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OPERATIONALISING THE BELLAGIO STAMP USING SELECTED NEIGHBOURHOOD SUSTAINABILITY ASSESSMENT FRAMEWORKS

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ABSTRACT

The 21st century has heralded a plethora of Neighbourhood Sustainability Assessment Frameworks through which a proposed neighbourhood development can be evaluated against an array of Sustainability Indicators (SIs). As these assessment tools continue to become the definition of a sustainable neighbourhood in different context due to their wide acceptance, it is essential to establish a global methodological framework for Sustainability Assessment at the neighbourhood level. This paper operationalises the Bellagio STAMP using the BREEAM Communities; LEED ND V4; PCRS; and the Green Star Communities. This is with the aim of arguing for a consensus approach to Sustainability Assessment at the neighbourhood level. Coupled with this, is to critically review if these selected assessment frameworks could lead to more sustainable neighbourhoods as envisaged. Findings from the study revealed that some of the selected assessment tools align partially with the Bellagio STAMP in their development as discussed in the paper. This study recommends that the Bellagio STAMP could be adopted to offer helpful guidelines and procedure in conceptualising Sustainability Assessment at the Neighbourhood level especially in developing countries where such a framework is yet to be conceived.

Keywords: Bellagio STAMP, methodological framework, sustainable neighbourhood, sustainability assessment frameworks, sustainability indicators.

INTRODUCTION

Sustainability discourse has continued to take the central stage in academic, professional, and government conferences (Komeily and Srinivasan 2015). This emphasis is attributed to the urgency to ensure that at all levels of spatial developments, there are places where people can live, work, and enjoy good quality of life whilst still maintaining the earth's current capacity (Roberts 2009). Undoubtedly, the constraints of climate and demographic changes coupled with changes in social needs and a decline in both natural and physical resources are also the driving forces in this campaign (Deakin and Curwell 2004; Girardet 2015; Lehmann 2015). Consequently, the sustainability crusade birthed several initiatives, one of which is sustainability assessment which is a tool to direct decision towards sustainability (Hacking and Guthrie 2008). Since its emergence for use at the neighbourhood scale of spatial development, it has been the front banner in the campaign for urban

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sustainability (Cashmore and Kornov 2013; Berardi 2013). Interestingly, as Sustainability Assessment Frameworks continue to take a foothold in the campaign for sustainable urban planning, several principles have emerged in literature (Gibson 2013; Reed, et al. 2006; Haapio 2012; Hacking and Guthrie 2008) which are to serve as practical guidelines in developing a Sustainability Assessment Framework both in content and in practice (process). Amongst these principles is the Bellagio STAMP which is the most widely recognised set of principles for Sustainability Assessment (Pinter, et al. 2012). While there have been few studies on the Bellagio STAMP (Sala et al., 2015; Pinter et al., 2012), no evidence in literature of a study to give a practical insight of how the Bellagio STAMP can be operationalised in terms of its application and in the development and implementation of an assessment framework. This raises a question of the validity and applicability of the principle.

This gap led to this study which is aimed at operationalising the Bellagio STAMP using selected neighbourhood sustainability assessment framework in order to provide a better understanding and give practical insight of the Bellagio STAMP. Furthermore, it is anticipated that could lead to the adoption of the Bellagio STAMP to serve as common basis for assessing sustainability. The study is guided by the question: can the Bellagio STAMP be adopted as a global methodological framework for Sustainability Assessment at the neighbourhood scale? The other sections of the paper are as follows: Section 2 introduces the evolution of neighbourhood sustainability assessment frameworks and the principles for its development; section 3 explains the methodology for the study while sections 4, and 5 presents the results; discussion and conclusions of the study respectively.

