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OPERATION OF ADOPTIVE GREEN BUILDING ASSESSMENT TOOLS-CASE STUDY

E.C. Mpakati-Gama[1], B. Sloan[2] and S.C. Wamuziri[3]

[1 2]*School of Engineering and the Built Environment, Edinburgh Napier University, Edinburgh, UK*

[3]*University Management Research Centre, Glyndŵr University, Wrexham, UK*

[1]*e.mpakati-gama@napier.ac.uk*

ABSTRACT

Purpose– The rising interest in the use of green building assessment tools (GBATs) as means of promoting sustainable construction has heightened the adoption of some well-established tools for use in other contexts. The role of the adoptive tools in minimising the hassle of developing GBATs in countries that are not able to develop their own cannot be overemphasised. However, more recently, the literature has emerged that offers contradictory findings about the contribution of these adoptive tools in addressing sustainability in the new contexts. However, the research to date has tended to focus on improving the performance rather than the way they are operated.

Design/methodology/approach–This paper examines the operating criteria of the Green Star (GS) tool in its original and adoptive countries (Australia and South Africa (SA) respectively to identify any implications caused in the South Africa context. The focus however, is on the facilitation, accreditation and implementation cost criteria based on the online resources.

Findings–One of the key findings in this synopsis is that, the GS-SA operating criteria tend to marginalise building projects and practitioners in the informal sector particularly with regard to the accreditation system employed.

Originality/value –Besides the recommendations on how to address the issues, the study provides a conceptual framework on which future empirical studies on improving the operating criteria by the GBCSA and its next generation tools, such as the GBC Ghana, could be based.

Key words: assessment criteria, green building, Green-star-South Africa, operating criteria, sustainable construction

Paper type – Conceptual paper

Introduction

The recognition of building related environmental impacts has led to the rising interest in the development and use of Green building assessment tools (GBATs) in various countries since the early 1990s. Although originally developed for environmental impact assessments of buildings, GBATs are widely accepted as design tools (Ding, 2008) following their adoption by the ISO (International Standardisation Organisation) 14000 series, as environmental management certification systems, as detailed by Haapio and Viitaniemi (2008). Despite their limitation to address socio-economic aspects of sustainability (Kajikawa et al., 2011; Ding, 2008), the GBATs play various roles important for the advancement of sustainable construction. For example, the GBATs play an important role as yardsticks or guidelines for minimising adverse environmental impacts contributed at design, procurement, construction as well as operation stages of the building's lifecycle (Cole, 2005; Saunders, 2008; Haapio and Viitaniemi, 2008). Likewise, with the use of specific indicators, the tools are used as benchmarks for assessing environmental performance of specific products and processes as illustrated by Presley and Meade (2010). Consequently, in some countries, they may form part of standards for building stakeholders to confer to when selecting building products or processes (Kajikawa et al., 2011). Furthermore, through

eco-labelling, GBATs serve as tools for building products and services' marketing (Todd et al., 2013; Crawley and Aho, 1999; Cole, 2006). Likewise, the GBATs enhance effective communication within building teams and among building stakeholders hence minimising professional language barriers in the promotion of sustainable construction (Cole, 1996; Kajikawa et al., 2011). Moreover, the tools promote awareness for building environmental sustainability particularly in developing countries where a number of environmental issues are yet to be addressed (Malanca, 2010). Also in countries such as Sweden, the GBATs have enhanced the review and proposal of sound sustainability policy (Malmqvist et al., 2011).

Despite the importance in various aspects, the contribution of the tools in tackling building environmental attributes continues to be questioned by many researchers such as Todd et al. (2013); Ng et al. (2013). The problems are exacerbated where the tools are adopted from elsewhere. That is bearing in mind that these tools are developed based on local conditions (such as climate, building materials, fuel or energy types) in their countries of origin, most of the indicators used are incompatible the conditions in their new contexts (AlWaer and Kirk, 2012). Therefore, as the practice of adopting tools to relieve the burden of some countries not able to formulate their own tools continues in several places around the world, structural, technical regulatory as well as administrative issues also continue to impinge their ability to address sustainable construction. Several efforts have been made however, by previous authors to address a number of the related problems in the new contexts. These include Banani et al., (2013) Ibrahim, et al., (2013); Michael, 2013); Säynäjoki (2013). However, performance of the tools, with regard to tool design, indicators and weightings and the marketing criteria, are still raising concerns to many authors (e.g. Todd et al., 2013; Berardi, 2012). Equally, little or no attention has been paid to problems related to how the tools are operated in adoptive countries.

