The Role of Sustainability Indicators in Public Administration

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Abstract: Sustainability constitutes a fundamental and increasingly significant concept across various domains, including the realm of public administration. Nevertheless, the measurement of sustainability presents inherent challenges due to its multifaceted nature encompassing environmental, social, and economic factors. Consequently, sustainability indicators tailored for public administration necessitate an integrated approach that holistically accounts for these environmental, social, and economic dimensions. Such an approach entails the utilization of indicators that accurately reflect administrative policies and practices in the context of sustainability. The selection of appropriate sustainability indicators is contingent upon the specific evaluative requirements of an organization, as it seeks to assess its sustainability. The adoption of a sustainability-oriented perspective holds benefits for diverse stages of public administration, encompassing planning, design, and implementation. By infusing the concept of sustainability throughout the entirety of governmental operations, it becomes feasible to ensure that administrative activities are oriented towards attaining sustainable development while duly considering the environmental, social, and economic ramifications.

Keywords: **Policy Maker, Governance, Sustainability Indicators, KPI, Project**

I. Introduction

In recent times, the sustainability of public projects has gained significant relevance within the domain of public administration, primarily driven by an increasing awareness of the environmental and social repercussions associated with human activities [1]. Furthermore, the global COVID-19 pandemic has underscored the necessity for coordinated and sustainable measures to address crises that can profoundly impact public health, the economy, and society at large. In order to ensure the sustainability of public projects, it is imperative to adopt an approach firmly grounded in the principles of the circular economy, with a primary objective of waste reduction and the promotion of resource recycling and reuse. This approach also entails advocating for the utilization of environmentally friendly technologies and materials, as well as enhancing waste and emission management practices to minimize adverse environmental consequences [2]. Additionally, active engagement of the local community in the planning and implementation of projects can contribute to their long-term success. This entails involving residents in decision-making processes pertaining to land usage, service selection, and the management of shared resources. Such involvement fosters heightened community awareness and responsibility towards the sustainability and efficacy of public projects [3]. It is worth noting that the sustainability of projects in public administration necessitates strong and dedicated leadership capable of cultivating a culture of sustainability within the public organization itself. This involves investing in the necessary skills and resources to implement sustainable policies and programs, while also promoting the exchange of best practices among various public entities. The concept of sustainability has garnered significant attention as both a measure of value and a paradigm shift, with the potential to revolutionize numerous fields, including public administration. To this end, a systematic research approach was employed, encompassing several phases. Section 2 of this paper delineates the methodology employed for conducting the review, while Section 3 presents the principal findings. Finally, in Section 4, the main conclusions are succinctly summarized.

II. Research Methodology

This article presents an analysis of the current state of the art regarding sustainability indicators for projects in public administration and their applicability. The purpose of this article is to provide an introductory overview and establish a baseline understanding of the topic. The aim is to contribute by offering clarity and a synthesis of the different types of sustainability indicators.

To achieve this, the following research questions (RQs) were formulated:

- **RQ1:** How is the impact of a project assessed?
- **RQ2:** How is the impact of a project monitored?
- **RQ3:** What are the indicators and tools used?

To examine current research trends on sustainability indicators, Nvivo software and VOSviewer were employed. The analysis focused on publication trends by year, document types, country analysis, and specific areas of interest.

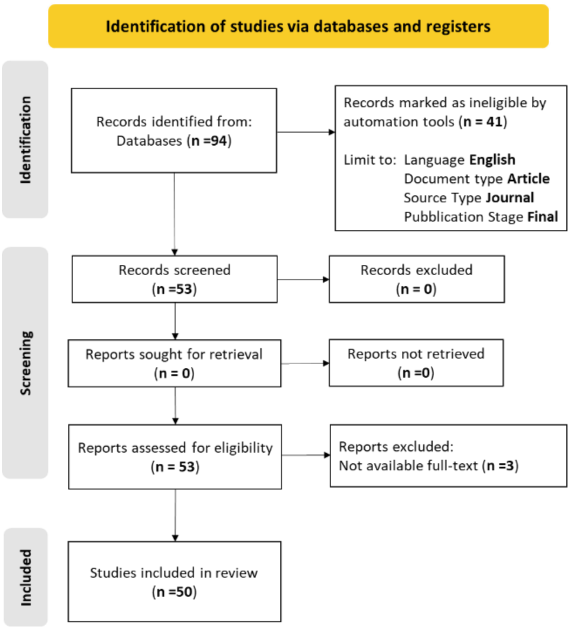

Figure 1. PRISMA flow chart (source: Author's elaboration)

