

Social Dimension of Sustainability: A Least Investigated Criterion for Built Environment Assessment Tools

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Abstract: Sustainability has driven built environment discourse increasingly in the last decades since the twentieth century. Expectations for buildings and built environment to be 'sustainably measurable' have increased. There has been a growth of development and introduction of built environment assessment tools, implemented as a measure of how 'sustainable' the built environment is, alongside inherent complexities of readily quantifiable indicators as well as less easily qualifiable indicators. This paper raises questions of how assessment tools are aligned with the myriad of diverse and dynamic scenarios of a rapidly changing built environment. Now, more than ever, exists the need to explore one of the least, if not the least considered criterion of sustainability in the built environment, the social dimension, and its critical inclusion in built environment assessment tools. The research study evaluated current available built environment assessment tools and the associated underpinning sustainable frameworks. The findings indicated there was a measure of aspiration and regard for this criterion which left room for a dedicated investigation for the incorporation and integration of social impact considerations. Exploring the ways in which social dimensions sit in fields other than built environment provided valuable reflection and ways forward for built environment assessment tools to be more holistically sustainable in its measurement approaches.

Keywords: Social dimension; built environment; assessment criterion; sustainability.

1. Introduction

Although many a theory not at the time labelled as sustainability have been seen through time from the fifties (Brown, et.al 1987) to start with, the origins of integrating 'sustainability' into an action were adopted only after the Brundtland Commission (WCED) 1987 stepped in, defining sustainable development as,

'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.

Thus, broadly leading classifying it into the three dimensions of environmental, economic and social, as parts of sustainability, with each of the dimensions explored with different goals. Since then, concepts of sustainability on a global scale have evolved from being vague moldable definitions formed

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out of necessity (Solow, 1991) to obscurely coherent ideas, morphing with time, to frameworks and tools as a form of measurement. Incorporation of the global concern of sustainability in built environment disciplines can be partially reflected from the statistics (SUMAS 2019) derived from the factors that can be majorly regulated from within the built environment such as energy usage, materiality, water use, recycling, waste management, to name a few, which make up half of the global usage. This invariably led to a focus upon sustainability and sustainable development in the built environment driven from the triple agent dimensions of environmental, economic and social. The physical outcomes of the built environment tend to last for a longer time making it an intergenerational character which when used appropriately can result in working to achieve sustainability rather than adding to the factors that produce a necessity for it (Sarkis, Meade, and Presley, 2008).

Within the context of the built environment, sustainability has branched across dimensions of environment, economy and social, interconnecting and linking associated categories and sub-categories, giving conditions and character counted with a numeric scale for a building or a built environment to be considered as a prospect of sustainability (Pearce, 1999). These categorised variables have served to determine the conditioned sustainability as a form of measurement to compare and certify the scale of sustainability in the built environment quite well. Along with its prominence, the pertinence of concepts to frameworks to tools as a measure the sustainability grew over time. These tools, evolved in the last half of the century as a unit of assessment from the concepts and frameworks of sustainability and used as practical aids to evaluate and measure, collectively referred to as Built Environment Assessment Tools (BEAT).

This research paper sought to firstly, summarise current understanding of the scope of criteria of seven different BEAT from a comprehensive literature review on sustainable assessment framework. The tools most used in built environment (BREEAM, CASBEE, DGNB, HQE, LEED, SBTool, criterion analysis conducted by Bernardi et. al., 2017) and the tool only that measures the social aspect in equity to its quantitative side (DeKay's ISD framework (DeKay 2011) and Moloney, et.al., 2017) are considered. Secondly, the focus of the research study sought to investigate social considerations as a measurable criterion of sustainability in the built environment. In addition, a light review of social sustainability definitions and applications in disciplines outside of built environment was undertaken to primarily offer reflection on how the consideration and uptake of the social criterion might be widened within the built environment. The research identified an argument for a more holistic and integral framework of sustainability be adopted within built environment design and practice. This research study is part of a larger post graduate research thesis study undertaken by the lead author (Ramineni) which had sought to understand the available literature on sustainable assessment frameworks and tools, their criteria and evidence a general oversight or lack of regard and consideration for 'social' dimensions in the discourse of sustainability in the built environment.