This study, which compares and contrasts the operating criteria of the Green Star (GS) tool in its country of origin, Australia and in its new context, South Africa, addresses the limitations associated with the adopted GS tool in promoting sustainability of the building and property sector in South Africa. Throughput this paper, the term "performance" will refer to the effectiveness of the GBAT in assessing the environmental impacts of a building or a project except where it refers to the rating results of a building at operational stage as defined in the latest Green star performance tool (Green Building Council Australia (GBCA), 2013). Equally, "operation" signifies the managerial procedures involved in the entire certification process limited to facilitation, accreditation and implementation costs in this study.is.

GBATs' developments

Overview

The past few decades have seen a rapid development of green building assessment tools (GBATs) around the world as evidenced in the literature. For instance, in their study to evaluate the scope and principle objectives of tools AlWaer and Kirk (2012),

employs 24 tools used drawn from African, American, Asian, Australian and European countries. This supersedes the number of well-known tools listed in studies conducted previously. For instance, in their study aimed at clarifying the field of environmental sustainability, Haapio and Viitaniemi (2008) analysed and categorised 16 tools to enable the clarification. Likewise, the 20 tools were used by Ding (2008) in a study to evaluate the role and limitations of GBTs in addressing building sustainability issues. Besides the commonly used or well-known tools, Cole, (2005); Saunders, (2008); Xiaoping et al. (2009), Sev, (2011); Ibrahim et al. (2013) demonstrate regional and national based tools used in their various studies.

Although there are several commonly used tools, BREEAM (Building Research Establishment Environmental Assessment Method) is regarded as the first comprehensive and commercially available green building tool. Developed by the Building Research Establishment (BRE) in the UK in 1990 (Prior, 1991), it addresses ecological issues attributed building not only in the UK but also in other countries which adopt it. Although originally developed for engineers and surveyors' use in life-cycle costing of buildings in the UK (Tam et al., 2004), BREEAM has since been used either directly or indirectly through eco-labelling (Ibid, 2004; Crawley and Aho, 1999). Leadership for Energy and Environmental Development (LEED-US) on the other hand, was establishment in 1993. It is not only another well-known tool but also the first buildings' environmental assessment tool for the United States (Saunders, 2008). Following the severe criticisms with regard to its first operational oriented version as putting more emphasis on technical aspects of energy use (Saunders, 2008; Tam et al., 2004) the latter versions have incorporated other issues such as water efficiency, materials and resource consumption. Lately, a new tool on the innovation in design aspects has also been developed (Todd et al., 2013). Another well-known tool, the Australian Green Star, also addresses a wide range of environmental aspects (GBCA, 2013). The GS, used in in this paper as a case, is one of the fastest developing tools around the world evidenced by the number of versions as well as the extensions to second and third generations. For instance, its 10 versions, released since its first launch in 2002 (GBCA, 2013) address the office, retail and residential building related environmental aspects. The latest GS interiors pilot version was released towards the end of 2012 and spotlights the interior fit-outs while the GS the performance version will be released in October 2013. Its aim is to reduce the cost overheads as well as enhance long term investment plans for buildings in Australia hence tackling the social economic aspects of sustainability (GBCA, 2013). Further details on various issues apropos to these coexisting tools' relationships and other well-known tools are brought to light by Xiaoping et al. (2009); Cole, 2006; Ding (2008); Alwae and Kirk (2012) among several authors.

Adoptive GBATs

In recent years, adopting tools for use in a different context has become a common practice. That is, the well-known, commercially established GBATs are increasingly being adopted in countries not able to establish their own tools (Berardi, 2012). The tools are also being adopted where there are already established tools but employ

alternative tools to compare the results Wallhagen and Glaumann (2011). Moreover, where there is a growing interest to demonstrate green buildings leadership by building stakeholders, there has been due support from the World Green Building Council hence enhancing development of local or national building councils in various countries (Malanca, 2010). This therefore, disputes Kibert (2007)'s claims on the slow pace in the development of GBATs to catch up with the rate of environmental attributes related to buildings. Xiaoping et al. (2009) demonstrates figuratively the three hierarchical levels of adoption of tools as illustrated in figure 1.