In order to retrieve articles of interest from the Scopus database, it is essential to employ an effective search string. This search string should be crafted using relevant keywords pertaining to the topic under investigation, and Boolean operators such as "AND," "OR," and "NOT" to combine these keywords and obtain more precise results.

Search string used for the Scopus database:

(TITLE-ABS-KEY (policy AND maker) OR TITLE -ABS-KEY (governance) OR TITLE-ABS-KEY (sustainability AND indicators) AND TITLE-ABS-KEY (kpi) AND TITLE-ABS-KEY (project) OR TITLE-ABS-KEY (found))*

Table 1 provides a summary of the keywords and Boolean operators used in the search string on the Scopus database. The time considered is from 2005 to 2023.

TABLE. 1 SEARCH METHODOLOGY AND LITERATURE SELECTION (INITIAL SETUP).

Database search identification	
Keywords	Policy Maker Governance Sustainability Indicators Project KPI Found*
Boolean operator	AND - OR
Time	2005 2023

The main exclusion criteria were identified and summarized as follows:

- E1. Documents not related to the sustainability of the projects of the public.
- E2. Duplicate documents.

While, the inclusion criteria identified are:

- I1. Only articles at the final state of publication.
- I2. English language documents only.

The importance of metadata in connecting article topics to other useful information is clearly highlighted in Figure 2.

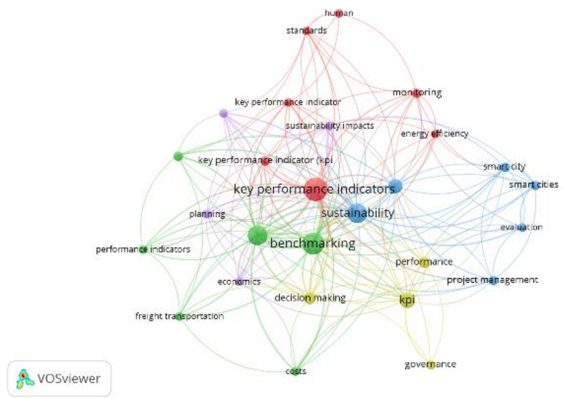

Figure 2. Co-occurrence analysis (source: VOSviewer)

The utilization of metadata simplifies the search process for pertinent and credible information. By employing metadata, users can identify their specific area of interest and access articles that provide in-depth insights on the subject matter. The interplay between words and metadata plays a crucial role in effectively managing digital information. It not only aids in organizing content but also facilitates swift and efficient access to information. The analysis conducted using the VOSviewer software yielded a graph characterized by five distinct and highly representative clusters. These clusters revolve around the keywords:

Benchmarking, Performance, Key Performance Indicator, Sustainability, and Energy Efficiency. Notably, the network clusters exhibit robust interconnections, effectively encompassing the entirety of the sustainability domain.

The graphical representation of publication data pertaining to this topic demonstrates an upward trend. Between the early years of 2005 and 2015, the number of articles published in journals was fewer than five (Figure 3). However, there has been a notable surge in publications since 2018. Subsequently, the number of publications has fluctuated, with an average of approximately eight publications per year.