BACKGROUND

Sustainability Assessment and the Evolution of Neighbourhood Sustainability Assessment Frameworks

Sustainability assessment framework emerged in the closing decades of the 20th century as one of the several initiatives to ensure urban sustainability. Sustainability Assessment according to Pope et al. (2004), Cashmore and Kornov (2013), and Sala et al. (2015) is traceable to both Environmental Impact Assessment (EIA) and the Strategic Environmental Assessment (SEA). It identifies, predicts, and evaluates the likely impacts and consequences of wide range of initiatives and alternatives on sustainable development (Devuyst 2000; AlWaer and Kirk 2015). Sustainability Assessment has attracted appreciable interest and acceptance through its usage most especially with the development of the assessment framework at the neighbourhood level as master plans can now be evaluated against a number of predefined sustainability criteria (Wangel, et al. 2016). Assessment frameworks for sustainability at the neighbourhood emerged around a decade ago, which was propelled by Agenda 21 and the need to enlarge the scale of assessment to the neighbourhood level. This was also as a result of the discovery that the pioneer Building Environmental Assessment (BEA) tools are inadequate in assessing the impact a proposed development on the environment (Cole 1999; Berardi 2011; Komeily and Srinivasan 2015).

Although Neighbourhood Sustainability Assessment framework is still overwhelmingly used for the appraisal of sustainability of the design and development plans of new-medium and large-scale neighbourhoods (AlWaer, et al. 2014; Sharifi

and Murayama 2013), it has found applications beyond assessment purposes as it now being used for certification. It is gradually becoming the standards for the definition of sustainability in the built environment (Berardi 2011). It can be used as a development guide in shaping sustainable neighbourhoods (Yigitcanlar, et al. 2015). Beyond these, it can be used as a tool for urban neighbourhood regeneration (AlWaer, et al. 2014), performance assessment, and a tool to promote community engagement (Joss, et al. 2015). Consequently, several Sustainability Assessment Frameworks dedicated for use at the neighbourhood scale of spatial development have been developed in various nations of the world with a driving vision to drive urban sustainability. Pioneering the movement of Neighbourhood Sustainability Assessment Framework was the development of HQE2R between 2001 and 2004 and Earth craft communities in 2003. Subsequently, in 2006-2009, the CASBEE-UD, the U.S. Star community Rating System (STAR-CRS), LEED Neighbourhood Development (LEED –ND), and the UK BREEAM communities (BREEAM-C) were launched. Most recently, the German system DGNB New Urban Districts and the Australian system Green Star Communities were launched in 2011 and 2012 respectively (Wangel, et al. 2016).

The Bellagio STAMP

In developing a sustainability assessment framework, Gibson et al. (2005); Reed et al. (2006); and Haapio (2012); Hacking and Guthrie (2008) identified the following key principles: (i) Change the unsustainable practices by advocating that projects, plans, and development contribute to desirable and durable future; (ii) Adequate coverage by integrating all issues that influence our prospects for a sustainable future; (iii) Seek mutually reinforcing gains and minimize trade-offs; (iv) Context-specific; (vi) Public participation in its development; (vii) Sustainability Assessment should not be a deviation from the national bibliography, recommendations, national regulations, building codes, cultural heritage, way of living, and building culture. However, the Bellagio STAMP has remained the most widely acknowledged principle for Sustainability Assessment which offers helpful and holistic guidelines for Sustainability Assessment. The Bellagio's principle (as it was initially referred to) dates back to 1996 which was a product of the harmonization among various field experts in a meeting held in Bellagio, Italy (Sala, et al. 2015). It was developed in response to the need to seek for better ways and procedure for evaluating sustainable development as canvassed by the World Commission on Environment and development (WCED) in 1987 (Devuyst 2000). The Bellagio STAMP comprises of the following eight principles as presented (See table 1).

Table 1: The Bellagio STAMP and its key questions

Principles	Question
Guiding vision	What is the vision of the assessment framework?
Essential consideration	Will the assessment framework covers the identified sustainability issues?
Adequate scope	Will the assessment framework cover the whole design process in the selection of its criteria and indicators?
Framework and indicators	Will the identified criteria and indicators be context-specific?
Transparency	Will the assessment process be transparent and communicate well with its uses?
Effective communication	
Broad participation	Will the assessment framework involve consultation with relevant stakeholders?
Continuity and capacity	Will the assessment framework be designed to be responsive to change and constant review?

