SDGs Localization: A New Tool for a Comprehensive Assessment of Neighbourhood Sustainability

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Abstract. The localization of the Sustainable Development Goals (SDGs) is a crucial factor for achieving all 17 goals outlined in the UN 2030 Agenda, particularly at the urban level. While SDG 11 specifically focuses on cities and communities, it is important to note that all SDGs encompass an "urban component". However, there are limited tools available that offer a comprehensive evaluation in this regard. This paper introduces the methodology employed to create a new tool for localizing SDGs at the urban and neighbourhood level, aimed at supporting the Regional Sustainable Development Strategy (Sardegna2030) of the Sardinia Region in Italy. The evaluation framework, indeed, is designed to become a centrepiece in the institutionalisation of sustainability assessment across the public administrations, and to promote sustainability through urban projects and policies. This work raises critical questions about the current practices and suggests how SDGs-oriented urban strategies and projects can offer a comprehensive a common framework of principles and criteria against which different interventions can be assessed and justified. The chapter concludes with a discussion of the potential more general relevance of such an approach, and some suggestions for future research and practice.

Keywords: 2030 Agenda · SDGs Localisation · Urban Sustainability · Evaluation Tools · Neighbourhood Sustainability Assessment

1 Introduction

The United Nations' 2030 Agenda for Sustainable Development, approved in September 2015, defined an action plan for People, Planet, Prosperity, Peace, and Partnership (the so-called "5P's"), with the aim of accelerating ecological transition without leaving anyone behind. In this context, the Sustainable Development Goals (SDGs) constitute the comprehensive operational framework of the 2030 Agenda. Their 17 goals and 169 targets seek to integrate environmental and social objectives into a single strategic vision, which had previously been predominantly addressed separately.

For the goals and targets of the 2030 Agenda to become operational, they need to be "localized". This involves adapting global goals to the specific reality of each

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local context, with a commitment from local authorities and all stakeholders to define significant strategies and priority actions aimed at extending benefits at the grassroots level [1–3].

Local goals and specific indicators are translated by "Voluntary Local Reviews" (VLRs) at different scales (national, regional and municipal), providing a useful support for assessing and monitoring current situation and the effectiveness of various policies, projects and interventions [4–7].

In Italy, the National Strategy for Sustainable Development, approved by the Italian Government in 2017 for the period 2017–2030, is the primary document supporting the process of SDGs implementation and monitoring across the territory through specific regional and sub-regional strategies [8, 9]. Among these local strategies, the Sardinian "Regional Sustainable Development Strategy" (Sardinia2030 Strategy) came into in force in 2021 [10, 11] and provides a Positioning Report that analyses the degree of SDGs achievement, comparing with other Italian and European regions.

In national and regional strategies, urban settlements are recognized as pivotal for attaining various sustainability goals. As UN-Habitat highlighted, the 23% of the 234 SDGs indicators include an "urban component" [12]. As a result, urban decisions that transform built, natural, social and economic environments have a significant impact on the attainment of multiple goals [13]. Thus, effective plans and urban design strategies require integrated site-specific decision support tools to make better choices in relation to different aspects of sustainability.

However, there are limited tools available to assist public administrations in SDGs-oriented decision-making. The current data, indicators, and evaluation models primarily focus on the municipal level as a whole. This macro-urban approach tends to flatten information through average values that are insufficient in describing specific situations at the neighbourhood or suburban scale (the urban micro-scale), which is the level where ordinary city transformation processes occur [14–16].

In this paper, we present a new tool specifically designed to facilitate the "localization" of SDGs at the neighbourhood level. The tool has been developed as part of the research project titled "Evaluation of Urban Sustainability through Mobility and Capability Analysis" (Urban SOSLab), funded by the Italian Ministry of Environment and Energy Security to support the development of the Sardinia2030 Strategy. Furthermore, the part of the instrument focused on mobility is under development through the project "GLOSSA: GLOcal" knowledge System for Sustainability Assessment" and within the Sustainable Mobility National Research Centre (MOST), funded within the framework of the Italian National Recovery and Resilience Plan (PNRR). The project is carried out by an multidisciplinary research team within the Department of Civil and Environmental Engineering and Architecture at the University of Cagliari (Italy).

