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**Sustainable public budgets: contributions to SDG implementation from correspondence analysis (ANACOR)**

**Presupuestos públicos sostenibles: contribuciones a la implementación de los ODS a partir del análisis de correspondencia (ANACOR)**

**Orçamentos públicos sustentáveis: contribuições para implementação dos ODS a partir da análise de correspondência (ANACOR)**

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### **Abstract**

**Objective:** To analyze how factors associated with Brazilian municipal budget laws can assist in implementing the Sustainable Development Goals (SDGs) from the perspective of their managers.

**Method:** Descriptive research using a qualitative-quantitative approach was conducted through the application of the chi-square test and correspondence analysis (ANACOR). The population included all Brazilian municipalities, while the sample consisted of 87 municipalities selected from the Sustainable Development Index of Municipalities (IDSC-BR). The finance secretaries of these municipalities completed a structured questionnaire administered via *Google Forms*.

**Results:** Three dimensions were presented: means, criteria, and contributions of budget laws in implementing the SDGs. The use of the three laws was found to be indistinct, although the chi-square test identified the LDO as the most appropriate channel. Regarding criteria, concern about the availability of resources for executing actions was emphasized. Finally, in terms of contributions, respondents recognized the executing role of the LOA and attributed to the PPA relevance for promoting changes in the reality of the federated entity in the medium and short term.

**Study Contributions:** By relating indicators such as IDSC-BR, HDI, and GDP to budgetary practices, the research expands understanding of how the public budget can align social, economic, and environmental policies, strengthening local governance and sustainability. In addition, it provides an unprecedented empirical basis at the national level, fostering new academic debates and supporting managers in adopting more effective practices to fulfill the 2030 Agenda.

**Keywords:** SDGs. Implementation. Budget Laws. ANACOR.

### Resumen

**Objetivo:** Analizar cómo los factores asociados a las leyes presupuestarias municipales brasileñas son capaces de ayudar en la implementación de los Objetivos de Desarrollo Sostenible (ODS) desde la percepción de sus gestores.

**Método:** Investigación descriptiva, con enfoque cuali-cuantitativo, realizada mediante la aplicación de la prueba de chi-cuadrado y del análisis de correspondencia (ANACOR). La población considerada abarcó todos los municipios brasileños, mientras que la muestra estuvo compuesta por 87 municipios seleccionados a partir del Índice de Desarrollo Sostenible de los Municipios (IDSC-BR). Los secretarios de finanzas de estos municipios respondieron un cuestionario estructurado, aplicado vía Google Forms.

**Resultados:** Evidenciaron tres dimensiones: medios, criterios y contribuciones de las leyes presupuestarias en la implementación de los ODS. Se observó el uso indistinto de las tres leyes, aunque la prueba de chi-cuadrado indicó la LDO como el canal más adecuado. En cuanto a los criterios, se destacó la preocupación por la disponibilidad de recursos para la ejecución de las acciones. Finalmente, en las contribuciones, los encuestados reconocieron el carácter ejecutor de la LOA y atribuyeron al PPA relevancia para promover cambios en la realidad del ente federado a mediano y corto plazo.

**Aportes del Estudio:** Al relacionar indicadores como IDSC-BR, IDH y PIB con las prácticas presupuestarias, la investigación amplía la comprensión sobre cómo el presupuesto público puede alinear políticas sociales, económicas y ambientales, fortaleciendo la gobernanza y la sostenibilidad local. Además, ofrece una base empírica inédita a nivel nacional, fomentando nuevos debates académicos y apoyando a los gestores en la adopción de prácticas más eficaces para el cumplimiento de la Agenda 2030.

**Palabras clave:** ODS. Implementación. Leyes presupuestarias. ANACOR.

### Resumo

**Objetivo:** Analisar como fatores associados às leis orçamentárias municipais brasileiras são capazes de auxiliar na implementação dos Objetivos de Desenvolvimento Sustentável (ODS) a partir da percepção dos seus gestores.

**Método:** Pesquisa descritiva, com abordagem quali-quantitativa, realizada por meio da aplicação do teste qui-quadrado e da análise de correspondência (ANACOR). A população considerada abrangeu todos os municípios brasileiros, enquanto a amostra foi composta por 87 municípios selecionados a partir do Índice de Desenvolvimento Sustentável dos Municípios (IDSC-BR). Os secretários de finanças desses municípios responderam a um questionário estruturado, aplicado *via Google Forms*.

**Resultados:** Evidenciaram três dimensões: meios, critérios e contribuições das leis orçamentárias na implementação dos ODS. Observou-se o uso indistinto das três leis, embora o teste qui-quadrado tenha apontado a LDO como o canal mais adequado. Quanto aos critérios, destacou-se a preocupação com a disponibilidade de recursos para execução das ações. Por fim, nas contribuições, os respondentes reconheceram o caráter executor da LOA e atribuíram ao PPA relevância para promover mudanças na realidade do ente federado em médio e curto prazo.

