The Development of Environmental Labeling of Buildings; a case study of Sustainability Applications in UK, Iceland and Egypt

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Abstract

International and governmental pressures to promote concepts of Sustainable development globally and within build environment sector are rapidly evolving. This is resulting in innovative and increasingly smart systems being used to bring down CO2 levels , and associated environmental impacts of buildings. In addition methods to measure and minimise environmental impacts are being used and applied rapidly to ensure buildings are more energy efficient and can adapt to ever changing climatic conditions.

Sustainability Research within the Architecture and built environment, has been driven by environmental labelling schemes for buildings e.g BREEAM, LEED, , Estidama. The basis of the schemes is a rating certificate awarded to individual buildings , which outlines the performance of building against a defined environmental criteria.

The application of such systems has particular relevance to the Middle East where there is environmental pressures on water resource and fragile ecosystems. This paper describes processes involved from planning and implementation of sustainability labelling scheme with designers, researchers , architects and planners to, selection of the suitable and country specific indicators , and the development of country specific scheme. It is not possible to have a scheme that address each and every country's environmental issues , so the points, and indicators have to correlated to address specific issues within each country.

The paper concludes that local environmental conditions are increasingly important in the selection of an appropriate system and the promotion of sustainable development within the build environment, and not one labelling scheme offers an overall solution to environmental problems.

Background to Environmental assessments

The first simplified environmental assessment and certification system developed internationally was the BREEAM rating system developed in the UK in 1990. Interestingly, the motivation for developing BREEAM came from a group of private sector speculative developers (led by Stanhope plc) wanting to differentiate the quality of their buildings from their competitors in a boom market.(Stanhope Plc)

At the same time, the protocols and standards for Life Cycle Environmental Assessment were under development and adaptation from product assessment to buildings assessment. There was a tension between the 2 constituencies – BREEAM was perceived as simplistic, but LCA was perceived as impossibly complex and impractical, especially for buildings which are composites of materials and products which must be reconciled with the lifetime operational performance of the buildings. In many European countries these initiatives continued in parallel and were then reconciled over time – BREEAM now uses LCA based credits for materials used based on comparative elemental LCA profiles.

ISO 14000 for Environmental Management Systems was also launched around this time and later mandated for use by suppliers to the European Commission. This created a potential for coordination between the design and operational performance and management of buildings. (Howard N, 2005)

BREEAM and LEED

BREEAM is run by Building Research Establishment (BRE) and over the past decade the UK version has been adapted for use in many other countries. This environmental assessment method is generally accepted as having widespread support in the UK. (Holmes and Hudson 2001) The objectives of BREEAM are stated as:

> (1) To distinguish buildings of reduced environmental impact in the marketplace
> (2) To encourage best environmental practice in building design, operation, management and maintenance
> (3) To set criteria and standards going beyond those required by law and regulations
> (4) To raise awareness of owners, occupiers, designers and operators of the benefits of buildings with reduced environmental impact.

The assessment method gives outcomes as credits; the classification of the assessment is then based on the number of credits. Classifications are Pass, Good, Very Good and Excellent. Objectives 1, 2 and 3 are relatively easily met. The assessment method and certification process itself provides a method of distinguishing buildings of reduced environmental impact as well as an encouragement for their use. In the USA a similar system exists known as LEED run by the Green Building Council, which has Certified, Silver, Gold and Platinum categories (USA, Green Building Council)

Case studies from UK and Iceland

In the following section we will compare two BREEAM case studies one from 2000, and one from 2009 and try and identify which changes have occurred in terms of mechanisms for improving sustainability in Built Environment

CASE STUDY from the UK

The focus of the case study was an 11,150m2 office development, which has been converted from a redundant post sorting office (Figure 1). The four-storey post-war building is constructed in cavity brickwork in a square U shape with the two points of the U facing south.

Figure 1 central square external view (Holmes and Hudson 2001)

"The structure is very robust with reinforced concrete floors and roof and two basement levels. Single storey buildings in the centre of the U were demolished and the space used to create an atrium with a white fabric roof and incorporating a spectacular, sculptural, open staircase. See figure 1 The final assessment was then carried out and a final score of 73 ('excellent') was achieved. Table 1 summarises the changes made to the design to achieve the 'excellent' rating". (Holmes and Hudson 2001)

It was reported by Holmes and Hudson that the objective of a BREEAM 'excellent' rating influenced both the original design of the building and the refining stage, to optimise the score. During the design phase, the engineers encountered difficulty in sourcing materials to meet the BREEAM constraints. This was very time-consuming, but it was important to ensure that the specified materials were readily available, especially when there were pressures to change the specification during the construction phase.