The findings of this study enabled a critical reflection upon a more holistic view of sustainability in the form of an Integral approach, introduced by de Kay (2011) theory in sustainable built environment design. The scope of relevant literature included in the review was between 1987-2020. A method of identification through absence was the principal means of identifying the gap while also that this approach has its limitations. Breaking the literature review, a study of sustainability and the tools of sustainability categorising their criterion was conducted. The findings of the previous study conducted with the tools (Bernardi et. al., 2017), in which the criterion was measured in terms of its priority within the tools, showed quantitative measures as the most covered, hinting the least inclusion or the lack of inclusion of the social dimension in them. The study was based on the six most used built environment assessment tools and their criterion was already broken down as to which are given most priority, used

as a comparative tool to measure the social dimension indicators (Figure 2). The study investigated how social sustainability might be included in built environment assessment tools demonstrating the need for a more holistic approach and referencing examples where an integral design framework was adopted as a reference. The outcome of this research has established the evidence of a gap in the depth and complexity of current literature available on social sustainability. The research proposal was impacted by the available accessible literature on the topic of exploring sustainability and its inclusion of social aspect in the assessment tools. The research study limited itself to the scope of prominent frameworks and tools only with its scale of most used tools at national level and global level. The study for the concepts of the dimensions of sustainability is limited to the three dimensions of environment, economy and social.

2. Literature review

2.1. Sustainability and its dimensions

Working definition of sustainability in this context refers to the balance of its dimensions, or rather the equity in the balance of its three dimensions, namely environmental, economic and social. Social dimension of sustainability can be defined as the interaction quality of the social being with their surroundings tangible and non-tangible, i.e., both the physical settings and the social world. The three dimensions and the theories behind them can be explained on paper but in practice creates paradox within each dimension and each with the other dimensions given the nature of their complexity (Solow, 1991). Derived from Goodland's (1995) definitions, all the three dimensions of sustainability are termed in context to capital and sustainability can be achieved and maintained from their interest i.e., environmental capital, economic capital and social capital.

Environmental Sustainability (ES) is rooted from the social concerns, (Goodland, 1995) is defined by the input/output rule, their balance and sustenance of each other while maintaining the natural capital, non-renewable resources, manufactured capital, non-substitutable, cost and value, and proportion of population to physical health (Goodland and Daly, 1996). Economic Sustainability (EcS) can be defined as the maintenance of financial capital and living off from its interest without depletion and with stability (Goodland, 1995), later leading to the consideration of scale as an influencing factor in sustainability. Social Sustainability (SS) can either be the first domino of making the change or the last domino falling to make the world sustainable again. Time is a factor in this regard, but the output of the fall can determine the fate of the future generations to come (Feng, Yang Deo, et al., 2019). According to Goodland (1995), social sustainability can only be achieved through community participation and strong civic society. Describing it as 'moral capital', he covers aspects of community, unity, cultural identity, diversity, sodality, comity, tolerance, humility, compassion, patience, forbearance, fellowship, fraternity, institutions, love, pluralism, commonly accepted standards of honesty, laws, discipline, etc., as a measure of attaining social sustainability.

Environmental dimension of sustainability is perceived as a pre-requisite for the social dimension of sustainability to be achieved (Goodland, 1995), which seems to be the major case in built environment with architecture as a response to social and environmental concerns globally (Owen and Lorrimar-Shanks, 2015). The relationship of sustainability to the built environment has shifted the focus of the fields (as defined by Bourdieu's sociology) evident from the dialogue of inclusion, exclusion and of being separate entities is a reflection from the social dynamics which lead to the rethinking of 'sustainability' in the field of built environment and making it more integrated (Owen and Dovey, 2008).

2.2. Measures of sustainability in built environment

The ideology lead to concepts and theories to frameworks and tools being the instrument of assessment of sustainability in built environment. The majorly accepted framework is the TBL: Triple Bottom Line, the dimensions of triple bottom line, Profit, People and Planet, translated and evolved in built environment as Economics, Social and Environmental dimensions of sustainability. In an ideal case each dimension is weighed equally and synergy forming a 'sustainable' way forward but taking the present day where the sustainability is already imbalanced, would require different weightage to the response of each dimension and its interrelations to the other. The drawbacks of TBL lies not in the theory but in the form of measurement, the economic dimension can mostly be measure in quantitative terms, while the social and economic dimensions provide a challenge of quantitative and qualitative, resulting in a more subjective way of understanding.

