A Community-based Classification of Impact Criteria for Life Cycle Sustainability Assessment in the Context of Estate Regeneration

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Introduction

Life Cycle Sustainability Assessment (LCSA) has been introduced in 2008 by Klopffer (Visentin et al., 2020) as a methodology for assessing the overall sustainability of products and systems (Klopffer and Grahl, 2014). LCSA has been used to support decision-making for the appraisal of building projects by assessing the environmental, social, and economic impacts of those schemes (Klopffer and Grahl, 2014; Sadhukhan, Sen and Gadkari, 2021). Other sustainability certification and assessment schemes can be used to assist the decision-makers in the options appraisal of estate regeneration scenarios. However, there is inconsistency in classifying the impact categories of those assessment methodologies. In addition, the impact categories of these schemes mostly do not reflect the priorities of communities in the context of estate regeneration. Sala et al. (2012), Zamangi et al. (2013), and Souza et al. (2015) have raised the importance of stakeholder involvement in the selection of sustainability indicators as one of the main gaps in conducting sustainability assessments. The aim of this paper is to identify a community-focused list of impact categories for LCSA to be used in the context of estate regeneration in the UK.

Methodology

To identify a community-focused set of impact categories for the LCSA of estate regeneration schemes in London, this paper has employed a mixed methods approach through primary and secondary data collection. A scoping review including the review of standards, legislation, and other relevant documents has been conducted. Data collection for the empirical research has been through a single-case case study[1], consisting of co-design workshops, focus groups, surveys, and interviews.

Desk-based Research

The classification of impact criteria for sustainability assessment of building projects was conducted through a scoping review, searching publications in the fields of Life Cycle Assessment (LCA); Life Cycle Inventory; LCSA; sustainability assessment; sustainability indicators; sustainability impact criteria; Tipple Bottom Line (TBL) approach; stakeholder and community involvement in decision-making; retrofitting buildings; social housing; and regeneration of estates. The categorisation of different sustainability indicators is identified through the review. Lack of a standardised list of impact categories is one of the gaps that the review tries to bridge towards an inclusive and holistic scope for LCSA.

Case Study

To explore the priorities of the communities as one of the main stakeholders of estate regeneration schemes, this study employed a complex mixed methods design including quantitative and qualitative approaches.

The quantitative part of this case study was conducted through close-ended questions in the survey and descriptive statistical analysis of the collected data. The quantitative questions were mainly aimed at collecting information about the perception of participants on the condition of their homes and the

estate, and their preferred regeneration scenario. The results of the survey have been analysed through descriptive statistical analysis.

The qualitative approaches of this case study consisted of several co-design workshops, open-ended survey questions, and semi-structured interviews for an in-depth exploration of the communities' priorities in relation to different aspects of estate regeneration. Collected qualitative data from the case study has been coded and interpreted using Braun and Clarke's (2021) guidance on reflexive Thematic Analysis (TA). Triangulation of analyses has helped in introducing a global set of meta-criteria, for the categorisation of sustainability indicators for a community-based LCSA for appraisal of estate regeneration schemes.

	Meta-Criteria
1	Climate Change
2	Environmental Impacts & Strategies (Excluding Climate Change)
3	Local Ecologic Impacts, & Strategies
4	Material Strategies and Circularity
5	Whole Life Cost
6	Health& Wellbeing
7	Accessibility
8	Safety and Security
9	Transport & Movement
10	Community Facilities and Amenities
11	Social Values
12	Design Legacy
13	Project Management & Aftercare

Figure 1 (top left). Authors' combined list of meta-criteria of relevant sustainability assessment schemes

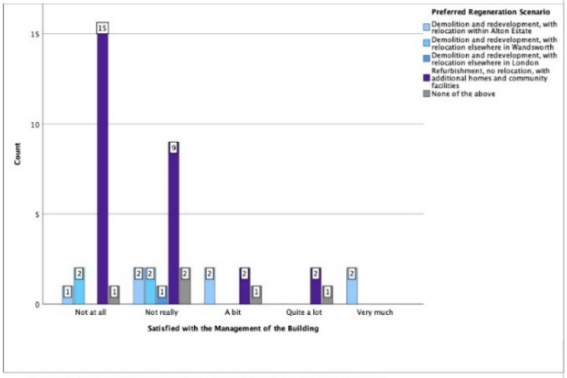

Figure 2 (bottom left). Grouped bar chart of participants' regeneration preference compared to their satisfaction with the building management