Figure 1: Developments in GBATs

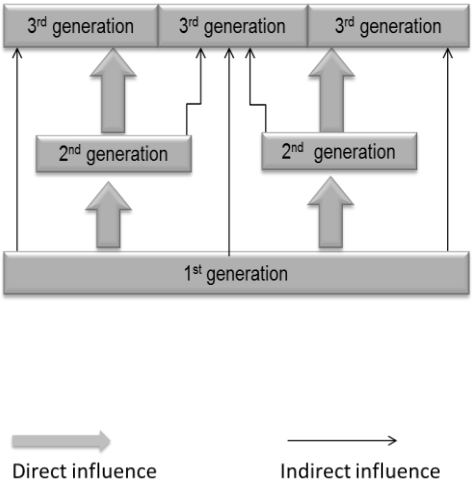


Table 1: Developments in GBATs

1st generation	**2nd generation**	**3rd generation**
BREEAM	SBTool, GBTool	CASBEE
	Green Star Australia	Green Star South Africa
	LEED-US	LEED-India

Sources: GBCA (2013); Malanca (2010), Xiaoping et al. (2009); Cole, 2005

Among the several examples of adopted tools presented in the literature is the LEED-India, Green Star South Africa and HK-BEAM (Hong Kong Building Environmental Assessment Method) based on LEED-US, Green Star-Australia and BREEAM respectively (Saunders, 2008; Potbhare et al., 2008). Similarly, Cole, (2005); Ng et al., (2013) shed light on other tools developed in such a manner as illustrated in Table 1. However, some tools need to be modified to suit their new conditions. The LEED-US new construction (n-c) is a typical example of tools comprehensively modified to adapt to the green building assessment requirements in India. As demonstrated by Potbhare et al. (2009) the LEED-India could be more suitable for local use than the original LEED. Therefore, despite the social and economic problems affecting the construction and property industry in some developing and economically emerging countries, the adoption of tools appears to be a convenient means for obtaining a usable tool for addressing the building related problems (Michael, 2013). However, there are severe criticisms towards the use of these adopted tools as highlighted by Cole 1998; Kyrkou et al., 2011 and Sev (2011) among other authors.

For instance, there is no clear cut in choosing an appropriate tool that meets the local requirements. Apart from a few examples such Michael (2013), who engaged various stakeholders in a process to suggest a tool appropriate for Nigeria, most studies hardly demonstrate the process used for selecting or adopting the tools. In addition, Sev

(2011) sheds more light on the lack the cultural and regional variations with these well-known tools hence the standards or measures used are only suitable for conditions of which they were designed. Moreover, the adopted tools suffer inherent problems such as the failure of the well-known tools to address the social economic sustainability issues (Ding, 2008). Failure to address these issues exacerbates the problems in achieving sustainability in the construction sector considering that a number of developing countries rely on such aspects for their wellbeing, (Sev, 2011). Furthermore, (e.g. Xiaoping et al., 2009) consider that the modifications increase the disparity between the original and the adoptive tools although this also depends on the extent and type of modifications made. Lastly, as noted by Säynäjoki et al. (2012) in a study focussing on new residential buildings in Finland, some of the requirements included in the tools are already highlighted in the building regulations of the country needing to adopt them. The authors therefore consider this as unfeasible in the Finish context suggesting that averting the adoption is the best option.

Although a number of problems related to the adoption of the GBATs have been addressed as evidenced in the literature (Banani et al., (2013) Ibrahim, et al., (2013); Michael, 2013); Säynäjoki (2013), the main focus has been on advancing the compatibility of the tools to the local conditions in the new contexts. Hitherto, little attention has been given to assess how they are operated in the new contexts as a means of attaining sustainable construction. Considering that the adoption practice continues in several places around the world, more particular, the developing countries where meeting the financial and other technical obligations is a big challenge, addressing the associated problems cannot be overemphasised.