2.3. Built environment assessment tools: an overview

A framework once structured, requires a measuring entity, this is the 'tool'. The BEAT are the scales of sustainability in which the intangible concept is reflected to action-based response. In the ocean of tools used as a measure of sustainability in the built environment form the past few decades, not all the tools measure the same part of sustainability. The major distinction in the tools can be classified as tools that assess the life cycle and tools that measure the impact on the environment, named as Life Cycle Assessment Tools (LCA) and Environmental Impact Assessment Tools (EIA). Further classifications termed from the intention of the tool and the phase of the building (design phase, construction phase, demolition phase etc.), typology of the building (residential, commercial, industrial, recreational, mixed use, retrofitting, conservational etc.) and the software used in assessing the performance of the buildings. Tools can be broadly divided into quantitative and qualitative of measurement quantitative dealing with numeric, scaled values and qualitative dealing with relative and subjective aspects (Forsberg and Von Malmborg, 2004).

The assessment of criterion is an examination of an aspect being assessed in reference to the framework of tool being employed for the sustainability. The criterion of the assessment tools is scaled in three-part, global issues and use of resources, local issues and indoor issues (Cole, 1997). The standard measurement of BEAT developed from the categories of sustainability, sub divided into indicators (measurable entities) and aspects (identified but non-measurable). A criterion can always be measured in quantitative and qualitative. This resulted in the quantification of the social dimension into sub-categories like walkability, access etc. However, the criteria for measuring sustainability in built environment is boundless, not all aspects of the built environment are measured by the assessment tools (Day et.al., 2015). Here comes a question of prioritization of what criterion overrules the other, not to devalue the criterion rather focusing on what can be tangibly measured to see results. The criteria of the tools considered for sustainability are broadly categorised into eight parts (Cole, 1997) with slight variations of weightage depending on the purpose of the tools and its usage (local, nation or global).

The criterion developed as a base from the matrix of sustainability, to the built environment assessment tools (BEAT) are, materials, land use, water, urban context, responsibility, air, energy and wastes (Cole, 1997). The form of measurement for the criterion derived from the matrix of sustainability (Cole, 1997) sits in the quantitative measurement side and the aspects covered are aligned to the environmental dimension of sustainability. The quantitative/numeric values derived from these criteria are often translated to economic sustainability in terms of capital, investment, maintenance and demolition. The qualitative scale of measurement is often not given much weightage, leading to almost

a scant participation of the social dimension in the tools of built environment. One of the recent tools which weighs quantitative and qualitative aspects with equity is the Integral Sustainable Design (ISD), by DeKay. Developed from Integral theory by Wilber, ISD: Integral Sustainable Design (Moloney et.al., 2017), has four quadrants on varying levels later adapted into built environment. The quadrants are divided in half based on qualitative aspects and quantitative aspects as scales of measurement making the tool more integrated than the previously devised BEAT in terms of social dimension weightage. Majority of the BEAT focus on tangible quantitative aspects than qualitative aspects. Integral theory also shows the interconnections between its different levels making it a 'holistic' tool in comparison with other available tools (DeKay 2011) that gives equal priority to both quantitative and qualitative aspects.

3. Methods

The research approach employed for this research was comprehensive review of existing literature to understand sustainability in built environment and the social dimension of sustainability. Secondary sources from books, online and published journal articles, published papers and internet search. The search was conducted considering, the title of the articles, abstract and the keywords and number of citations (Bernardi et. al., 2017). Importance in selection of literature was given to the studies which have already attempted the comparison of the tools' criterion, and not the building typology the tools were used to study on, as this research focuses on criterion of the tools than the tools themselves. Why only studies which already broke down the criterion? Factors like time to the magnanimity of knowledge available in the built environment regarding the assessment tools and social conditions (COVID-19 leading to access of only online sources) has directed the research to be more effective when using the available data on the tools as the foundation, than aiming to conduct a primary research. The tools have not been tested in this research, only their criterion which has been studied regarding answering the social dimension from the secondary sources (which have used other systems of classifications for their respective research) have been considered taking the dimensions of TBL (ES, EcS, SS) as a reference of contextual comparison.

