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BALANCEANDO ABORDAGENS PARTICIPATIVAS NA AVALIAÇÃO DE SUSTENTABILIDADE DE BAIRROS

BALANCING PARTICIPATORY APPROACHES IN NEIGHBOURHOOD SUSTAINABILITY ASSESSMENT

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RESUMO

O artigo tem como objetivo apresentar uma primeira versão de uma metodologia para avaliar a sustentabilidade de bairros em comunidades de baixa renda no Brasil, usando uma abordagem que integra perspectivas de participação top-down e bottom-up de forma balanceada. O trabalho emprega a Design Science Researche detalha as etapas de compreensão, desenvolvimento e avaliação do artefato proposto, com ênfase na parte de desenvolvimento, que busca abordar os desequilíbrios nas ferramentas convencionais de avaliação de sustentabilidade, especialmente os relacionados ao processo de elaboração de indicadores. A metodologia proposta integra uma abordagem baseada no lugar, envolvendo partes interessadas e expertise locais, para criar soluções sustentáveis alinhadas com os contextos locais. A pesquisa envolve entrevistas exploratórias, um estudo Delphi e atividades participativas baseadas no lugar para selecionar, ajustar e ponderar indicadores. A abordagem proposta visa alcançar uma avaliação precisa e sensível ao contexto da sustentabilidade de bairros, visando melhorar a formulação de políticas públicas e ações coletivas.A contribuição deste trabalho refere-se a uma primeira versão do método e a apresentação do trabalho no evento tem foco em coletar input de experts no tema da sustentabilidade com o propósito de refinar a metodologia e a coleta e análise de dados proposta.

Palavras-chave: Indicadores de Sustentabilidade, Abordagem Baseada em Lugar, Artefato.

ABSTRACT

The article aims to present an initial version of a methodology for assessing the sustainability of low-income neighbourhoods in Brazil, using an approach that integrates top-down and bottom-up participation perspectives in a balanced manner. The paper employs Design Science Research and outlines the stages of understanding, development, and evaluation of

the proposed artefact, with a particular emphasis on the development phase, which seeks to address imbalances in conventional sustainability assessment tools, especially those related to the indicator development process. The proposed methodology integrates a place-based approach, involving stakeholders and local expertise, to create sustainable solutions aligned with local contexts. The research involves exploratory interviews, a Delphi study, and place-based participatory activities to select, adjust, and weight indicators. The proposed approach aims to achieve an accurate and context-sensitive assessment of neighbourhood sustainability, with the goal of improving public policy formulation and collective action. The contribution of this paper lies in the initial version of the method, and the event presentation of the paper focuses on gathering input from experts in sustainability to refine the methodology and the proposed data collection and analysis techniques.

***Keywords**: Sustainability Indicators, Place-based Approaches, Artefact.*

1 INTRODUCTION

'Sustainability' encompasses a multifaceted blend of economic security, environmental integrity, social cohesion, quality of life, and effective governance. However, achieving a consensus on a precise methodology for assessing sustainability that considers diverse dimensions across sectors remains elusive (Turcu, 2013). Urban sustainability, particularly within the urban development context, requires a delicate equilibrium between environmental, social, economic, and institutional factors unique to each city's temporal and spatial context (Michalina et al., 2021). This combination of dimensions underlines the significance of accurate and comprehensive sustainability assessment frameworks in urban planning and policy (Benites; Osmond; Rossi, 2020; Sharifi; Murayama, 2014).

Existing literature showcases various tools and methods for assessing sustainability, with Neighbourhood Sustainability Assessment (NSA) tools being among the most popular, being used by developed and developing nations (Grazieschi; Asdrubali; Guattari, 2020; Sharifi; Murayama, 2013). However, many of these mainstream tools exhibit imbalances, predominantly emphasising environmental factors at the expense of social and economic considerations (Sharifi; Murayama, 2013). Besides that, they usually adopt a top-down methodological paradigm, meaning little community participation in indicators development and implementation (Turcu, 2013). So, the challenge for NSA tools lies in transparently developingindicator setswhile addressing local contextual factors (Komeily; Srinivasan, 2015; Sharifi; Murayama, 2013).

