GREEN BUILDING CHALLENGES: EVALUATING THE OPERATION OF ADOPTED BUILDING ASSESSMENT TOOLS - CASE STUDY

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In recent years, the green building environmental assessment tools (BEATs) are increasingly being adopted from one country to the other. Previous authors have proposed several ways for improving the performance of BEATs precisely, the second generation tools adopted from elsewhere. However, a few studies have focussed on how the tools are operated in their new contexts. Therefore for further advancement of this emerging field in the property and building sector, the current work compares the operation criteria of the original and adoptive tools in order to analyse the implications associated with the adoptive tools hence suggest ways for improvement. Focusing on the Green Star tool as a case study, a few implications have been highlighted relative to facilitation, accreditation and implementation criteria of the tools. Although there is no clear-cut for promoting BEATs based on how are structured, continuous improvement of the BEATs in specific contexts is needed.

Keywords: adoptive countries, building assessment tools, green building, green star tool, operating criteria.

INTRODUCTION

Green building environmental assessment tools (BEATs) are being advocated for use as one of the ways for promoting sustainability in the built environment in most countries in recent years. Although not originally developed for the building industry (Cole 1999), the BEATs are now widely accepted in the building and property sector following the adoption of environmental management certification system based on the ISO (International Standardisation Organisation) 14000 series (Haapio and Viitaniemi, 2008). Consequently, the several tools and methods which exist in developed countries (WGBC 2010) are now rapidly being adopted in other parts not able to develop their own tools. However, (Kibert 2007) considers that the pace in these developments has been slow relative to the rate of depletion of the resources.

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Mpakati-Gama E.C; Wamuziri S.C and Sloan B (2012) Green building challenges: evaluating the operation of adopted building assessment tools - case study *In*: Smith, S.D (Ed) *Procs 28th Annual ARCOM Conference*, 3-5 September 2012, Edinburgh, UK, Association of Researchers in Construction Management, 1257-1267.

Other authors (e.g. Cole, 2005) therefore suggest the need for a common tool as one way of speeding up the developments.

Despite the absence of a common tool, the BEATs are contributing to the advancement of sustainable construction although more is yet to be done (Ding, 2008). So far, the BEATs are being used as yardsticks for minimising the adverse environmental impacts contributed at various stages of a building's lifecycle (Cole 2005; Saunders 2008). As marketing tools, BEATs are also contributing to awareness on use of green building products to various building stakeholders through eco labelling of buildings (Saunders, 2008). It is therefore, not surprising that the BEATs designed for national use are continuously being adopted in other parts of the world despite the social and economic problems affecting the construction and property industry in some countries. Consequently, through the facilitation of the local and World Green Building Council (WGBC), well established BEATs are available for use to those undergoing economic and structural problems to formulate their own tools.

In spite of these on-going developments, the performance and operating systems of the BEATs appear to continue haunting their contribution to sustainable construction in most countries. A few attempts have been made by previous authors to analyse the performance of original and adopted BEATs. Most of these compare and contrast various combinations of tools with reference to various factors. For instance, Xiaoping *et al.* (2009) compared and contrasted the similarities and differences of some mainstream tools used in Japan, United Kingdom, United States of America, China, Singapore and the internationally designed Green Building Tool (GBTool). Similarly, Crawley & Aho (1999) compared and contrasted the potential marketing applications of BREEAM (Building Research Establishment Environmental Assessment Method), LEED (Leadership in Energy and Environmental Design) and others. Furthermore, Cole (1999) contrasted how the greenness or sustainability of the building environmental tools could be described although not concentrating on a particular tool. Finally, Potbhare *et al.* (2009) also highlighted the changes made to the LEED-US (n-c) to make it suitable for the Indian context. Interestingly, so far, a few efforts have been made to evaluate how the adopted tools are operated in their new contexts compared to the original counterparts.

Therefore, using the Green star as a case study, this study compares and contrasts the operation of the Green Star tools in the countries of origin and the new contexts. The review study is based on an intensive literature of an on-going academic research to find ways for promoting environmental sustainability in the construction industry in developing countries. In this paper, the limitations associated with the adopted BEATs are operated in promoting sustainability in the building and property sector are analysed. For the purpose of this study, operation of the tools signifies the various procedures involved in the entire certification process. However, the focus in this study is limited to facilitation, and implementation and the accreditation procedures. In contrast, performance of the BEATs, though not the major focus in this study, is defined as the effectiveness of the BEAT in assessing the environmental implications of a building or a project. That is, performance is not related to the building's rating results at operational stage of its lifecycle as defined in the latest Green star performance tool under development (GBCA, 2012).

