicators if not reflected in the policy strategies. The next step is to employ quantitative measures to enhance the evaluation of the associated impacts. The ongoing PhD to explore ways for promoting environmental sustainability in the construction industry uses the energy analysis single assessment criteria method due to resources available but this can be developed further at local and regional levels.

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