Table 1: The changes made to the design to achieve the 'excellent' rating

Water services	Specification changes were made to include smaller cistern sizes and aerating taps. Additional urinal flushing controls were included.
Landscape planting	Planting species were changed to support city wildlife habitat.
Ventilation services	Façade details were amended to include a higher percentage of opening windows.
	Air intake and exhaust positions were re-sited to avoid potential local pollution sources.
Building design	Changes were made to provide a separate outside building for smokers and a separate storage area for recyclable materials.
Materials	Specification changes were made to source 'greener' materials for windows, insulation and timber.

Changes made to the design (Table 1) could be considered minor and not a fundamental change in design philosophy of the building

Case study from Iceland

BREEAM has been applied to two visitor centres in west and east of Iceland, and a centre for Icelandic studies . The client wanted a Practical , trustworthy , accepted method of assessing building which showed consideration about the local environmental conditions in Iceland. Iceland as a unique country has many features which can provide the ideal conditions for the creation of a sustainable building, such as significant reliance on renewable energy supplies (Valdimarsson 2009). The Icelandic authorities thought the system provided an excellent checklist for good design , and allowed for decisions to be made earlier in the design process. However the system does not seem to adjust to Icelandic reality, some of the criteria seem to be weak compared to Icelandic benchmarks. In additions there are issues surrounding accountability of CO2 production and renewable energy use (Birgisdóttir.2009)There are a number of country specific factors and considerations that have to considered when implementing a environmental assessment system for any specific country. In summary BREEAM has been useful as benchmarking tool for icleand, however some aspect of the tool do not translate well.

Is BREEAM suitable for any country?

The expansion of the BREEAM Scheme has led to the development of the BREEAM international and Bespoke (other buildings) to cater for the needs of other buildings, e.g theatres, swimming pools. BREEAM International has been developed as a reaction to the needs of other countries and it takes into account local planning requirements for that specific countries. Examples of international standards are BREEAM Retail Europe and BREEAM Gulf.

For a benchmarking tool to work well the following are considered important

- Verifiable
  Easily understood and capable of being provided at reasonable cost. The systems needs to be complimentary or linked to specific regulatory system in that particular country against which the credits can be achieved. Thus making it possible to have improvements and measurable against established guidelines. In addition the system while maintaining some kind of regulatory, administrative and mathematical complexity it needs to be an easy enough tool to be applied and used by assessors of various bodies from governmental departments to commercial organsiations

- Appropriate to climate and local environment.
  The BREEAM system for example, having originated in the UK gives low priority to water conservation, whereas BREEAM Gulf has been adapted for the local market. Gone are the Good, Very Good, and Excellent ratings, and in comes star ratings. The weightings are changed so that water is the key issue, rather than energy as in the standard UK schemes. In addition to the CIBSE guidance being the measure for certain credits, ASHRAE and other standards are also now referenced in BREEAM Gulf (BSRIA 2009. BREEAM –or LEED).

- Appropriate to the professional infrastructure
  For example the 'considerate constructor' credit in UK relies on the existence of an independent construction inspection scheme. If a region or a country does not have such a scheme, then another method of demonstrating this aspect of the environmental labeling scheme needs to be developed

Examples of other environmental benchmark system in UAE and Egypt

Estidama means sustainability in Arabic is a sustainable way of living. It is not a programme, or a rating system, but an overarching way of viewing all aspects of our life based on its 4 areas, environmental, economic, social, and culture, to ensure that its sustainable goals and aspirations are well rounded. Estidama,

It was recognized early on that significant industry knowledge and capability has been created around widely adopted green building programs such as BREEAM, LEED and Green Star.

"Rather than create a new program, Pearl rating system is striving to harmonize the criteria within these programs, so that developers and their consultants can draw upon programs with which they are most familiar, in the pursuit of a Pearl Rating". (Estidama, common Questions 2009)

Under development the HBRC in Egypt is the building labeling system called the Green Pyramid scheme . A team of Researchers are trying to develop a criteria for environmental

assessment system and by carrying out a interactive workshops, and international collaobration. It was realized that a system developed has to take into account specific conditions relating to Egypt, the system under development is called the Green Pyramid (HBRC)

Have Environmental labeling systems approach changed over the last ten

As can be seen from the discussions of the paper that these systems are trying to address environmental change, through targets whether its 10 years ago or now, they are a tool to deliver change in the built environment. The targets set by building environmental assessment tools should be attempting to approach these levels of improvement, particularly in respect of energy efficiency. Assessment tools need to raise standards, in increments and over time frames that are challenging within the prevailing market conditions. These finding are supported by(Burnett 2005) see diagram below ,Gains resulting from the implementation of assessment tools have already been realised. For example, in the US, improvements of around 30% over benchmark have been reported for buildings qualifying for the LEED silver award.