BUILDING ENVIRONMENTAL ASSESSMENT TOOLS - BACKGROUND

The past decade has seen a rapid development of building environmental assessment tools (BEATs) in many countries. Although the rate in the developments of BEATs is not fast enough to cope with the level of resource depletion in most regions (Kibert 2007) several BEATs have been developed so far to encourage sustainable development at global and national levels. This section provides a brief overview of the mainstream tools and their advancement in adoptive countries. As highlighted by previous researchers, the BEATs used in United Kingdom, Japan, Australia and the United States of America are part of the most well-known tools commonly used for green building assessment. BREEAM in particular, is the first comprehensive and commercially available green building tool developed in the UK in 1990 (Crawley and Aho, 1999) by the Building Research Establishment (BRE). BREEAM was basically aimed to be used by engineers and surveyors in life-cycle costing of buildings (Tam *et al.* 2004). However, BREEAM has since been used for eco-labelling to address the local and global ecological issues attributed to the building industry in the UK (Ibid 2004; Crawley and Aho 1999). With a similar aim, several tools have developed in different countries to date following BREEAM. The Leadership for Energy and Environmental Development (LEED-US) tool for example, is the first tool designed for environmental assessment of buildings in the US. Although its first version focussed on the operational level, with much emphasis on technical aspects related to energy use (Saunders 2008; Tam *et al.* 2004), there are now several versions concentrating on several other environmental issues. Similarly, the Australian Green Star tool addresses a wide range of environmental aspects based on the 10 versions launched since its first launch by Green Building Council Australia (GBCA) in 2002 (GBCA 2012). Although these tools are meant for national use, buildings can be registered with more than one tool despite the problems to compare the results due to a variation in rating tools and assessment criteria used (Saunders 2008).

Figure 1:Developments in adoptive adoption of BEATs

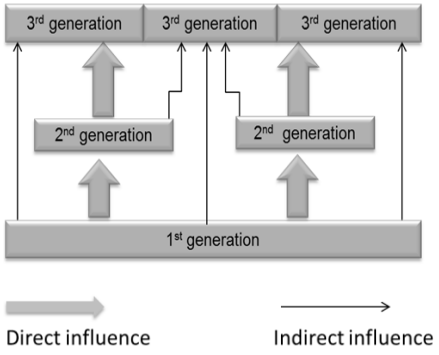

Table 1: Examples of original and tools at different levels

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

Sources: GBCA (2012); Malanca (2010), Xiaoping et al. (2009); Cole, 2005

As the interest in green building and eco labelling continues, most of the national tools are being adopted in other countries which are not able to develop their own. LEED-India, Green Star South Africa and HK-BEAM (Hong Kong Building Environmental Assessment Method) are few examples originating from the LEED-US, Green Star-Australia and BREEAM respectively (table 1). Previous authors such as Xiaoping *et al.* 2009; Ding 2008 etc. provide details of other tools established in various countries.

Xiaoping *et al.* (2009) in particular, figuratively demonstrates the three hierarchical levels of change as illustrated in figure 1. As the levels increase, the operating processes also keep on being modified to suit the next contexts' needs. The changes could however be in response to previous authors' recommendations (e.g. Cole 1998; Ding 2008 and Kyrkou *et al.* 2011) on how to improve the performance of the adopted tools. Potbhare *et al.* (2009) provide a detailed outline on how the Leed-US new construction tool was modified to suit the local Indian green building assessment requirements. In contrast, some authors consider that the changes being made appear to increase the disparity between the original and the new tools (Xiaoping *et al.* 2009). However, this can be well discussed based on typical examples.

OPERATION OF GREEN STAR AUSTRALIA AND SOUTH AFRICA

General overview

Green Star is one of the rating tools developed in Australia to address a wide range of environmental aspects related to buildings. Under the facilitation of the Green Building Council Australia (GBCA), who also owns it, more than a few versions have been developed since its first launch in 2003 (GBCA 2012). The existing 10 versions aim to address office, retail and residential building environmental aspects while the 2 forthcoming versions aim to address the performance and community related issues at a building's use stage. Although originally designed for the Australian property industry, the GBCA permits other GBC's to use the Green Star directly or indirectly. With Green Star tool adoption procedures, the adoptive GBC is given a mandate to conduct all the required processes in contrast to other BEATs such as the LEED-US where the mother GBC takes the responsibility of most of the operating activities (Potbhare 2009). However, a mandate for the Green Star certification is only given where the financial and legal agreements are made with the mother body, the GBCA (Malanca 2010).