METHODOLOGY

Data required for this study was obtained primarily from the technical manuals of selected assessment frameworks and also from existing literature. The assessment frameworks include BREEAM Communities 2012; LEED ND V4; Pearl community rating system; and Green Star communities. The choice of these frameworks is as a result of their continental locations and accessibility of their manuals. Since this study attempts to operationalise the Bellagio STAMP, the selected frameworks were reviewed using the key issues (guiding vision, essential consideration, adequate scope, framework and indicators, transparency, easy communication, broad participation, and continuity) of the Bellagio STAMP through the following means:

(i) Document analysis of the technical manual of each of the assessment frameworks to get precise information of: its vision; assessment scope and stages; relationship with key policy documents; and the involvement of stakeholders in its development among others.

(ii) Re-categorization of the criteria of the selected assessment frameworks into a common framework of assessment issues comprising of 6 sustainability categories as summarised. (See table 2). The percentage for each category was obtained by examining and summing the weight assigned to credits or indicators under the category.

Table 2: Re-categorisation of the selected assessment tools into a single framework

Category	BREEAM C	LEED ND	PCRS	Green STAR
Governance	9.3%	2%	2.1%	14%
Economic wellbeing	14.8%	1%	1%	21%
Social wellbeing	17.1%	20%	11.7%	25%
Environment and resource efficiency	32.4%	34%	57.4%	25%
Location, land use, and site design	12.6%	31%	22.6%	12%
Transportation	13.8%	12%	6.2%	3%
Total	100%	100%	100%	100%

This similar approach of re-categorization was used in the study of Wangel et al. (2016), Haapio (2012), Sharifi and Murayama (2013). This was done to determine how holistic and integrated the assessment framework is in terms of choice of sustainability criteria.

RESULTS

This section presents the result obtained from operationalising the Bellagio STAMP using the selected Neighbourhood Sustainability Assessment Frameworks.

Vision

The Bellagio STAMP advocates that sustainability assessment should go beyond the global vision for sustainability but also include local vision where the values, needs, and aspirations of the people are captured. The vision of the selected Neighbourhood Sustainability Assessment tools aligns with the overall aim of sustainability. It was

however discovered that each of the tools included a local vision which has to do with the peculiar sustainability challenges peculiar to that context. For example, LEED-ND V4 for example addresses the issue of urban sprawl which has been a dominant urbanization problem in the United States by including a mandate to enhance smart growth, new urbanism in addition to green infrastructure and buildings.

Essential consideration

The Bellagio STAMP advocates for a holistic approach by ensuring that all sustainability issues are treated in the assessment process. In the selected assessment frameworks, 'environment and resource efficiency' has the highest percentage of indicators (see table 2). BREEAM Communities allocates 32.4%; LEED ND- 34%; Pearl community rating system- 57.4%; and Green Star communities- 25%. This is due to the fact that most of the selected assessment tools were 'spin-offs' of existing building environmental assessment (BEA) tools (Sharifi and Murayama 2013) and as a result few modifications were carried out when then assessment tool was extended to the neighbourhood scale.

In order to ensure some acceptable level of sustainability, BREEAM Communities, LEED-ND V4, Green STAR Communities have 'mandatory criteria' (See table 3). The mandatory criteria are unavoidable and are compulsory before a new development can be certified. That is, they are not tradeable. The BREEAM communities certificate for instance will not be issued to a development without addressing all the mandatory criteria (BRE 2012). Mandatory criteria are referred to as 'prerequisites' in LEED-ND and 'required credits' in Pearl Community Rating System. LEED-ND V4 and PCRS do not assign a score to the mandatory criteria, whereas BREEAM Communities does. Green STAR communities however do not have mandatory criteria which gives room for criteria hunting and trade-offs.