This paper provides a comprehensive overview of the structure of the "Urban SOSLab" evaluation framework, offering insights into its intricacies and components. It delves into the methodology behind the selection of indicators, shedding light on the rationale and criteria employed. Furthermore, the paper explores the key findings derived from the application of the proposed evaluation tool and discusses the broader policy implications of the proposed tool, considering its potential impact on urban governance, decision-making processes, and the pursuit of sustainable urban development goals.

2 The SDGs Assessment Tool: Methodology

The development of the assessment tool involved four phases each characterized by specific objectives, methodologies, and outcomes (Fig. 1).

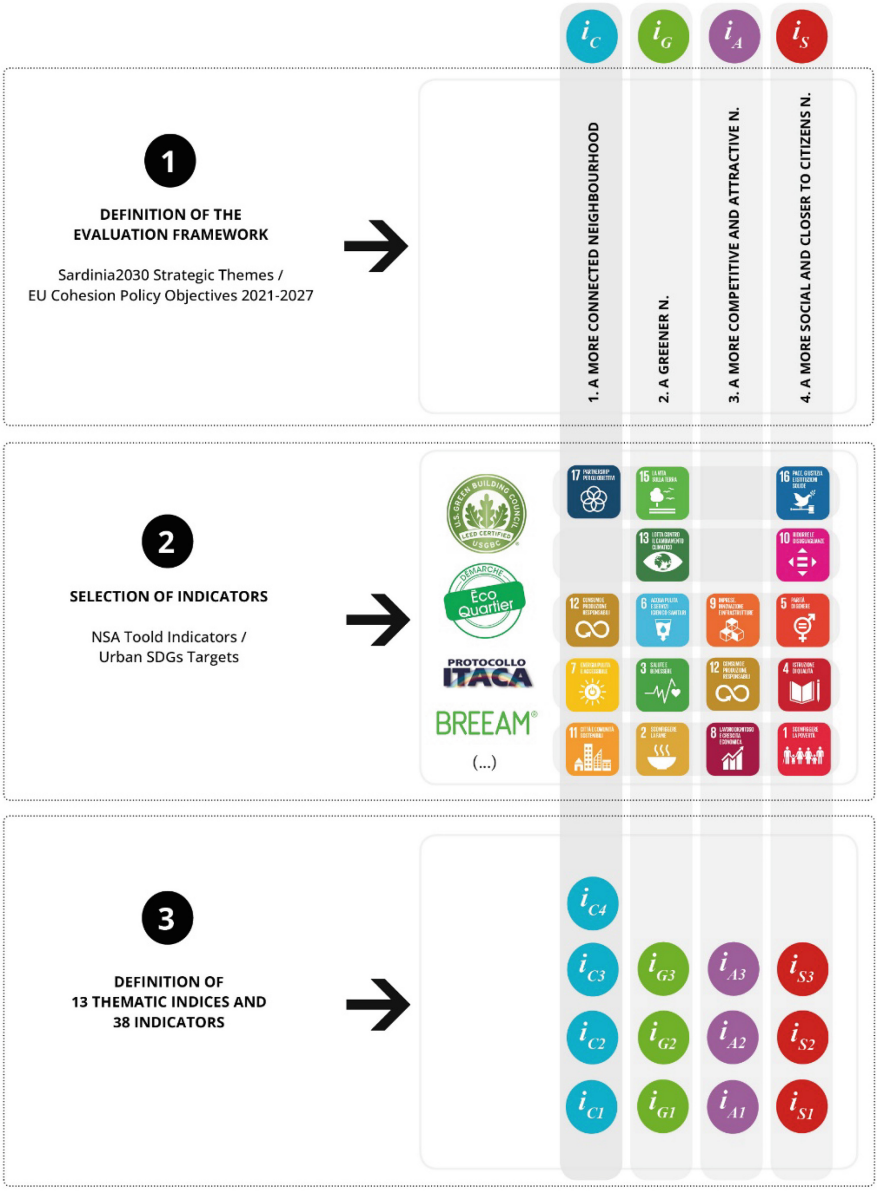

Fig. 1. The proposed Evaluation Framework: steps for the definition and structure.