Hitherto, there are several examples of Green Star Australia based BEATs. The Green Star South Africa (GS South Africa), based on the Green Star Australia (GS Australia), is a typical example of a directly adopted Green Star tool. Launched in 2008, the GS South Africa has 2 operational versions, 1 pilot and one other version under development (GBCSA 2012). To date, the GS South Africa is being used in other countries not able to meet the financial and other technical obligations to adopt the original Green Star Australia. Ghana Green Star is an emblematic example in this respect. It is based on the Green Star South Africa but also follows the original Green Star Australia assessment requirements indirectly. Currently, it is unclear on how such tools are being operated as most of them are still in their early stages of development. For this reason, these have been truncated from the present study. Therefore, the operation comparison presented below only represent the second and third generation of Green Star tool, using the illustration in figure 1.

Operation the original and adopted Green Star tool

As defined earlier, operation of the tools in this regard refers to the processes of facilitation, implementation and the accreditation of the various tools. With reference to the Green Star in Australia and South Africa, the GBCA and GBCSA are responsible for facilitation, implementation and accreditation of their tools as summarised in table 2. As would be expected, there are some similarities between the two tools considering that the latter is based on former tool. On the contrary, some

disparities also exist due the changes made to the Green Star South Africa to make it compatible to the local conditions.

With regard to facilitation, both the GBCA and GBCSA are not only responsible for the ownership, development and running of the tools but they are also in charge of the review processes of the rating tools. The reviews for both tools are based on public consultations and stakeholder inputs although it is not very clear on how the GBCSA conduct the consultations. Despite the similarities in development and the review processes, a number of disparities also exist. For instance, paid consultants and voluntary members of the Technical Working Group are involved in the GS-SA tool development while the Green Star Faculty, comprising of 18 individuals from member organisations, is responsible for similar actions related to the GS Australia. The other difference is that the GS Australia is extensively advocated through the government institutions such as the federal, states and territories as well as the local government. In addition, it contributes to review and proposal of sound sustainability policy guidelines. In contrast, it appears that the GS South Africa is not well embraced in most of the cities based on the case studies presented by the GBCSA (GBSA, 2012).

Beside facilitation is the accreditation or certification process. This which is grouped here into two categories namely, projects and professional accreditation systems (see Table 2). Although it cannot be generalised, the project accreditation processes are persuaded by the local GBCs for both the GS South Africa and the GS Australia tools. However, the third party or independent assessors are involved in the preliminary assessment and scoring which are based on both the rating criteria and the level of assessment requested by the applicant. However, with the GS Australia, a member of the project team can purchase the assessor's manual to conduct an assessment of a particular project although the final score is determined by the assessing panel. Therefore, the project will be awarded depending on the rate of pass ranging from a minimum of 45 points at both the design and also construction stages. Contrary to the GS Australia criteria, 2 different certificates are issued for the GS South Africa project rating, referred to as 'Design' or 'As built' certification. Furthermore on project accreditation, the Green Star South Africa provides 2 extra points to the project incorporating an accredited professional from the beginning of the project. In contrast, the GS Australia offers a fee discount to accredited members at project submission stage. This therefore demonstrates that, although the award systems are different, the professional accreditation qualifications or membership of an organisation is vital at project submissions stage of the accreditation process. So far, project accreditation is not required by law in both Australia and South Africa hence the progress may not be as fast as the need to promote sustainable construction is. However, the labelling credits obtained by participating individuals or organisations provide further opportunities for marketing of the building to the environmental conscious customers although this is considered to work better in matured markets as discussed later.

Unlike the project accreditation, whose criteria are more or less similar, wider differences exist between the two tools with regard to professional accreditation. For instance, with reference to the GS Australia, independent assessors are responsible for the professional accreditation through the issuing of certificates while the GBCSA is liable for the running of the courses to qualify for building assessment for Green Star in South Africa. Similarly, full training with the green Star Faculty is a requirement for one to qualify as a GS Australia assessor although alternative arrangements including online courses are also available. In contrast, attendance of an interactive

multi-disciplinary accreditation course is a necessity for the GS South Africa followed by an examination.