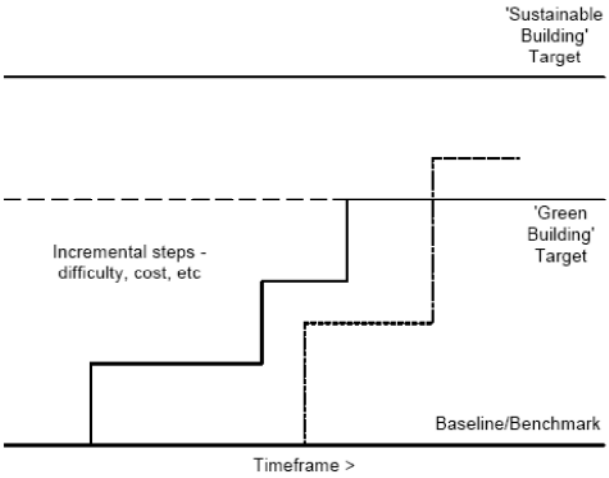

Diagram 1 Raising standards over time (Burnett 2005)

Design Stage (DS) and Post Construction Survey (PCS)

The BREEAM methodology and tool has been revised in 2008, and now includes a Post Construction Survey (PCS). This means that assessment will ensure that any environmental modifications made at the design stage are continued to the built phase (Building Sustainability 2008)

Credits for innovation

In addition to the above under BREEAM 2008, credits will provide extra recognition for innovations that improve a Building's sustainable performance that are not covered under the usual assessment. (Sustainability in Buildings; A new Face for BREEAM 2008)
There are two ways to achieve these:

- By exceeding the exemplary performance level requirements of an existing BREEAM topic
- By having a feature of the building or a process assessed by BRE Global deemed "innovative".

Conclusions

It can clearly be seen that there is a gradual worldwide movement towards worldwide giving sustainability ratings for building whether its BREEAM or one of the other schemes. This paper has identified that environmental benchmarking systems can influence early stage design, with the aim of promoting sustainable building practice. The systems have been developed across many regions and are similar in terms of environmental consideration and ratings,

Whilst it can be seen that the systems promote sustainability, It does not deliver a step change in thinking in terms of changing the way in which buildings are used or promoting wider sustainability. The Iceland case study indicates some weakness in using the BREEAM methodology in that region and future development of these tools should examine opportunities for local variations for these tools.

References

Birgisdóttir.,H. (2009) Experience From Current BREEAM projects. What does Icelandic sustainable building approach need to include? EFLA Consulting Engineers Iceland

BSRIA. BREEAM or LEED - strengths and weaknesses of the two main environmental assessment methods www.bsria.co.uk/news/breeam-or-leed/ [assessed 22.12.2009]

Building Sustainability BREEAM, LEED, REGULATIONS & THE CODES http://www.building.co.uk/sustain_section.asp?navcode=3732 [assessed 15.1.2010]

Building Sustainability A new face for BREEAM http://www.building.co.uk/sustain_story.asp?sectioncode=32&storycode=3115416#ixzz0et0b6f2t [assessed 15.1.2010]

Burnett.,J (2005) ASSESSING THE PERFORMANCE OF BUILDINGS – ONLY THE FINAL PRODUCT COUNTS!The 2005 World Sustainable Building Conference,Tokyo, 27-29 September 2005 (SB05Tokyo)- 1621-1628 –

Estidama www.estidama.org [assessed 5.2.2010]

Holmes., J and Hudson.,G (2001), The application of BREEAM in corporate real estate: A case study in the design a city centre office development Journal of Corporate Real Estate Volume 5 Number 1

Housing and Building National Base http://www.hbrc.edu.eg/ahbrc/ [accessed 12.12.09]

Howard., N (2005) BUILDING ENVIRONMENTAL ASSESSMENT METHODS: IN PRACTICE The World Sustainable Building Conference,Tokyo, 27-29 September 2005 (SB05Tokyo)

The Stanhope Cooperation http://www.stanhopeplc.com/?page=51&id=543 [assessed 8.12.2009]

The USA Green Building Council http://www.usgbc.org/
BREEAM: the Environmental Assessment Method for Buildings Around The World http://www.breeam.org/[assessed 10.2.2010]

Valdimarsson., Ó (2009) Using environmental assessment methods in procurement and construction of public buildings in Iceland, Government Construction Contracting Agency – Iceland