In the next subsections we describe these phases in detail to provide readers a comprehensive understanding of the iterative and systematic approach undertaken to create the evaluation tool.

2.1 Strategy and Policy: Build a Common Vision

The primary objective of the initial phase was to establish the evaluation framework by defining common local objectives, ensuring a comprehensive assessment of urban sustainability at the neighbourhood scale. In this context, we aligned the Sardinia2030 Strategy with the mission and objectives of the Urban SOSLab to establish a unified overarching vision [17]. The main activities undertaken included:

- Surveys for collecting information.
- Thematic work groups and collective discussion.

These activities aimed to identify relevant evaluation issues and define key assessment categories. The evaluation framework maintains the five strategic themes of the Regional Strategy, aligning with the 2021–2027 EU cohesion policy objectives [10, 11]. This alignment is crucial for optimizing resources, given that the Sardinia Region, classified as NUTS level 1, receives a significant portion of funds for growth and employment due to its lower GDP per capita, which currently stands below 75% of the EU average. Consequently, the proposed evaluation framework encompasses goals related to:

1. Constructing a more **competitive** and **smarter** neighbourhood with enhanced administrative capacity and a more innovation-oriented production system for greater competitiveness.
2. Developing a **greener** neighbourhood focused on the conservation, management, and enhancement of resources and land, fostering an ecological and resilient transition to address climate change.
3. Establishing a **more connected** neighbourhood by promoting inclusive accessibility through sustainable mobility and digital accessibility.
4. Cultivating a **more social** and **closer to citizens** neighbourhood by encouraging investments in well-being, including health, social inclusion, equality, and culture.

All the objectives are multidimensional, synergistic, and complementary. This implies that each strategic theme and goal should be interrelated with the others and not be read individually or considered as self-supporting.

2.2 Selection of Representative Indicators

The five strategic themes of the Sardinia2030 Strategy, described in the previous subsection, are interconnected through a matrix presenting a specific set of 102 indicators. These indicators serve to support and guide the implementation of actions and policies. However, as these indicators are designed for the urban macro-scale, they may only be useful in focusing on potential themes and evaluation elements. For our neighbourhood-scale evaluation, we require indicators at a smaller scale.

Therefore, to establish specific indicators at the proposed level for the five strategic themes, we conducted an analysis and selection of evaluation and certification tools

and systems. These tools were chosen from among the most significant ones currently employed internationally. We considered evaluation systems at both the city-wide and neighbourhood levels to formulate a list that is as representative as possible of the diverse objectives and thematic indicators in use.

Over the past few decades, there has been a noticeable increase in both academic and practical interest surrounding sustainability assessment tools, certification systems, and indicator frameworks. This trend reflects a tangible commitment to embracing multi-criteria analysis and sustainable accounting methodologies to gauge the efficacy of urban interventions.

These evolving patterns not only highlight a growing engagement with comprehensive evaluative approaches but also signify a maturing recognition within academic circles of the pivotal role these instruments play. They serve as essential tools for not only discerning but also enhancing various dimensions of sustainability outcomes stemming from neighbourhood level interventions in urban environments. This heightened scholarly and practical attention underscores the growing imperative to employ robust evaluative mechanisms to navigate the complexities inherent in fostering sustainable urban development [15, 18–21].

Proposing varied sets of criteria and indicators, these tools aim to measure, monitor, and evaluate the sustainability of existing urban areas, neighbourhoods, and planned interventions across multiple dimensions. These include environmental aspects, such as the relevance of green space provision, resource management (including water, energy, and waste), and transportation usage patterns.

Social considerations encompass factors such as housing affordability, the provision of services and public spaces, as well as levels of community participation and involvement. Additionally, economic dimensions involve evaluating economic activities and their impact on job creation within these neighbourhoods. This holistic approach underscores the interconnectedness of environmental, social, and economic factors in shaping sustainable urban development [15, 22, 23].

Regarding the urban scale, the primary point of reference includes the studies and tools developed by UN-Habitat for the implementation of the New Urban Agenda (NUA), such as the “City Prosperity Index” (CPI). The CPI serves as a comprehensive global index founded on a robust statistical approach that integrates multiple indicators to measure various dimensions of prosperity and sustainability. Recently, it underwent an update to incorporate all indicators of Goal 11 and the SDGs with an urban component. In its latest iteration from 2017, the CPI evolved into the City Prosperity Initiative-Perception Index (CPI-PI), also known as “CPI-SDGs”, aligning itself with the urban sustainable development goals associated with the SDGs and the NUA.