Although a one off examination fee payment of R850 (about US$100) is enough for the required online examination, payments are recurring until one has obtained not less than 75% passing rate in order to qualify as a GS South Africa assessor. In contrast, the GS Australia course fees are payable depending on the mode of training. These include the in house for member organisations or public course, further area of inspiration or continuous professional development (GBCA 2012).

The final aspect, implementation, relates to the financial support structure of the tools. Similar to facilitation and implementation criteria, there are some similarities and differences between the GS Australia and the GS South Africa with regard to the implementation criteria. For instance, both the GS South Africa and the GS Australia, whose first launch was funded by the founding members with support from other organisations, continue to rely on individual organisations sponsorship to support the development of new versions. The GS Australia categorises them as principal, Gold, Silver and Bronze sponsors depending on the extent of support as detailed in Table 2. On the contrary, sponsorship of GS South Africa tool is directly allocated to the activities being sponsored. That is, apart from the sponsorship made with the founders of the tool, conferences, conventions and tool development sponsorships are always needed from those who are interested in becoming green building leaders. In principle, individual and organisational membership financial support is the one major financial source for implementing these tools. Therefore based on these criteria, a few implications are considered to affect the performance of the Green Star South Africa tool with respect to the way it is operated.

Table 2: Operation criteria of Green Star tool in Australia and South Africa

Operation criteria	Green star Australia	Green Star South Africa
Facilitation		
Tool ownership	Green Building Council Australia (GBCA)	Green Building Council South Africa (GBCSA)
Responsible parties for tool development	Green Star Faculty (made of 18 individuals from member organisations)	Paid consultants, voluntary Technical Working Group
Tool updates and reviews	Through public reviews and stakeholder feedback	Consultations
Promotion	Though local Government institutions, contribution to green policy guidelines	Not specified
Project accreditation		
Accrediting body	Third party certified assessors	Independent assessors
Assessment requirements	Voluntary	Voluntary
Accreditation (certification) procedure	2 rounds of submission and assessment. Score based on assessment panel's recommendations and GBCA awarded credits	2 main stages: submission and scoring processes. 2 extra points awarded for including an Accredited Professional
Certification obtained	Green Star Certified Rating to project score of 45 plus	Design certification and As Built certification
Fee structure	Based on total ground floor area Members obtain a fee discount	Based on project ground floor area
Professional accreditation Accrediting body	Green Star Faculty (third party)	GBCSA
General procedure	Face to face, online courses and continuous professional development courses	Interactive multi-disciplinary accreditation course and Green Star SA 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
Implementation		
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

Source: GBCA (2012), GBCSA (2012)

IMPLICATIONS OF THE OPERATING SYSTEM OF ADOPTIVE GREEN STAR IN PROMOTING SUSTAINABILITY

As much as the advancements in the adoption of BEATs are contributing to ways of advancing sustainable construction in a number of countries, it appears that there are also some implications associated with how they are operated. Focussing on the Green Star South Africa, as summarised above, one of the major implications related to facilitation for instance is the lack of compatibility between the tool and the existing policies. Although there is a wide range of government set targets to address greenhouse gas emission and other building related environmental issues, it is not clear on how the tool is amalgamated with the existing sustainability policies and regulations or vice versa. Consequently, as it is with most adoptive tools, there is little evidence of the GS South Africa's contribution towards the local policies addressing the building environmental issues to supplement what is stated in the mission or vision statement. This is even more problematic with the next generation tools with reference to those states without clear environment and sustainability policies as previously discussed by Mpakati-Gama *et al.* (2011).

The other implication relates to the accreditation procedure. The GS South Africa for example, assesses buildings at two different stages namely; 'design' and 'As built' accreditation. Although a design certification is not a prerequisite for obtaining the 'As built' accreditation, there is a requirement that these have to be achieved within a 24 month period of the practical completion. Although this is practically possible, it is still problematic with some low cost projects. For instance, most of mass projects involving low income families are built at different phases and at owner's pace relative to financial availability. Such buildings, which have no certain completion schedule, seldom meet the basic assessment requirements for registration or certification based on how the GS South Africa operates. Therefore, this remains one of the great challenges for most less industrialised countries to deal with in promoting the use of BEATs focussing in low-cost housing projects.