Green Star South Africa

Among the several tools developed from original tools, the Green Star is used in this paper as a case study which clearly demonstrates a typical progression of tools further than the second generation. Launched in 2008, the Green Star South Africa (GS-SA) as a second generation of the Green Star Australia, the GS-SA is now adopted as a third generation tool in other countries in Africa such as Ghana. That is, although the GS was originally designed for the Australian property industry, the GBCA permits other GBCs in other countries to adopt the tool whether directly or indirectly. The adoptive GBC is, therefore, mandated to manage all the required obligations as opposed to other GBATs such as the LEED-US, where the mother body, US-GBC, takes the responsibility of almost all the other operating activities of the adoptive tool (Potbhare, 2009). However, the mandate is only given upon the completion of financial and legal agreements between the GBCA and the GBC adopting the GS tool (Malanca, 2010). Considering the difficulties in meeting the basic requirements the GS South Africa offers to support those interested to have a tool yet have low capacity to do so. For this, the third generation tools, as classified by Xiaoping et al. (2009), are obliged to comply with not only the GS-SA, but also the Green Star Australia basic requirements. Currently, there is little information on how the GS-SA third generation tools perform and how they are operated, probably because they are in their early stages of development. This is however, beyond the scope of the current study, yet a

potential area for further investigation. As highlighted earlier on, this study aims to develop a conceptual framework for use in future empirical studies to improve the operating criteria of GBATs in adoptive countries using the Green Star tool as a case study.

Method

To facilitate the identification of implications relative to the GS-SA operating criteria in promoting sustainable construction in SA, a comparative analysis between the original and adoptive tools in Australia and South Africa respectively are carried out first. Previous authors have used the comparative analysis method to analyse various characteristics of original, adopted or a combination of various sets of GBATs. Examples include Cole, (2006); Xiaoping et al. (2009); Tam et al. (2004); Ding (2008); Potbhare et al. (2009); Kajikawa et.al (2011); Zeiler (2011). For instance, Xiaoping et al. (2009) compared and contrasted the similarities and differences of mainstream tools used in Japan, United Kingdom, United States of America, China, Singapore and the internationally designed Green Building Tool (GB-Tool) to find ways for improving the Green Building Evaluation Standard tool for China. Using a similar method, Ibrahim et al. (2013) assessed various Asia based rating tools used in Malaysia, Singapore, Japan, Indonesia and Hong Kong in order to evaluate their similarities and differences in the rating and classification criteria as a means of improving the Indonesian-Greenship tool. The current analysis to compare and contrasts the managing criteria of the original and an adoptive Green Star tool in Australia and South Africa is limited to the implementation costs, facilitation and accreditation procedures. The data used is based on the information available on the two GBCs' websites considering that few empirical studies have yet been undertaken in this emerging field to enable the comparison.

Findings

A number of similarities exist in how the Green Star Australia (GS-A) and the Green Star South Africa (GS-SA) are operated bearing in mind that they are based on a generic tool, Green Star. On the contrary, some disparities also exist due to the modifications made to the original GS-A in order to make it compatible to the SA conditions. Based on the method employed in this study the operating criteria of the GS (limited to facilitation, accreditation and implementation costs) are summarised below.

Facilitation

Regarding facilitation, it is noted that both the GBCA and the Green Building Council South Africa (GBCSA) are responsible for ownership, development and the daily running of the tools. As summarised in Table 2, the councils are also in charge of the review processes which include obtaining feedback through public consultations. The stakeholder inputs are, therefore, used as the basis for further reviews or improvements of the tools. However, there are also a number of disparities between the original and the adoptive tools apropos to the facilitation criteria used. For

example, the consultation results of the GS-A are systematic and clearly illustrated through stakeholder feedback reports while with the GBCSA, it is not clear on how the consultations are conducted. Likewise with the GS-A, the Green Star Faculty, comprising of 18 industrial professional individuals from member organisations, is responsible for further development of the tool, while with the GS-SA, paid consultants and voluntary members of the Technical Working Group are involved. The disparities also extend to the way the tools are advocated. For example, with the GS-SA, public institutions such as the federal, states and territories as well as the local government are actively involved in advocacy while with the GS-SA, it is not clear on how the tool is advocated and the parties involved based on the information available.