Table 3: Mandatory requirements in selected assessment frameworks

Neighbourhood Sustainability Assessment frameworks	**Mandatory requirements**
BREEAM Communities 2012	G001-Consultation plan; GO02- Consultation and engagement; SE01- Economic impact; SE02- Demographic needs and priorities; SE03- Flood risk assessment; SE04- Noise pollution; RE01- Energy strategy; RE02- Existing buildings and infrastructure; RE03- Water strategy; LE01- Ecology strategy; LE02- Land use; TM01- Transport assessment.
LEED-ND V4 2016	SLLP1- Smart location; SLLP2- Imperilled species; SLLP3- Wetland and water body conservation; SLLP4- Agricultural land conservation; SLLP5- Floodplain avoidance; NPDP1- Walkable streets; NPDP2- Compact development; NPDP3- Connected and open community; GIBP1- Certified green building; GIBP2- Minimum building energy efficiency; GIBP3- Indoor water use reduction; GIBP4- Construction activity pollution prevention.
PCRS 2010	IDPR1- Integrated development strategy; IDPR2- Sustainable building guidelines; IDPR3- Community dedicated infrastructure basic commissioning; NSR1- Natural system assessment; NSR2- Natural system protection; NSR3- Natural systems design and management strategy; LCR1- Plan 2030; LCR2- Urban systems assessment; LCR3- Provision of amenities and facilities; LCR4-

	Outdoor thermal comfort strategy; LCR5- Minimum Pearl rated building within communities; PWR1- Community water strategy; PWR2- Building water guidelines; PWR3- Water monitoring and leak detection
Green STAR Communities	No mandatory requirements

Adequate scope

This principle advocates that an assessment framework should be broad enough to cover the entire design process. A review of the selected neighbourhood sustainability assessment frameworks showed that this principle was not considered in their development. Although, the assessment frameworks are quite useful for ex-ante evaluation, there is no proper consideration for the ex-post evaluation which attempts to access the performance of the development after certain period of time. According to Wangel et al. (2016), the existing assessment tools adopted only the process and features indicators which are mainly to either assess the consideration of a specific process with the aim of improving sustainability performance (process indicators) or whether specific measures, or solutions will be in place (feature indicators).

Framework and Indicators

This principle suggests the consideration of the local context in the development of the framework and identification of indicators. In the selected Neighbourhood Sustainability Assessment Frameworks, there was consideration for the local context in the choice and selection of indicators (see table 4).

Table 4: Target indicators to address context-specific urban challenges

Country	Assessment framework	Core/local urban challenges	Targeted indicators to address to local urban challenges
UK	BREEAM Communities	Inadequate social wellbeing; non engagement of citizens in planning	SE02- Demographic needs and priorities; SE05- Housing provision; SE06- Delivery of services, facilities, and amenities; SE07- Public realm; SE09- Utilities; SE11- Green infrastructure; SE12- Local parking; SE14- Local vernacular; SE15- Inclusive design
USA	LEED ND	Urban sprawl; high dependence on automobile; urban heat Island	NPD C1- Walkable streets; NPD C2- Compact development; NPD C3- Mixed-use neighbourhood centres; NPD C4- Mixed-Income diverse communities
UAE	PCRS	Limited water supply	PW R1- Community water strategy; PW R2- Building water guidelines; PW R3- Water monitoring and leak detection; PW 1.1- Community water use reduction: landscaping; PW 1.2- Community water use reduction: heat rejection; PW 1.3- Community water use reduction: Water features; PW 2: Storm water management; PW 3: Water efficient buildings
Australia	Green STAR	No consideration	No consideration

Whether the indicators satisfied the essential requirements of an indicator was assessed aside from being context-specific. The selected assessment frameworks were able to integrate partially the social, economic, environmental, institutional, and other dimensions of sustainability in the framework. Also, BREEAM Communities and PCRS considered existing policy documents (statutory and legal requirements) in their

structure. In BREEAM communities 2012 for instance, the Environment Impact Assessment (EIA), Noise Impact Assessment, and flood risk assessment among other statutory policies are to be carried out before a proposed development will be considered for certification (BRE 2012). The Pearl community rating system (for Estidama) also made compliance to the Plan 2030 and other Urban Planning Council (UPC) policies compulsory for any development.

Transparency and effective communication

This principle attempts to examine the accessibility of the data, indicators, and results of the assessment to the public as advocated by Pinter et al. (2012) and also the clarity of the assessment methods and the process. The selected assessment frameworks have their manuals available to the public where the stages and steps required for an assessment are explained. Aside from this, documents that needs to be submitted prior to the assessment stages are well stated. How effective an assessment framework communicates to its users can also be measured or determined in the presentation of its results. The final result should give a brief summary of what is happening, while also aiding decision-making, evaluation of actions, and also indicating the level attained towards sustainability (Sharifi and Murayama 2013). In the selected assessment frameworks, results can easily be obtained by simple arithmetic and not by complex calculations. The final results and certifications attained are also very clear in meaning.