This paper focuses on addressing these challenges through a balanced approach that integrates both top-down and bottom-up perspectives in a participatory process of neighbourhood sustainability assessment. The top-down methods, often driven by experts, risk overlooking local nuances, while bottom-up approaches involving community engagement need more precision. Achieving a harmonious blend of these approaches is crucial to ensure comprehensive evaluations that resonate with local communities and promote sustainable development (Sharifi; Murayama, 2013).

Moreover, the adaptability of sustainability assessment tools to local contexts is of utmost importance, recognising the unique trajectories of development in different regions (Boyle; Michell; Viruly, 2018). These tools should be dynamic, responsive, and capable of addressing both physical and non-physical aspects of sustainability (Berardi, 2013). The involvement of local stakeholders, beyond mere accreditation, is essential for fostering inclusivity and community-driven sustainable initiatives (Boyle; Michell; Viruly, 2018).

This study uses Design Science Research to present an artefact especially developed to solve a real problem. The aim of this paper is to present a first version of this artefact, a methodology for assessing neighbourhood sustainability in low-income communities in Brazil, employing a place-based approach that integrates both top-down and bottom-up considerations. The paper presentation aims to invite expert input to refine the methodology further and advance the sustainable urban development field. Through a balanced, participatory, and locally adaptable framework, this research aims to facilitate accurate and context-sensitive neighbourhood sustainability assessment for improved policy and collective action.

2 LITERATURE REVIEW

The concept of "place" is multifaceted, encompassing physical and social dimensions. Physically, it signifies a location that shapes daily life and possesses tangible attributes. Socially, it includes societal standing, community involvement, and emotional attachments (Crooks; Andrews; Pearce, 2020). Additionally, place extends to administrative boundaries, connecting locals to shared spaces with personal significance. Collaborating with residents is crucial to establish socially, economically, and environmentally resonant places. Each place's uniqueness emerges from its environmental features, governance, economics, and social significance (Victoria State Government, 2020).

Place-based approaches expand organisational boundaries to address underlying causes instead of isolated issues. These approaches tap into local knowledge and passion, creating a platform for local agency (Baker, 2022). It empowers communities to apply their expertise, fostering connectedness and resilience. A systemic view of place aids in implementing evidence-based policies effectively across diverse contexts. This strategy encourages policymakers to engage stakeholders, generating innovative solutions for local challenges. A place-based approach shifts from crisis reactions to preventive responses, tailoring interventions for optimal impact(Victoria State Government, 2020).

Education and training are vital for effective place-based approaches. They encompass raising awareness, altering behaviours, enhancing capabilities, interdisciplinary training, and involving the entire community (Brandli et al., 2017; Tilbury, 2011). Collaborative education fosters learning, communication, and capacity development. Stakeholder interaction facilitates participatory education, enabling rapid qualitative information acquisition across sectors. Besides that, for sustainability, skills can be cultivated in various environments, ensuring alignment with local needs and promoting intercultural dialogue (Cotton; Winter, 2014).

3 MATERIALS AND METHODS

This paper is part of a broader research project for a thesis in urban and regional planning. The selected methodology used inthe project is Design Science Research (DSR), which aims to develop innovative solutions for real-world problems in the form of an artefact(Dresch; Lacerda; Antunes Júnior, 2015; Holmström; Ketokivi; Hameri, 2009). The DSR process involves identifying a research problem, understanding it theoretically and practically, formulating a creative solution concept (artefact), executing and assessing the solution's feasibility, evaluating its applicability, and analysing theoretical advancements. The research design consists of three main stages: comprehension, development, and evaluation, with refinement cycles throughout. This process includes case study data collection involving the community

and literature reviews conducted at different research stages. The scale of analysis is the neighbourhood, understood as a place by its inhabitants, which should include the administrative boundaries, location, locale and sense of place. A community for the case study is yet to be selected, but it should be a low-income neighbourhood in Porto Alegre, preferably with some level of community engagement in policy decision-making.