Table 2: Facilitation

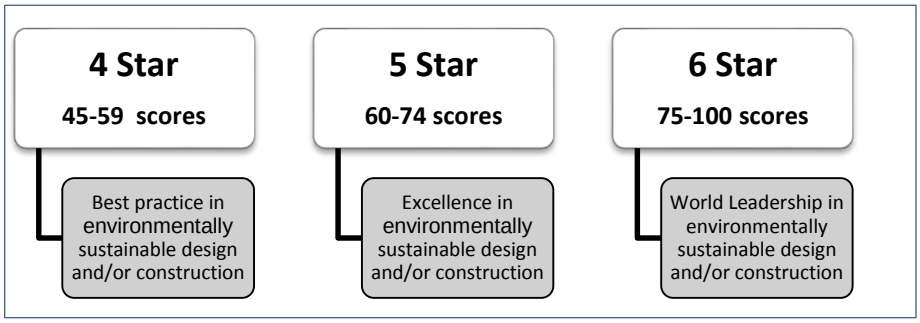
	Green star Australia	**Green Star South Africa**
Tool ownership	Green Building Council Australia (GBCA)	Green Building Council South Africa (GBCSA)
Consultation	Green Star Faculty	Paid consultants, voluntary Technical Working Group
Tool updates and reviews	Through public reviews and stakeholder feedback	Consultants
Advocacy	Though local Government institutions, contribution to green policy guidelines	Not specified

Source: GBCA (2013), GBCSA (2013)

Accreditation or certification

As it is with other GBATs, projects and professional accreditation are the two main accreditation or certification categories conducted voluntarily. Similar to facilitation, a number of similarities and disparities exist apropos accreditation. Focussing on project accreditation for instance, one of the major similarities is that ground floor area is used to calculate the application fees for either tool. In addition, the scores obtained are based on the recommendations from the assessment panels in either case. Moreover, credits are awarded by the GBCs using the point based certified rating with 45 as the minimum pass rate (Figure 2) at both the design and construction stages.

Figure 2: Green Star Certified Rating



Focussing on disparities, it is observed that with the GS-A third party assessors are involved in the preliminary assessment and scoring stages. However, the rating criteria used is relative to the level of assessment requested by the applicant. In contrast, independent assessors are involved in project accreditation for the GS-SA. That is, trained and accredited professionals are responsible for conducting project assessment and submitting them for registration and evaluation. Moreover, a member of the project team is eligible to conduct an assessment of a project using the assessors' manual readily available for purchase although the final score will be determined by the assessing panel. Furthermore, the types of schemes used also contribute to the disparities. For instance, although the GS-A and GS-SA versions focus on similar building types (e.g. retail, office and residential buildings), the certification at different lifecycle phases are different. That is while the GS-A a wide range of certification for the 10 different versions it currently has, GS-SA issues 2 different certification referred to as 'Design' or 'As built' upon meeting the minimum criteria of the level assessment applied for. Briefly, the 'Design' certified rating application can be launched as soon as there is adequate information while the 'As Built' certification IS obtained within 24 months of project completion. Finally, there are also some differences with both tools concerning the award systems employed. For example, the GBCA offers a fee discount to accredited members at project submission stage but with regard to the GS-SA, 2 extra points are granted to the projects involving an accredited professional from project's inception.

Table 3: Project accreditation

	Green star Australia	**Green Star South Africa**
Accrediting body	Third party certified assessors	Independent assessors
Registration requirements	Voluntary	Voluntary
Accreditation stages	Round 1 and round 2 of submission and assessment.	2 main stages: submission and scoring processes.
Accreditation procedure	Score: based on assessment panel's recommendations and GBCA awarded credits	Certified rating awarded based on the assessment panel's recommendations and GBCSA awarded credits
Certification types	Various types upon achieving a 45 minimum score	"Design certification" and "As Built certification "upon achieving a 45 minimum score
Award system	Members obtain a fee discount	2 extra points awarded for including an Accredited Professional
Fee structure	Based on total ground floor area	Based on project ground floor area