4. Findings and discussion

The three major dimensions of sustainability being environmental, economic and social are not exclusive of each other but rather, are interrelated. Each dimension has the other dimensions as part of it. Most of the environmental impact assessment tools focus their criterion in terms of environment, then economic value and social aspects with the least prominence. This has been a reoccurring pattern in the history of tools until De Kays' Integral Sustainable Design came along and proposed a different perception of including the social dimension, its aspects and qualitative measurement as a form of measuring tool for built environment. One such tool which gives equal importance between qualitative and quantitative aspects, in comparison to the vastness of tools currently used in the world for only measuring the quantitative side, is still being explored and lacks acceptance in the field and (Buchanan, 2012). Although there is research into exploring the integral sustainable design, (Roetzel, Fuller and Rajagopalan, 2017, and Whittem and Ang, 2020), to be more integrated in-built environment, the findings of such researches often also reflect on the nature of inclusion of qualitative aspects and the social dimension and also the lack on holistic nature of the other tools measuring sustainability in built environment.

The illustration (Figure 1) of the timeline from 1950 to 2015, comparing theories of sustainability and the BEAT, using the data for the theories form Kidd, (1992) and Kauffman, (2011), and the tools from Bernardi et. al., (2017), Moloney et.al., (2017), Masri et.al., (2015), Ding, (2008), shows the depth of the gap, and the effective nature of the current data available for the tools to be more integrated with the concepts that include all three dimensions of sustainability.

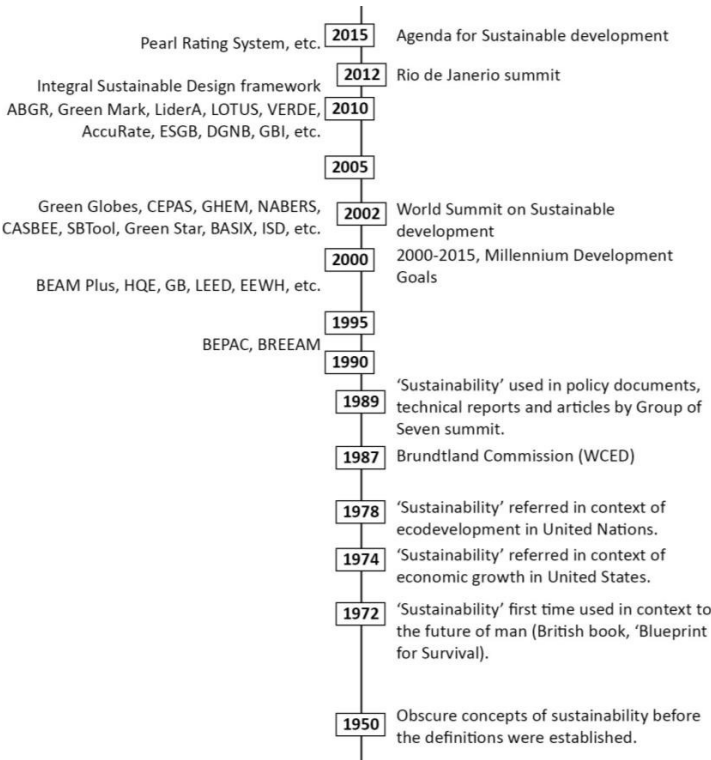


Figure 1: Comparative timeline of Theories to Tools in context of sustainability in built environment (by Authors, 2020)

4.1. Built environment assessment tools

The considerations of criterion for the tools are given each a weightage for the three dimensions and their categories varying on the framework the tool is developed from and its purpose in built environment. Many a study has been conducted on breaking down the criterion into the qualitative and quantitative contexts of built environment assessment tools (Bernardi et. al., 2017) and the qualitative non-inclusion of social dimensions (Atanda, 2019). These criterions when contextualized taking the existing criteria of the BEAT as positive terms reflect on the non-included criteria of social sustainability as a non-positive or negative open a possible direction for future exploration, reaffirming the lack of

evidence and the non-inclusivity. A detailed list of indicators contrasted (referring Figure 2) from the six widely accepted built environment assessment tools (BEAT) by Bernardi et. al., (2017) and non-inclusion of social dimension indicators taken from Atanda, (2019), were compared in context as ‘positive’ and ‘negative’ within the qualitative indicators to offer a diametric probe into the complexity of considerations for the criterion in the BEAT. This enabled a more tailored outcome from using the tools, than when taking into account only the quantifiable aspects labelled as positive as the measure of sustainability in built environment.