Figure 3 (right). The identified sustainability indicators (outer circle) against the proposed meta-criteria (inner circle) for the LCSA of estate regeneration

Findings

Scoping Review

Our extensive review of thirty-seven publications in relation to Building LCSA and sustainability assessment has identified the inconsistency of categorisation of indicators as one of the main gaps in defining LCSA scope. Other limitations relate to not considering the context and not including the priorities of the communities in identifying and classifying the sustainability criteria for LCSA of estate regeneration schemes. To find a coherent list of meta-criteria that is descriptive of the indicators and reflects the categories of different assessment methodologies, the list in Figure 1 has been suggested from the review of the relevant sustainability assessment schemes and the scoping review.

Quantitative Analysis

The general picture emerging from the statistical analyses reveals the participants' preference for a refurbishment scheme over demolition scenarios for the regeneration of the estate. The analyses

demonstrate a level of correlation between issues such as home attachment with the preferred regeneration scenario. While poor maintenance and management of the estate are greatly agreed among the participants, the participants' preference for a refurbishment scenario despite their dissatisfaction with the conditions and management of the buildings (Figure 2) suggests the need for further in-depth exploration of the community's priorities through qualitative approaches to identify a list of community-focused meta-criteria and indicators for the LCSA of the schemes.

Qualitative Analysis

The collected data from the surveys, workshops, and interviews have been coded using an iterative process for TA (Bergin, 2018). The identified codes have been categorised into relevant sub-themes. The sub-themes from the TA coding, referred to as meta-criteria, have been listed and aligned with the findings of the scoping review. Mental Health and Socioeconomic Values have been introduced as separate categories in addition to the results of the scoping review. The findings of the TA support the importance of engaging with the communities and exploring their priorities to identify a plausible scope for LCSA of the regeneration scheme of their estate.

Discussion

In pursuit of a profound LCSA scope (Weidema et al., 2020) the sustainability indicators have been interpreted from the identified priorities of the community. Triangulation of the analyses has introduced 'Mental Health & Wellbeing', and 'Socioeconomic Values' as new meta-criteria for the scope of the LCSA framework which have been neglected in most of the existing studies. The list of sustainability indicators and meta-criteria identified from the triangulation of the findings of the scoping review and the case study for the LCSA scope of the studied estate has been presented in Figure 3.

The findings of this study highlight the priorities of the communities that are not completely reflected in the impact categories of current platforms for the sustainability assessment of the regeneration schemes.

Conclusion

This paper has proposed a community-based categorisation of LCSA indicators introduced as meta-criteria for the appraisal of estate regeneration schemes in London. Through a scoping review, statistical analysis of quantitative data, ethnographic observations, thematic analysis of the qualitative data, and triangulation of the results of the study, the following conclusions can be drawn:

- Inconsistency of meta-criteria across different frameworks and not considering the context and communities in identifying indicators are the main gaps in the literature.
- The findings of TA and triangulation of the results of the case study and scoping review have introduced a list of meta-criteria with new categories including Mental Health and Wellbeing, and Socioeconomic Values.
- The findings of this paper support the importance of engaging with the communities and exploring their priorities to identify a plausible scope for LCSA in the context of estate regeneration.

While the identified indicators are local and reflective of the context of the projects, the introduced categories of meta-criteria can be used as a global classification for the sustainability indicators for similar studies. We would encourage researchers to examine these findings beyond the population of this case study. We would also recommend exploring the priorities of other stakeholders to identify a multi-stakeholder LCSA scope in the context of estate regeneration.

Acknowledgements

This research is funded by Engineering and Physical Sciences Research Council (EPSRC) – Grant Reference EP/N509577/1 and EP/T517793/1

We would also like to thank all our participants from the Alton Estate community, and Alton Action group who have generously taken the time and energy to take part in our research.

[1] Part of the case study was conducted in collaboration with a team of researchers from UCL (Principal Researcher: Dr Pablo Sendra), and the community of Alton Estate in London.

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