Simultaneously, a selection of relevant assessment and certification tools for urban sustainability at the neighbourhood scale, known as “Neighbourhood Sustainability Assessment Tools” (NSA Tools), were also analyzed. These tools can be considered a significant reference for shaping a monitoring platform for Goal 11 and urban targets at the micro-urban scale [16]. Among these: LEED for Cities and Communities (US Green Building Council 2019), GBC neighbourhoods (Green Building Council Italia 2015), BREEAM Communities (Building Research Establishment Global Ltd.

2017), HQE2R, STAR Community Rating System (STAR Communities 2015), ÈCO-QUARTIERS (Ministère de la Transition Écologique 2021), ITACA Protocol (Institute for Innovation and Transparency in Government Procurement and Environmental Compatibility 2020) and others [15, 18–21, 24].

The correlations between UN sustainability goals and NSA (Neighbourhood Sustainability Assessment) tools has been emphasized in recent studies conducted by researchers [16, 25, 26] and private organizations dedicated to advancing the achievement of SDGs through their tools. Notably, tools such as BREEAM and DGNB have been highlighted for providing a correlation matrix that illustrates the alignment between global goals, indicators, and the criteria used for evaluating buildings or neighbourhoods. Moreover, the DGNB System District Criteria version 2020 offers an additional incentive known as the "Agenda 2030 bonuses" in nine criteria. These additional points are awarded to projects that make a significant contribution to urban climate, biodiversity, life-cycle assessment, energy, and mobility infrastructure [27–29].

In our study, we have curated a selection of indicators tailored to our specific case study. This process involved a comprehensive analysis of the environmental, social, and economic challenges within the Sardinia Regional Strategy (see Sect. 2.1) coupled with an extensive review of academic literature and best practices in urban sustainability assessment (see Sect. 2.2). Each indicator was chosen based on its relevance to the unique characteristics of the study area and its ability to provide meaningful insights into sustainability at the neighbourhood scale.

2.3 Identification of SDGs "Urban Targets"

Concurrently with the preceding step, an examination is conducted on the 230 SDGs indicators that hold relevance for an urban project. Beyond Goal 11, a comprehensive scrutiny of all SDGs is undertaken to pinpoint additional objectives linked to urban planning and design interventions. Employing this methodology, a distinct set of "urban targets" and indicators is identified, as outlined in the work by Saiu and Blečić [26]. In this way, the set identified in Sect. 2.2. is further refined and adapted to identify indicators aligned with the SDGs.

2.4 Definition of Local Indicators

To make the assessment tool effective within the local context of Sardinian urban areas, an analysis is conducted on open-access databases and information sources, at the national, regional and municipal level [27]. This examination aims to ascertain which indicators can be calculated and update periodically. The intended evaluation tool is designed for user-friendliness, targeting public administrations and local stakeholders. Consequently, it necessitates straightforward low-cost and easy management procedures.

The final set of indicators is achieved by applying the evaluation framework to a designated case study. This experimentation serves as a crucial test of the tool's validity and reliability in practice. Indicators are calculated through an automated procedure integrated into a Geographic Information System (GIS) platform that can generate georeferencing for thematic layers, facilitating overlay and map calculations. This process

provides a comprehensive view of the neighbourhood's diverse performances across various thematic areas of evaluation, in relation to different SDGs.

The resulting visualization highlights priorities and proposes actions for improvement. The set of indicators and their descriptions is provided in Table 1.