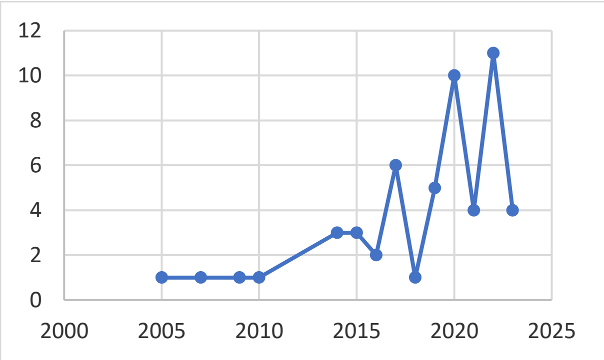

Figure 3. Publication by years (source: Scopus)

As for the geographical distribution, Figure 4 it sees the United Kingdom in first place with 7 publications (18%) followed by Italy and Spain in equal position with 5 publications (13%),

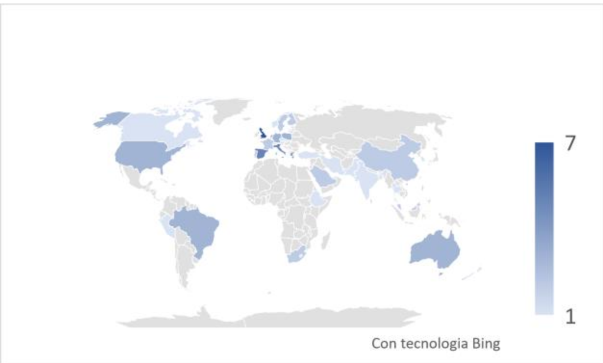

Figure 4. Country analysis (source: Scopus)

All other countries follow with a number less than 3. It is worth noting the fact that the main countries of the European Union are the largest contributors of scientific articles, i.e., a distinctive feature of the scientific research landscape at the European level on this topic.

III. Findings

A. *What is the main tool adopted to monitor project performance?*

When it comes to outward communication, it is widely acknowledged that significant efforts are being made to enhance its utilization. However, the key challenge lies in identifying unambiguous and universally recognized tools that can streamline the work and enhance transparency. Transparency, in this context, refers to improved readability and comparability across different sectors. In the current landscape of expansive public administration design and highly competitive and interconnected service delivery, performance is a critical factor for both public administration [1] and other organizations. Therefore, making rational and effective decisions in project selection within public administration not only optimizes cost and quality functions but also offers competitive advantages to the organization.

The United Kingdom has devised a clever solution to evaluate project effectiveness through a project called EnergREV [2]. For this project, a multi-criteria MCA (multi-Criteria Analysis) system was implemented, which assigns discrete weights and indicators to determine the significance of individual indices on the value scale [3], [4], [5].

In this regard, the Analytic Hierarchy Process (AHP), a multi-criteria analysis method developed by mathematician Thomas L. Saaty, has gained widespread use in decision-making [6]. This method is rooted in the principle that experience and knowledge are as valuable as the available data in the decision-making process. AHP consists of two stages: the hierarchical design stage and the evaluation stage. It allows decision problems to be broken down into comprehensible components, analyzed separately, and logically integrated. By incorporating empirical data and subjective judgments, AHP facilitates the prioritization of decision alternatives, bridging the gap between qualitative and quantitative assessments that may not be directly comparable. Furthermore, it combines multidimensional scales of measures into a single priority scale [7]. In summary, AHP is a comprehensive methodology designed to facilitate decision-making in complex situations.

An example of its application is the spatial sustainability assessment model (SSAM) developed by ARPA Umbria in collaboration with the University of Perugia. SSAM utilizes an open-source plugin called QGIS, freely available from the QGIS repository [8]. This plugin represents an advanced version of the previous GeoUmbriaSuit, maintaining its theoretical approach but with significant improvements in the working environment and results [9]. The multi-criteria method employed by SSAM is the Topsis algorithm (Technique for Order Preference by Similarity to Ideal Design), which ranks different alternatives based on their distance from the worst point and proximity to the ideal point, considering all the criteria employed.

The AHP method has already been extensively utilized in the public administration domain, as evidenced by numerous documents in the healthcare sector [9-bis]. Its applications encompass a wide range of areas, including resource allocation, facility and technology planning, intervention prioritization, and healthcare policy evaluation.