Source: GBCA (2013), GBCSA (2013)

Similar to the project accreditation, the two tools have wider differences apropos professional accreditation. For example, as summarised in Table 4, independent assessors employed through the Green Star Faculty are responsible for professional accreditation and the issuing of certificates in the Australian contexts. Contrary, the GBCSA is liable for the running of the courses hence the issuing of a Green Star qualification in South Africa. Further disparity relates to the training criteria for professional accreditation concerning the two tools. For instance, to get assessed for the GS-A, a full training is required although there now other alternative arrangements such as the online courses facilitated by the Green Star Faculty. In contrast, the GS-SA demands attendance of an individual to the interactive multi-disciplinary accreditation course which followed by an online examination. Finally, the course fees, often determined by the mode of and type of training determine the fee payable especially for the GS-A professional accreditation. For instance, fees will vary by undertaking in house training for member organisations, public courses for non-members, inspiration courses which are open to all or continuous professional development courses for already registered members. In contrast, with the GS-SA, a standard one off fee of R850 is demanded to sit for the GS-SA professional accreditation examination. However, similar amount will be requested until the applicant obtains a 75% minimum pass rate. That is the fee is recurring subject to meeting the pass rate.

Table 4: Professional accreditation

	Green star Australia	Green Star South Africa
Accrediting body	Green Star Faculty (third party)	GBCSA
Registration requirements	Voluntary	Voluntary
General procedure	Face to face, online courses and continuous professional development courses	Interactive multi-disciplinary accreditation course and Green Star SA online examination
Professional accreditation fee per person	Members: AU$230-450 (in-house courses), non-members AU$160-650 (public courses)	R850 paid for exams for members and non-members

Note: The fees were correct at the time the report was being compiled
Source: GBCA (2013), GBCSA (2013)

Implementation costs

The final operation aspect, implementation, focuses on the financial support structure available for the development of the tools and their related activities. As summarised in Table 5, two main similarities exist between the two tools pertaining to their implementation costs. That is, beside that they were established with the funds raised by the founding members and other independent organisations, the tools continue to rely on individual organisations' support to run their activities. However, they also

vary in the categorisation of the support from their sponsors as well as and the timeframe an organisation remains to be a sponsor. For instance, with the GS-A, the sponsorship is categorised depending on the extent of support offered. A Gold, Silver and Bronze title is therefore obtained as a result as illustrated in Table 5. In contrast, with the GS-SA sponsorship, organisations allocate their sponsorship directly to the activities requiring funding at that particular time such as conferences, conventions and tool development activities. There are also opportunities for obtaining a green building leadership title due to other financial commitments made. Although not all aspects pertaining to the operational criteria of the tools are included in this study due to the criteria used, a number of implications and how they affect the promotion of sustainable construction in South Africa are noted as discussed below.

Table 5: Implementation accreditation

	Green star Australia	Green Star South Africa
Green Star running costs	Sponsorship from organisations	Sponsorship from organisations
First launch Sponsorship	GBCA founding members	GBCSA founding members (once off sponsorship)
Other sponsorship categories	Principal sponsor AU$80,000 + GST Gold AU$60,000 + GST Silver AU$30,000 + GST Bronze AU$20,000 + GST	Continuous contribution by green leading organisations, conferences, conventional and rating tools sponsorships

Note: The figures were correct at the time the report was being compiled
Source: GBCA (2013), GBCSA (2013)

Implications of GS-SA operating criteria on sustainability

As the interest for using GBATs to address sustainability continues to rise in various building stakeholders, numerous GBATs are being developed for national or local as well as regional use all over the world. However, as noted by Ding (2008); Cole, (2005); Lützkendorf et al. (2012); AlWaer and Kirk (2012), the challenges in meeting the basic needs of the local society are also increasing. However, studies focussing on individual tools are lacking. In this study, it is noted that the operating criteria of the GS-SA tool has some limitations with regard to the promotion of sustainable construction in South Africa based on the analysis criteria used in this study.