Broad participation

This principle advocates for stakeholders' engagement in the development and implementation of an assessment framework. The development of the four selected neighbourhood sustainability assessment frameworks was expert-led with non-involvement of the public. Green star communities was developed by a conglomerate of 46 industry and government peer reviewers; 15 government sponsors (including all government land organizations); and 10 industry sponsors (GBCA, 2010). LEED ND adopted similar approach in its development as it involved representatives from three particular organizations which are the U.S Green Building Council (USGBC), the Congress for the New Urbanism (CNU), and the Natural Resources Defence Council (NRDC). BREEAM communities which was developed by BRE Global Limited is another expert-led initiative, which involved a panel comprising range of experts who have the wherewithal to assess BRE Global limited standard schemes in order to ensure a robust assessment framework (BRE 2012). The Pearl community rating system also adopted the expert led orientation as it was developed by the Abu Dhabi Urban planning council (AUPC).

Continuity and capacity

This principle advocates for continuous update of assessment frameworks which is needful for progress. BREEAM Communities has two versions (2008 and 2012). Also, LEED ND released in 2009 was upgraded with the release of the LEED ND V4 in 2016. The PCRS developed in 2010 is yet to the upgraded while the Green STAR communities has Pilot versions 0.0 released in 2012; 0.1 in 2014; 0.2 in 2015; versions 1.0 in 2015; and 1.1 (2016).

DISCUSSION AND CONCLUSIONS

In this paper, the Bellagio STAMP was operationalised using selected neighbourhood sustainability assessment frameworks. Although, none of these assessment tools were tailored to suit the Bellagio STAMP in the process of their development, they align satisfactorily well with the Bellagio STAMP. As it can be observed from the results, the principle of broad participation (i.e. engagement with stakeholders) was not thoroughly considered in the selected assessment frameworks. The normative effectiveness of sustainability assessment (Bond, et al. 2013) which canvassed for knowledge sharing and social learning can only be enhanced where there is a forum for engagement among various stakeholders. This broad participation ensures striking a balance and harmonizing the diverse needs of the stakeholders. Stakeholders' involvement ideally should be embedded in the development process in a trans-disciplinary setting which can result to co-production of knowledge from problem definition towards solution (Sala, et al. 2015). Sustainability Assessment should encourage public participation by being open and broadly engaging. It must not be a technical exercise or be expert led as it should be a matter of public choices among options and objectives for a desirable and lasting future while it also strengthens the participative potentials of citizens and civil society organizations (Gibson, et al. 2013; Reed, et al. 2006).

Consideration of the local context is essential in developing a Neighbourhood Sustainability Assessment Framework. Sustainability Assessment must in every application respect the peculiarity of the context by specifying the effective criteria for evaluations and decision making in cognisance of the key desires, needs, capacities, and concerns of the locality involved (Gibson 2013). The consideration for local indicators can be observed in some existing assessment frameworks. BREEAM Communities and the Pearl Community Rating System considered the existing policy documents in the context they are been applied as canvassed by Haapio (2012) and Berardi (2011). Issues relating to governance, economic wellbeing are not well considered in these frameworks. Sustainability Assessment requires a balanced treatment of sustainability issues (Komeily and Srinivasan 2015). The Assessment framework must ensure adequate coverage by integrating all issues that influence prospects for sustainable future. In addition, it must seek mutually reinforcing gains by being a vehicle for appreciating the interdependence of ecology, economy, and the society in a way that are reinforcing so as to generate a harmonized environment (Gibson 2013). As can be inferred from the study, the Bellagio STAMP provided an efficient and holistic analytical framework for reviewing the assessment tools. While the context-specificity of sustainability has well been argued in literature (Joss, et al. 2013; Du Plessis 1999) which makes the transferability of existing frameworks unrealistic, the adoption of the Bellagio STAMP as a global methodological framework for Sustainability Assessment will serve as a guideline for Sustainability Assessment most especially in developing countries where there is yet to evolve a definition of systems and criteria for assessing urban neighbourhoods.

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