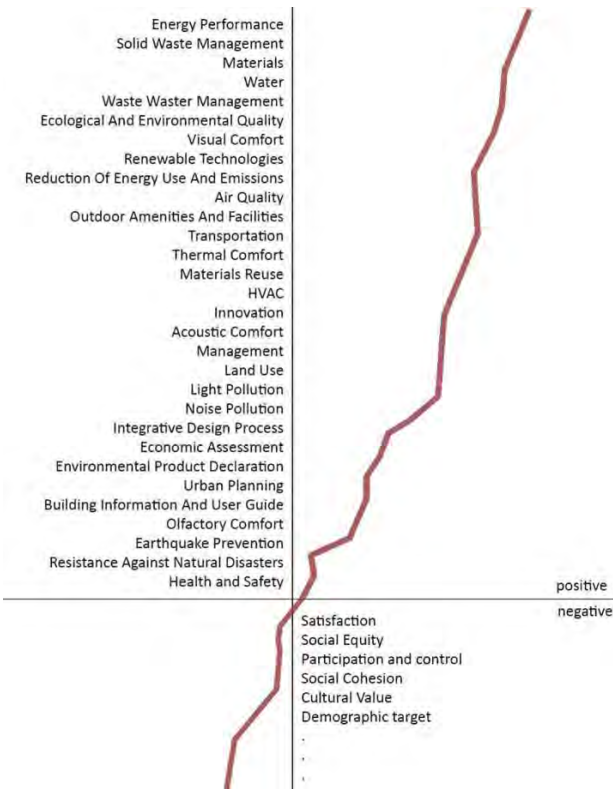


Figure 2: Sustainability criterion from a top down approach with a context to the aspects of quantitative criterions indicating a “positive” and aspects of social sustainability as “negative” in comparison to each other for evaluation criteria of the tools (context illustration by Authors, 2020)

4.2. How can social dimension be explored?

The theories/concepts in sustainability are derived not from built environment but from economical and sociological fields, this shows the origin of the criterion for sustainability outside of built environment. Leading to the proposal for understanding the social dimension in built environment is to address it

from outside of built environment, i.e., from sociology. Partial inclusion of social sustainability has been attempted on an urban scale, Colantonio (2008), providing a direction of the themes of social sustainability to be incorporated in built environment. Strengthening the social dimension, social indicators also reflect the perception of how built environment is experienced, creating synergy with the built environment and its consumers. Few of the social themes to start with, by Colantonio (2008) and Atanda (2019) are, social equity, satisfaction, participation and control, social cohesion, cultural value, identity, sense of place and culture, empowerment, participation, access, health and safety, social capital, demographic change, social mixing, wellbeing, happiness, quality of life. Although the qualitative aspects are subjective, the only way to deal with forming a measurable structure is by developing the knowledge base exploring the complexity of the social dimension both in and outside of built environment, which may not always be feasible due to the social dimension being a complex dimension, but it does not justify the non-inclusion of its criterion in the tools that measure sustainability in built environment. While it is of significance to view sustainability as a part of built environment, it is in equal gravity to perceive built environment as a part of sustainability, especially when developing holistic tools of measurement. This research may not provide a framework which can be adapted in social dimension for built environment assessment tools but aims to provide a base for further research in the exploration of it.

Other components, to state a few, for social dimension of sustainability and built environment assessment tools are not researched but identified as follows:

- Stakeholders: Fields of built environment, construction, current rating systems, user group, owners, political, economic, cultural etc.
- Scale: Evolution of the framework of tools from a single building to the built environment, to local, national, regional and global.
- Education: Inclusion as not just an area of study but as a necessity or the future generation to come.
- Awareness: In not only the academic, but in professional and more importantly in the user group.
- Time: In terms of having records documented which may clear up the ambiguity the term sustainability faces, credibility of the rating tools in context to the many evolving today.

5. Conclusions

Social dimension in sustainability is rather a multiplexity of parameter to deal with, though it is challenging to deal with the factors that make it subjective, the idea behind this research is to show that it is needed to be considered when accounting for achieving sustainability. Exploring the ways in which social dimensions sit in fields other than built environment provided valuable reflection and ways forward for built environment assessment tools to be more holistically sustainable in its measurement approaches. The research evaluated current available built environment assessment tools and the associated underpinning sustainable frameworks, developed from the theories as a form of measurement for sustainability regarding their inclusion of all the dimensions of sustainability. The purpose of this research is to show the prominence of the social dimension by itself and the social aspect which needs to be considered within the environmental dimension when using as a scale of sustainability. The lack of social aspects in the environment becomes the evidence, solidifying the gap while also pointing out the projected benefits of inclusion from integral sustainable design.

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