Firstly, with reference to facilitation, it is not clear on how the tool relates to the existing sustainability policies. As demonstrated in the literature, sustainable construction needs to address a broad perspective of development issues including environmental, social-economic, cultural, technology and other life dimensions affecting the human society Hasna (2012) but also enganging various stakeholders

(Du Plessis & Cole, 2011). Although there is a wide range of government set targets to address such issues, the tool focuses more on the quantifiable building related environmental issues (Republic of South Africa, 2011). Therefore, there is a need to find measures to enable the tool complement the existing policies in the country.

Secondly, apropos project accreditation, the criteria used appear to marginalise other buildings within the building sector hence limiting the promotion of sustainable construction in South Africa. For instance it is a requirement for the Design rating certification to be issued where information is considered adequate. Equally, 'As built' accreditation can only be achieved within a 24 month period of the practical completion. Although these targets are attainable by the formal sector, they will remain a challenge for the informal sector to meet such targets. Most commonly, where certain low-cost housing models such as incremental buildings are involved, these targets will hardly met. This is because of the slow construction pace which is relative to the owner's capability to procure the necessary building materials among other factors (Landman and Napier, 2010). Moreover, these building types are among the list of building types excluded in the GS-SA multi-unit residential rating in the country. Therefore, bearing in mind that such projects are concentrated in certain geographical areas, it will not be surprising that registered buildings will also be concentrated in few other geographical locations. Therefore, although the tool is expected to promote competition for the use of green products and processes in the building sector eco labelling will not be very well patronised for products and processes used in such regions. Despite that accreditation or certification is not mandatory, creating a basis to accommodate a wide range of building project types is vital at this early stage for the promotion of sustainable construction in South Africa.

Thirdly, the professional accreditation criteria also raise concerns with regard to its applicability in promoting sustainable construction in South Africa. As highlighted in the previous section, this voluntary accreditation is dependent on an individuals' interest in green issues. Therefore, despite enhancing the knowledge and understanding of one's specific areas of interest, some training related issues provide opportunities for other building practitioners to opt not to participate. For instance, with regard to accreditation cost, an examination fee of R850 (about US$100) is required for the first and every re-sit of the examination a more than 75% pass rate is obtained. However, with low affordability of some individuals, attempts to enrol for GS-SA accreditation training may be ruled out altogether hence limit the accreditation or participation of the underprivileged professionals. That is, where the benefits outweigh the costs, certification for promoting the green issues will be limited hence impinging the sustainability of the construction industry in the country. On the contrary, poor participation or the lack of interest could be attributed to the flaw of awareness of the tool in least represented geographical areas.

Finally beside the fact that the tool is only 5 years old, the small market size in the region (Malanca, 2010), exacerbated by economic instability could also affect the sponsorship of the tool bearing in mind that the GS-SA sponsorship is dependent on companies and organisations. Consequently, few companies might be in a position to

make such financial commitments. Nevertheless, empirical studies to verify these hypotheses are urgently needed. In short, continuous improvement of the operation criteria of the adopted GBATs is highly recommended as means of attaining sustainability in the building and property sector in South Africa. On the contrary, as highlighted by previous authors such as Ding, (2008) further improvements in the GBATs are still needed for the tools to be really useful in the promotion of sustainable construction in SA.

The way forward

A wide range of suggestions on how the GBATs, particularly those adopted for use in other countries or regions, could be designed or modified in order to meet the intended local needs (e.g. Banani et al., (2013) Ibrahim, et al., (2013); Michael, 2013); Säynäjoki (2013). Moreover, Sev (2011); Kajikawa, et al. (2011) , among others, suggest that GBATs developers need to look beyond the environmental aspects when designing or promoting the use of these tools. Therefore, the authors emphasise that these tools need to embrace regional, socio economic and cultural aspects of sustainability (Berardi, 2012; Ding, 2008). However, few though not practical resolutions have been made to date on how to amalgamate the socio-economic issues with the current rating criteria used in most tools. Similarly, there is no clear cut on how to assess the socio-economic aspects (Ding, 2008). Suggestions to develop national and regional tools continue to be raised by various authors such as Lützkendorf (2012) despite the failure of similar attempts, such as the generic GBTool, due to its complexity to use (Ding, 2008), the conflicting goals and different interests among stakeholders (Cole 2006) among other problems. However, achieving such targets is still far from being accomplished. This is even more problematic with the tools meant for developing countries or regions which also have other institutional problems concerning the building sector (Iwaro and Mwasha, 2010).