This paper brings a part of the development stage of the thesis research project, which refers to developing the first version of the balanced methodology to assess neighbourhood sustainability.The methods adopted in the composition of the artefact were selected based on literature review and the analysis of other case study limitations and potentialities (Fraser et al., 2006; Scussel, 2007; Turcu, 2013; Delsante, 2016; Monteiro, 2020).

4 PROPOSED ARTEFACT

4.1 Comprehension Stage

This stage focuses on understanding essential concepts and elements relevant to the research. It comprises several activities, including exploratory literature review, exploratory interviews and a Delphi Study, briefly outlined as follows:

The literature review involves an in-depth exploration of the research problem through a narrative literature review synthesis(Grant; Booth, 2009), divided into two parts: The first involves searching scientific literature to understand concepts related to sustainability and place, which will inform the methodology's conceptualisation and operationalisation.The second concerns establishing a foundation for sustainability assessment (Fraser et al., 2006; Michalina et al., 2021; Turcu, 2013), a literature synthesis of public consensus lists of sustainability indicators will be conducted.The exploratory interviewsseek to comprehend the Brazilian context of neighbourhood sustainability from various stakeholder perspectives(Ameen; Mourshed, 2019).The Delphi study involves understanding contextual differences in sustainability indicators between developed and developing countries, specifically Brazil, South Africa, and the UK.

4.2 Development Stage

This stage aims to devise and refine the artefact through various phases and apply them in a case study to obtain evidence (Dresch; Lacerda; Antunes Júnior, 2015).

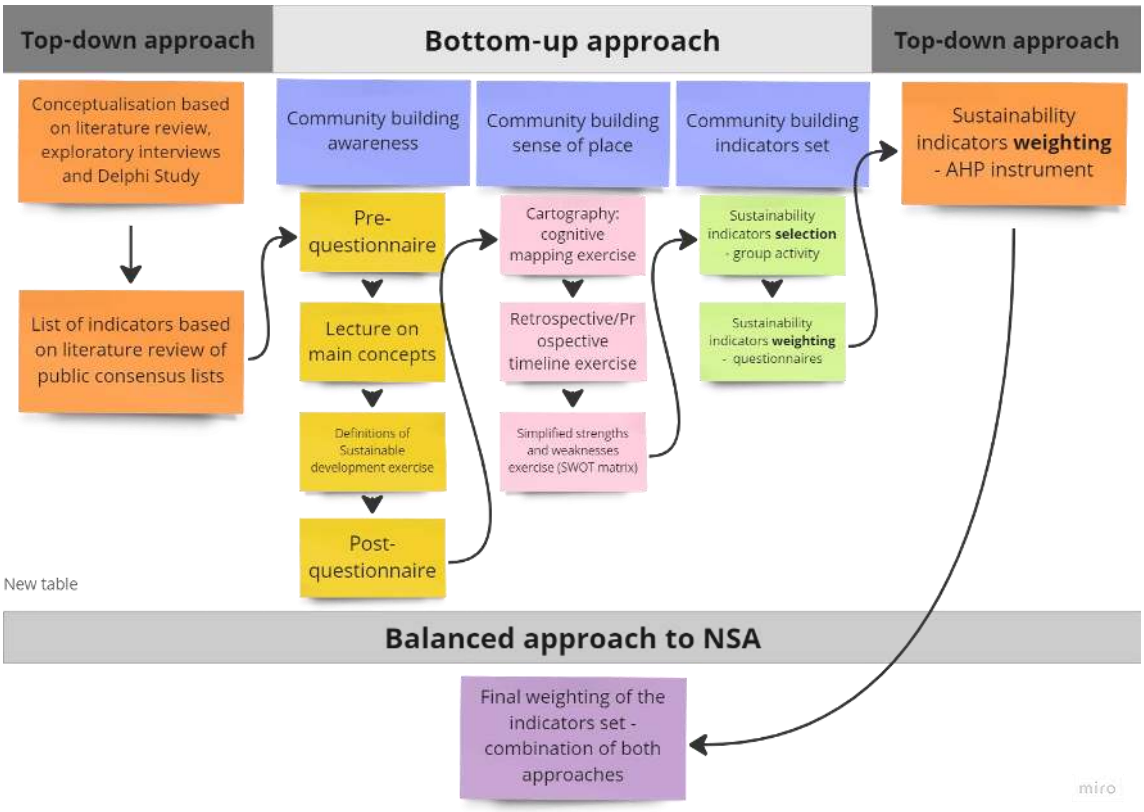
The initial methodology version integrates steps from the comprehension stage, conceptualisation, literature review, interviews, and Delphi study. It encompasses a "Top-Down Approach" to indicator selection, a "Bottom-Up Approach" involving place-based activities for community engagement in indicator selection, adjustment, and weighting, and again a "Top-Down Approach" for expert indicator weighting. A final phase follows, where both approaches will be combined, called “Balanced Approach to NSA”. Figure 1 shows a flowchart of the proposed methodology. Next, the detailing of each activity is presented.