B. *How is the “sustainability” of a project assessed?*

Sustainability lies at the core of urban transformation strategies aimed at achieving resource-efficient, resilient, and smarter cities. However, there is still a lack of consensus on which indicators to use in guiding decisions for urban interventions. The mySMARTLife project [10] has developed a holistic framework based on Key Performance Indicators (KPIs) [11], [12], which has been successfully implemented in select cities through co-creation with local stakeholders. The importance of clearly defining the measurement boundary and collaborating with city stakeholders to achieve sustainability goals has emerged as a key aspect. Smart cities rely on innovative technologies, guidelines, and mechanisms to enhance citizens' quality of life. Nonetheless, studies that establish pragmatic approaches to implementing smart city strategies [13]–[16] are still needed. A study conducted by Alshuwaikhat et al. [17] identified best practices, relevant stakeholders, key issues, and 15 key performance indicators involved in different sustainable smart city strategies and project life cycle phases. The proposed framework can serve as an evaluation tool to assess the progress of each phase of a smart city project, thus aiding in the prevention of implementation delays or challenges. Regarding the European Union's role in creating unique instruments, it carries out one of the largest funding initiatives in Europe, and likely globally. Therefore, it is important to study how to measure the performance of EU projects, programs, initiatives, and policies for the betterment of all citizens. This paper identifies and categorizes studies conducted in the field of performance evaluation in European funding activities. The study seeks to address several questions: which areas of European funding activities are the focus of research in measuring their effectiveness, which key performance indicators (KPIs) are most studied in the chosen topics, and what are their characteristics based on the literature. The methodology employed for this study involved a literature review. The review revealed the most studied areas of European policies.

The categorized KPIs [18] are standardized as much as possible, often representing a macro perspective, aligning with the areas represented in the analyzed journals. The study notes the limited number of classified studies and the restricted representation of policies, suggesting that researchers should place greater emphasis on the efficiency of funding activities.

In analyzing EU documents conducted in 2022, it was found that key performance indicators (KPIs) often have a non-financial nature, making them challenging to measure [19]. This implies a high degree of subjectivity [20]. Notably, this study also sought to develop and investigate good practices in the application of sustainability measurement indicators. The chosen indicators aimed to maximize the expected results of the selected policies, such as cohesion policy. At a macro level, several attempts have been made to design indicators that assess the economic and social cohesion of regions between neighboring countries [21]. Thus, the indicators that effectively provide information focus on evaluating policy effectiveness at the macro level rather than microprojects [22]. In energy research, researchers have focused on selecting KPIs that promote best practices in the implementation of EU energy policy [23]. Some of the key performance indicators reported in the survey [24] are macroeconomic in nature and widely accepted EU indicators for assessing member states' national-level spending on research and development (R&D) investment. While classified studies have also analyzed KPIs from a micro perspective [25], these cases have been limited to KPIs such as gender, number of models, researchers, energy efficiency, and funding structure [26]–[30].

In conclusion, ensuring the sustainability of public projects requires a long-term approach that considers environmental impacts, social and economic considerations, and resource availability. It is crucial to raise awareness and implement appropriate sustainability measures. The analysis of current trends in sustainability indicators reveals a growing interest in the field, with increased publications and contributions from various countries, particularly within the European Union. However, a unified and shared vision of sustainability indicators for public administration projects is still lacking. The articles reviewed indicate a high degree of heterogeneity in tools and subjectivity in value attribution. Nevertheless, the European Union is making commendable efforts in creating unique tools and evaluating project performance. Further research is needed to address the measurement of non-financial KPIs and ensure objectivity. Looking ahead to Agenda 2030, numerous goals need to be accomplished, along with the challenges of external disclosure and the necessity for unique and widely recognized tools to enhance transparency and comparability in the sector. Future research should focus on the efficiency and effectiveness of funding activities and the development of best practices in the application of sustainability indicators.

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APPENDIX A.

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