A few more suggestions for improvement are highlighted here focussing on the operation criteria of the GS-SA tool as a means of promoting sustainable construction in South Africa. One of the ways forward in South Africa is to incorporate the green assessment tools on mandatory basis through the regulatory system. It is appreciated though that, restructuring the institutional regulations to incorporate sustainability issues in South Africa is not only costly but also requires time and political will it is in other countries. In addition, this would marginalise the informal sector even further bearing in mind that the informal sector rarely incorporate policies and regulations in their activities according to Wells (2007); Mushumbusi (2011) just to mention a few. Moreover, if the tools are made compulsory to the building sector, this will prohibit other countries from adopting GBATs such as the GS-SA in the region. However, incorporating the tools could as a way forward in South Africa follows the UK and Singapore examples whose tools are already part of the countries' regulatory systems (Ng, 2013). This is to agree with Malanca (2010) who suggested this as a means for advancing the use of GBATs in Africa.

The second way for improving the performance of the GS-SA criteria is by engaging a wider spectrum of the property industry sectors. As opposed to Kajikawa et al. (2011), who tackled GBATs issues but addressing the building professionals (planners, designers, policy makers, building owners and constructors), here we focus on the individual segments of the building industry. Consequently, besides attracting the stakeholders paying attention operating criterion that involves the informal sector for instance is one of the way forward. For instance, enhancing awareness programmes to reach out sectors currently being marginalised and promoting the public private partnerships in project accreditation process provides other opportunities for taking various sectors on board. Moreover, by taking a leading role in strengthening the GBSA ties with other well established building professional organisations as well as the active building research bodies in the country as suggested in a report compiled by Malanca (2010) on GBATs promotion in Africa also opens further opportunities for engaging other sectors. Consequently, this will not only promote participation by a wider range of building stakeholders but also help to minimise accreditation overhead costs by limiting the number of hired consultants involved in accreditation processes.

Finally, although consultations are already being conducted frequently, empirical studies to establish how the managing criteria meets the stakeholder requirements are urgently needed. Among the studies, a clear definition of sustainability need to be demonstrated in order to properly address the operating criteria associated problems. Although the recommendations presented in this paper focus more on the case study used, similar approaches are applicable elsewhere especially in countries that use adopted tools.

Conclusion

Despite Kibert (2007)'s, perception that GBATs developments had not been fast enough to cope with the level of resource depletion, this can be refuted considering the on-going developments in green building assessment tools (GBATs) for national and international use around the world. Although some are developed for local use, there is an increasing tendency to use them in other countries not able to meet the financial and other technical obligations to develop their own tools with support from the local of international Green Building Councils. Furthermore, well known tools are also increasingly being adopted as alternative means for comparing study findings. The concern to date is on the extent to which these numerous tools are able to address sustainability in various places they are intended for. Although several studies have been conducted to address the problems, analysing their performance in their new contexts has been the main focus in most studies undertaken so far. However, very few on no studies have been conducted on how the tools are operated in their new contexts hence the associated implications. Using the original green star (Australia) and the adopted (South Africa) tools, this study sets a conceptual framework for further studies in this area. Although it is appreciated that the GS South Africa is still in its early stages of development, it is noted that there are a few irregularities in its operating system based on the information available for the evaluation. For instance,

relative to the accreditation criteria used, the system appears to marginalise small projects and non-qualified professionals. One of the reasons could be due to the lack of categories to which these groups could be associated with. Therefore, finding ways to incorporate these marginalised projects and professionals to go green is one of the areas for the GBCSA to address as a way forward to promoting sustainable construction in SA. However, this requires a joint effort by government, private actors and the marginalised groups. Bearing in mind that little empirical evidence exists on how the various sectors are engaged in promoting the GBATs the need for further empirical studies in this emerging field cannot be overemphasised. The suggestions for improvement presented in this paper focus the GS-SA. However, this conceptual framework can be used for improving the managing criteria of adoptive tools in other countries too. This is particularly more important for consideration for countries using the third GS generation tools to incorporate these recommendations whilst in their early stages of development.

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