Community Building Awareness

The initial phase of the place-based activities involves enhancing the community's knowledge and skills related to sustainable development and sustainability. According to Brandli et al. (2017) and Taylor et al. (2017), these endeavours should

be carried out in collaboration with community leaders and stakeholders who have a strong interest in playing an active role in the process (as emphasized by Baker, 2022). These individuals should possess the ability to involve other stakeholders in the participatory process and must be carefully chosen by the research team.

Figure1 – Flowchart of the proposed phases of the methodology for NSA



Source: Authors (2023)

The first step in this process involves administering a preliminary questionnaire to assess the existing perspectives of key stakeholders on the research topics, as outlined in Brandli et al. (2017).Subsequently, the research team should organize a lecture for key stakeholders based on the conceptualization phase of the literature review. This lecture should cover various aspects, including sustainable development, sustainability, sustainable development goals, and indicators—highlighting how these elements can empower the community and enhance quality of life. Furthermore, the concept of "place" and place-based approaches should also be addressed.

As recommended by Cotton and Winter (2014), the next activity should involve a group exercise titled "Definitions of Sustainable Development." This exercise serves as a brief activity designed to stimulate discussion about different perspectives on sustainable development. It should be conducted after the lecture to gauge the audience's awareness of the topic. Subsequently, a post-questionnaire will be administered to assess the participants' increased awareness (as discussed by Brandli et al., 2017).

The data collected from these activities will be analysed using descriptive statistical analysis for the questionnaires and Thematic Analysis for the "Definitions of Sustainable Development" exercise (as proposed by Braun and Clarke, 2022). The results are expected to demonstrate a significant improvement in the participants' understanding of sustainable development and sustainability.

Community Building Sense of Place

The second segment of the place-based activities focuses on nurturing a sense of place within the community and among diverse stakeholders. Drawing from insights by Taylor et al. (2017), Crooks et al. (2020), and the Victoria State Government (2020), this phase of the methodology entails gaining a profound understanding of what constitutes a place and formulating a comprehensive definition of the specific geographical area in question, encompassing administrative boundaries, limits, and essential components through the views of the community. To accomplish this, the method proposes engaging in three activities: cartography through cognitive mental maps, a retrospective/prospective timeline exercise, and a strengths and weaknesses exercise.

The cognitive mental maps exercise, inspired by Lynch's "Image of the City" (1960), explores how people perceive urban spaces, focusing on elements like paths, edges, districts, nodes, and landmarks. It follows guidelines from Cotton & Winter (2014) and Gehl & Svarre (2013). Data analysis aims for consensus-building and results in a consolidated map highlighting frequently mentioned place elements and boundaries. This map aids subsequent research phases, with data also undergoing thematic analysis, ultimately connecting place-based activities to the overarching research objectives through indicator correlation.

The retrospective/prospective timeline exercise follows as Atkisson (1996) highlights the potential challenge of introducing a long-term, comprehensive perspective on sustainability, which might initially alienate stakeholder groups during the indicator discussion phase. To address this, the concept of time context should be introduced into the discussion process, following the insights of Mischen and Lipo (2021). It's crucial that participants have a defined time frame within which to operate. Given the iterative nature of the assessment, this time frame could be adjusted or revised in subsequent assessments.