Table 1. Evaluation framework: themes and indicators

Strategic Theme	Elements of evaluation / Goals	N. of Indices	N. of Indicators
A more competitive and atractive neighbourhood	social diversity, universal accessibility of urban space, support for vulnerable social categories, degree of resident participation, and women's proactivity	3	11
A greener neighbourhood	environmental quality concerning health and safety, assessed through the presence of urban greenery, the area's carbon dioxide (CO2) sequestration capacity, albedo effect, and permeability of public and publicly used surfaces, with the possibility of extending the calculation to private surface	3	7
A more connected and accessible neighbourhood	urban connectivity and permeability, vehicular, pedestrian, and cycling mobility, as well as public transportation	4	14
A more social and closer to citizens neighbourhood	functional diversity, variety and accessibility of different services and activities within the neighbourhood	3	8
	TOTAL	**13**	**38**

Figure 2 shows an exemplary calculation summary of indicators, which in this specific case illustrates the indicator "1.2.1 – Road surface dedicated to pedestrian pathways" one of the 11 indicators included within the strategic theme "A more connected and accessible neighbourhood".

The summary is divided into two parts: the side column contains the indicator's name, description, formula, and the data required for calculation, followed by the indicator value. On the left side, you can view the map of the area under examination, where colours represent the different values assumed by the indicator in various parts of the study area.



Fig. 2. An exemplary calculation summary prepared to evaluate two of selected indicators.

3 Conclusions

The methodology delineated in this paper presents a robust approach to assessing and localizing Sustainable Development Goals (SDGs) at the neighbourhood level. By aligning with the objectives of the Sardinia2030 Strategy and employing a comprehensive evaluation framework, this tool stands as a cornerstone for advancing sustainable urban development initiatives. Its systematic approach not only addresses the complexities of urban sustainability but also offers a practical means to translate global SDGs into actionable strategies at the local level.

Through meticulous selection and adaptation of indicators, this methodology ensures a nuanced understanding of neighbourhood-level sustainability, taking into account the unique context and challenges of each locality. By focusing on urban targets across various SDGs, it enables a holistic evaluation that encompasses environmental, social, and economic dimensions of sustainability. This multi-dimensional perspective is crucial for fostering resilient and inclusive communities in the face of contemporary urban challenges.

Furthermore, the methodology's integration of data from open-access databases and utilization of Geographic Information System (GIS) technology enhances its analytical capabilities, allowing for the comprehensive assessment of neighbourhood performance across diverse thematic areas. This data-driven approach not only facilitates evidence-based decision-making but also enables stakeholders to track progress over time and identify areas for improvement.

The user-friendly design of the tool ensures accessibility for public administrations and local stakeholders, democratizing the process of urban planning and decision-making. By providing a common framework and language for discussing sustainability goals, the methodology fosters collaboration and consensus-building among diverse stakeholders, thereby enhancing the likelihood of successful implementation.

In conclusion, this methodology offers more than just a technical tool; it represents a paradigm shift towards a more integrated and participatory approach to urban sustainability. Its potential applications extend beyond the specific context of Sardinia, serving as a valuable resource for urban planners, policymakers, and researchers worldwide.

Furthermore, by providing actionable insights and tangible outcomes, this methodology has the potential to inform real-world urban development projects and policy interventions. It equips decision-makers with evidence-based information to guide strategic investments and interventions, ultimately contributing to the creation of healthier, more resilient, and equitable cities for future generations.

We have begun to explore the potential for scaling up our methodological approach into a more generalized framework. This endeavour entails a careful examination of the outcomes derived from our specific case study, assessing the transferability and adaptability of our methodology to diverse urban contexts. Our aim is to develop a flexible methodology that can be readily applied across various urban settings to assess sustainability and inform planning and development decisions for creating healthier, more resilient, and equitable cities for future generations.

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The portion of this study focusing on objective 11 of the 2030 Sustainable Development Goals "Sustainable Cities and Communities", is currently undergoing expansion through the project "A GLOcal knowledge System for Sustainability Assessment of urban projects (GLOSSA)", a Research Project of National Relevance (PRIN) funded by the Ministry of University and Research (MUR) (CUP F53D23005650001). This project received financial support by the Italian Ministry of University and Research (MUR) under the National Recovery and Resilience Plan (NRRP), Mission 4, Component 2, Investment 1.1, Call for tender No.104 published on 2.2.2022, funded by the European Union – NextGenerationEU.

Additionally, the segment of this study focusing on mobility is currently being expanded within the MOST – Sustainable Mobility National Research Centre, which received funding from the European Union Next-Generation EU (PNRR – Italian National Recovery and Resilience Plan – Mission 4 Component 2, Investment 1.4—D.D. 1033 17 June 2022, CN00000023).

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