Another area of concern relates to the professional accreditation method employed and applicability in promoting sustainability. As discussed earlier on, trained and accredited professionals conduct the assessment of projects and also submit them for registration and other evaluation processes. Although the training enhances the knowledge and understanding of the trainees in their areas of interest, accreditation depends on the interest of the organisations or individuals in green issues. Eventually, for some reasons, others would opt not to participate if this outweighs the benefits. A few major examples with professional accreditation are the prohibitive training procedure and the examination costs particularly recurring payments for resitting examinations. In a long run, the extra expenses to new and underprivileged professionals limit participation although empirical studies are needed on this.

Finally, focussing implementation of the tool, a few implications exist based on the way the adoptive tools are operated. As indicated earlier, the award system promotes competition for the use of green products (Saunders 2008). However, in places like Africa, it appears that there is little contribution the eco labelling or certification has made so far possibly due to the small market size as highlighted by Malanca (2010). Consequently, there is slow progress in its development. The slow progress could however, be exacerbated by financial implications involved at various stages of the assessment and accreditation processes. As it is the case with the GS South Africa, sponsorship of the activities is dependent on companies and organisations. However,

very few companies and individuals in last developing countries, most of which rely on government funding for running their projects, are not only unavailable but also would be able to make such financial commitments. In contrast, poor participation could be due to the lack of interest to advocate the Green star tool in particular geographical areas. With reference to the GS South Africa, the available few registered buildings appear to be located in certain cities but not others not that some are more environmentally conscious than others but this would also be to lack of awareness. Some recommendations are highlighted below as a way forward.

RECOMMENDATIONS FOR IMPROVEMENT

A few recommendations presented here are not only applicable to the case study but also other parts facing similar problems. In South Africa, where the tool is already operational, extension programmes are required to involve a wider spectrum of the property industry. According to Malanca (2010) incorporating the green assessment tools in the policies on mandatory basis is considered as a way forward is to advance the use of BEATs hence sustainable construction. Even though this appears to be one of the appropriate ways, there are also several problems Malanca (2010)'s suggestion may come across. For instance, restructuring the regulations to incorporate sustainability policies in most countries is not only costly but also requires ample time and political will as highlighted previously by Mpakati-Gama *et al.* (2011). In addition, incorporating them in regulations will marginalise other groups such as the informal sector who rarely follow the policies and regulations. We therefore suggest the involvement of other active bodies to take a leading role as demonstrated elsewhere in the literature. For example, in addition to the African Architects Union already involved in influencing building professionals need to incorporate the green building assessment at design level (Malanca 2010) while the national construction councils where they exist, can facilitate the operation of the tools alongside or in the absence of formal GBCs. Consequently, this will help to cut the number of hired consultants, avoid voluntary assessors and consequently, minimise the assessment overhead costs over the entire process. Subsequently, this will promote participation by a wider range of building stakeholders although the challenge to incorporate the informal sector to go green requires further actions by various actors. Promoting the public private partnerships operating in most countries is one of the opportunities to be utilised as a way forward to take the informal sector on board. On the contrary there is need to create more new accreditation categories to accommodate the marginalised professionals and projects. This therefore will not only promote membership but also promote marketing of projects under the new category. However, a clear definition of sustainability requires to be worked upon by a wide range of stakeholders promoting the green building tools for easy understanding of various stakeholders.

CONCLUSION

Focussing on the adopted Green Star South Africa, this work provides a conceptual framework for future empirical studies to improve the operating procedures of BEATs in adoptive countries. It should be appreciated that the GS South Africa used as a case study is only just about 5 years ago hence it's still in its early stages of development. Consequently, its contribution will take a while to be evidenced. On the contrary, based on the operating criteria currently in use, it appears that both the small projects and new or non-qualified professionals are marginalised on the eco market. However, there are a number of opportunities that can be utilised for further improvements

briefly summarised in this paper. Finally, as sustainability marketing tool, the BEATs need to be promoted through awareness programmes to reach various building sector categories including the informal sector which currently appear to be marginalised. This will not only promote the marketing tools but also enhance sustainable practices in the property and building industry at all levels. However, so far, there are a few studies conducted on how the green assessment tools are operated particularly with reference to both original and adoptive tools from which comparative studies on their operation can be based. Therefore, the need for further empirical studies in this emerging field cannot be overemphasised.

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