This exercise addresses the time frame issue and can be combined with the first activity to explore how past urban environments shape people's visions for future city development. Participants will collaborate in groups to identify historical aspects of the area and envision the community's desired future, including timeframes. Activity instructions draw from Cotton & Winter (2014). Data analysis follows a consensus-building approach, resulting in a synthetic timeline and/or map reflecting a collectively agreed-upon vision for the neighbourhood's future in a particular time frame. This timeline/map will be accessible in subsequent research stages, with data from this phase undergoing thematic analysis and ultimately linking to the selected indicators, affirming the connection between place-based activities and the overarching research objectives.

Building on Monteiro's (2020) insights, which emphasize the influence of various urban factors on the quality of life and sustainability of a place—such as land use, public spaces, urban mobility, urban layout, housing, urban infrastructure, and public management capacity— the strengths and weaknesses exercise will be conducted in small groups. The aim is for community members to identify Strengths, Weaknesses, Opportunities, and Threats (SWOT) pertaining to their neighbourhood in a simplified manner, in line with Pesonen and Horn (2013).

The data collected will once again be analysed through a consensus-building lens, leading to the creation of a matrix highlighting the principal Strengths, Weaknesses, Opportunities, and Threats identified by community members across sustainability dimensions. The data collected in this phase will also undergo thematic analysis and

be correlated with the indicators selected towards the end of the process, thus reinforcing the link between place-based activities and the overarching research objectives.

Community Building a Set of Indicators

The third phase of the place-based activities focuses on the development of a set of indicators by involving community members and diverse stakeholders. This phase includes presenting the outcomes from earlier stages and engaging the community in the selection, adjusting, and weighting of the indicators. To begin, all materials generated in previous activities will be shared with the community through both online resources and printed copies distributed at meeting locations.

Following the approach outlined by Turcu (2013), this step involves a participatory process where community members and stakeholders collaborate in group activities to choose indicators from the initial list generated during the research's comprehension stage. Each group will evaluate the list, discussing which indicators they believe should be included in the final selection and proposing new ones based on their community experience and previous exercises. Subsequently, the chosen indicators will undergo a three-step adjustment process before being incorporated into the final list. These selected indicators will be cross-referenced with the themes derived from the place-based activities to ensure alignment.

Additionally, a survey questionnaire will be administered to assess the weighting of the indicators, with respondents using a Likert scale to rank the importance of each sustainability indicator. Turcu (2013) highlights the importance of allowing respondents to provide explanations, suggest new indicators, and comment on existing ones to mitigate the limitations of a forced-choice response format. The results will be analysed to determine the importance ratings of indicators within and across dimensions, aiming to reflect the connection between local priorities and current sustainability policy initiatives. These findings will also be correlated with the themes identified in the place-based exercises to verify their alignment.

Top-Down Approach to Indicator Weighting

Following the community's selection and weighting of indicators, experts with specialized knowledge, including scholars, city council technicians, researchers, and other stakeholders in sustainability, will also have the opportunity to assess these chosen indicators using a different approach. Specifically, they will utilize the Analytical Hierarchy Process (AHP), a method endorsed by Ameen &Mourshed (2019) and Michell et al. (2022). AHP is a structured technique for systematically organizing and analysing complex decision criteria through pairwise comparisons, widely regarded as suitable for establishing a weighting system to prioritize relevant factors in an assessment framework. The analysis of data derived from AHP involves evaluating the reliability and validity of the decisions made during these pairwise comparisons. A crucial metric, the consistency ratio (CR), is employed in AHP to assess the consistency of the experts' judgments. Implementing the analytical phase is ideally done using Microsoft Excel, in accordance with recommendations from Vaidya & Mayer (2016) and Ameen &Mourshed (2019). The end result should be a finalized list of weighted indicators.

Balanced Approach to Neighbourhood Sustainability Assessment

This phase combines community and expert weightings in a balanced manner. This part is still under development.

Follow-up Stages of the Artefact Development

The first version of the artefact is presented and refined through expert discussions, like in this article, ata sustainability event. A refined version is then again put under review, for later it to be tested in a case study, followed by data collection. The results are likewise discussed in focus groups or sustainability events to evaluate their applicability. Finally, the methodology is finalised based on the feedback received.

4.3 Evaluation stage

In the final stage of the DSR process the identification of theoretical and practical contributions of the work should take place from the overall analysis of collected data in the case study. The thematic analysis of the place-based exercises should be correlated to the final indicators selected and weighted to understand the methodology's validity and applicability. Through this process, it is possible to know if the balanced approach reflects the communities' necessities and goals. A connection to existing urban policy will also be analysed.

The thesis results should be evaluated in the final viva presentation and published in peer-reviewed journals. Limitations and directions of the research should also be appointed in this stage.

5 CONCLUSION

This paper aimed to present a first version of a methodology for assessing neighbourhood sustainability in low-income communities in Brazil, employing a place-based approach that integrates both top-down and bottom-up perspectives in a balanced way and themain focus of the paper presentation is to gather expert input on the method and its procedures to data collection and analysis. Therefore, it is expected to receive that input during the event, and use it to further refine the method.

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REFERENCES

AMEEN, R. F. M.; MOURSHED, M. Urban sustainability assessment framework development: The ranking and weighting of sustainability indicators using analytic hierarchy process. **Sustainable Cities and Society**, v. 44, p. 356–366, Jan. 2019.

ATKISSON, Alan. Developing indicators of sustainable community: Lessons from sustainable Seattle. **Environmental Impact Assessment Review**, [*s. l.*], v. 16, n. 4, p. 337–350, 1 Jul. 1996. ISSN 0195-9255. DOI 10.1016/S0195-9255(96)00025-X.

BAKER, Sophie. **A scoping review of place-based approaches to community engagement and support**. Cardiff: Welsh Government, 2022. p. 63. Available at: https://www.gov.wales/place-based-approaches-community-engagement-and-support.

BENITES, H. S.; OSMOND, P.; ROSSI, A. M. G. Developing Low-Carbon Communities with LEED-ND and Climate Tools and Policies in São Paulo, Brazil. **Journal of Urban Planning and Development-ASCE**, v. 146, p. 04019025, 2020.

BERARDI, U. Sustainability assessment of urban communities through rating systems. **Environment, Development and Sustainability**, v. 15, p. 1573–1591, 2013.

BOYLE, L.; MICHELL, K.; VIRULY, F. A Critique of the Application of Neighborhood Sustainability Assessment Tools in Urban Regeneration. **Sustainability**, v. 10, p. 1005, 2018.

BRANDLI, L. L. et al. (EDS.). **Pré-requisitos para a sustentabilidade dos municípios do Rio Grande do Sul**. Passo Fundo: Ed. Universidade de Passo Fundo, 2017.

BRAUN, V.; CLARKE, V. **Thematic analysis: a practical guide**. Los Angeles: SAGE, 2022.

COTTON, D.; WINTER, J. "Sustainability pedagogies" from sustainability education: Perspectives and Practice across Higher Education. In: WHEELER, S. M.; BEATLEY, T. (Eds.). **Sustainable Urban Development Reader**. 3. ed. London: Routledge, 2014.

CROOKS, V. A.; ANDREWS, G. J.; PEARCE, J. Introducing section 4: Places and spaces. In: **Routledge Handbook of Health Geography**. London: Routledge, 2020. p. 386.

DRESCH, A.; LACERDA, D. P.; ANTUNES JÚNIOR, J. A. V. Design Science Research. In: DRESCH, A.; LACERDA, D. P.; ANTUNES JÚNIOR, J. A. V. (Eds.). **Design Science Research: Método de Pesquisa para Avanço da Ciência e Tecnologia**. Porto Alegre: Bookman, 2015. p. 67–102.

FRASER, E. D. G. et al. Bottom up and top down: Analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management. **Journal of Environmental Management**, v. 78, n. 2, p. 114–127, 2006.

GEHL, Jan; and SVARRE, Birgitte. **How to study public life**. Washington: Island Press, 2013. 179 p. ISBN 978-1-61091-423-9.

GRANT, M. J.; BOOTH, A. A typology of reviews: An analysis of 14 review types and associated methodologies. **Health Information and Libraries Journal**, v. 26, n. 2, p. 91–108, 2009.

GRAZIESCHI, G.; ASDRUBALI, F.; GUATTARI, C. Neighbourhood sustainability: State of the art, critical review and space-temporal analysis. **Sustainable Cities and Society**, v. 63, p. 102477, Dec. 2020.

HOLMSTRÖM, J.; KETOKIVI, M.; HAMERI, A. P. Bridging practice and theory: A design science approach. **Decision Sciences**, v. 40, n. 1, p. 65–87, 2009.

KOMEILY, A.; SRINIVASAN, R. A need for balanced approach to neighborhood sustainability assessments: A critical review and analysis. **Sustainable Cities and Society**, v. 18, p. 32–43, 2015.

LYNCH, Kevin. **Aimagem da cidade**. The image of the city. Lisboa: Edições 70, 1960. ISBN 972-44-0379-3. Accessed: 5 Jul. 2023.

MICHALINA, D. et al. Sustainable Urban Development: A Review of Urban Sustainability Indicator Frameworks. **Sustainability**, v. 13, n. 16, 2021.

MICHELL, K. et al. Systematic review of critical success factors for developing an Afro-centric neighbourhood sustainability assessment framework. **IOP Conference Series: Earth and Environmental Science**, v. 1101, 2022.

MISCHEN, Pamela A.; and LIPO, Carl P. A Place-Based Approach to Sustainable Communities: A Case Study from Rapa Nui (Easter Island, Chile). **Journal of Sustainable Development**, v. 14, n. 5, p. 1, 30 Jul. 2021. ISSN 1913-9071, 1913-9063. DOI 10.5539/jsd.v14n5p1.

MONTEIRO, Deyvid Aléx de Bitencourt. **Proposta de um método para avaliação da qualidade de vida urbana e da sustentabilidade de bairros brasileiros**. 2020. 512 p. Universidade Federal do Rio Grande do Sul, 2020.

PESONEN, Hanna-Leena; and HORN, Susanna. Evaluating the Sustainability SWOT as a streamlined tool for life cycle sustainability assessment. **The International Journal of Life Cycle Assessment**, v. 18, n. 9, p. 1780–1792, 1 Nov. 2013. ISSN 1614-7502. DOI 10.1007/s11367-012-0456-1.

SHARIFI, A.; MURAYAMA, A. A critical review of seven selected neighborhood sustainability assessment tools. **Environmental Impact Assessment Review**, v. 38, p. 73–87, Jan. 2013.

SHARIFI, A.; MURAYAMA, A. Neighborhood sustainability assessment in action: Cross-evaluation of three assessment systems and their cases from the US, the UK, and Japan. **Building and Environment**, v. 72, p. 243–258, 2014.

TAYLOR, M.; BUCKLEY, E.; HENNESSY, C. **Historical review of place-based approaches**. Lankelly Chase, Institute of Voluntary Action Research (IVAR), 2017. Available at:<https://lankellychase.org.uk/wp-content/uploads/2017/10/Historical-review-of-place-based-approaches.pdf>. Accessed in: 3 Jul. 2023.

TILBURY, D. Higher education for sustainability: A global overview of commitment and progress. In: **Higher Education in the World 4 - Higher Education's Commitment to Sustainability: From Understanding to Action**. 4. Palgrave, 2011. p. 18–28.

TURCU, C. Re-thinking sustainability indicators: local perspectives of urban sustainability. **Journal of Environmental Planning and Management**, v. 56, n. 5, p. 695–719, 2013.

VICTORIA STATE GOVERNMENT. **A framework for place-based approaches**. Victoria State Government, 2020. Available at:<https://www.vic.gov.au/framework-place-based-approaches>. Accessed in: 8 Jun. 2023