**Contribuições do Estudo:** Ao relacionar indicadores como IDSC-BR, IDH e PIB às práticas orçamentárias, a pesquisa amplia o entendimento sobre como o orçamento público pode alinhar

políticas sociais, econômicas e ambientais, fortalecendo a governança e a sustentabilidade local. Além disso, oferece base empírica inédita em âmbito nacional, fomentando novos debates acadêmicos e subsidiando gestores na adoção de práticas mais eficazes para o cumprimento da Agenda 2030.

**Palavras-chave:** ODS. Implementação. Leis Orçamentárias. ANACOR.

## 1 Introduction

According to Morais and Donaire (2019), reports such as "The Limits to Growth" from 1972 and "Our Common Future" from 1980 emphasize the balance between economic growth and the needs of current and future generations. Consequently, other sustainability initiatives, including Agenda 21 and Eco Rio 92, supported the development of the United Nations (UN) 2030 Agenda for Sustainability in 2015. In this context, Pimentel (2019) described the 17 Sustainable Development Goals (SDGs) of this agenda as tools for planning and aligning social, environmental, and economic policies.

According to the UN SDG Implementation Ranking (Sachs, Lafortune, Fuller, & Iablonski, 2025), based on data from 2025, the global scenario places the Nordic countries in the top three positions: Sweden (85.6 points), Finland (84.9 points), and Denmark (84.9 points). Despite their prominence, these countries still face significant challenges, as only about 17% to 35% of the goals are on track to be met. Brazil ranks 54th, behind several Latin American countries such as Chile (35th), Uruguay (38th), Cuba (40th), and Argentina (46th), highlighting the region's long journey toward meeting the goals. The United States is in 44th position, below all European Union countries but ahead of China, which is in 49th place.

Sustainable development, according to Ferreira (2019), is a way to implement public policies based on the tripod formed by economic, social, and environmental dimensions. These dimensions can be directly reflected in public expenditures from approved budgets, which, depending on their design, may or may not include a sustainability perspective (Silva, Silva, & Pereira, 2024).

For this reason, Pereira (2008) suggests that budget preparation should go beyond the traditional program-budget model used in the country, which is limited to meeting the priority needs of the population. The new approach proposes shifting the focus to the SDGs to balance the three dimensions mentioned and consolidate sustainable budgets, or budgets for sustainable development.

This perspective recognizes that the public sector does not act in isolation but interacts constantly with the demands of the market and society. It is necessary to respond to these demands to provide public goSDG and services efficiently. Thus, sustainability in the public sector becomes a strategic imperative for both the modernization of organizations and their ability to survive in a political, economic, and social environment marked by profound transformations.

The relationship between the SDGs and the Brazilian budget arises from the budget's role as the primary political and operational tool for implementing public policies and fulfilling the commitments of the 2030 Agenda. According to Silva and Azevedo (2022), the budget cycle is where government priorities are translated into programs, actions, and resource allocations, making the State's strategic objectives concrete.

In this context, the effectiveness of the SDGs depends on robust budget governance mechanisms that ensure alignment between planning, execution, and results. Adopting practices for risk management, performance monitoring, and transparency is essential to prevent waste

of public resources, mitigate failures in policy implementation, and maximize public value, especially in a scenario of fiscal constraints.

The SDGs are closely linked to the participatory budget methodology. As a democratic tool of significant importance, it enables society to directly influence the determination of priorities and the allocation of available budget limits (Lucena, 2021). By promoting transparency, social control, and efficiency in fiscal management, participatory budgeting enhances the legitimacy of public decisions and helps ensure that resources are used in ways that better align with collective needs and sustainability principles.

Given the current scenario, the following research problem was established: **What factors associated with Brazilian municipal budget laws can assist in implementing the SDGs from the perspective of their managers?** The general objective is to analyze factors associated with Brazilian municipal budget laws that support the implementation of the Sustainable Development Goals (SDGs), with the following specific objectives: i) investigate municipalities that implemented the SDGs based on their respective budget laws; ii) understand the municipal IDSC-BR, HDI, and GDP indices through the interactions between criteria included in the budget laws and actions taken for SDG implementation; iii) analyze the municipal IDSC-BR, HDI, and GDP indices in relation to the actions carried out and the contributions perceived by municipalities that implemented the SDGs through their budget laws.

From an academic perspective, the study aims to advance the theme of SDG implementation. It broadens the scope by analyzing the role of municipal budget laws as instruments of governance and strategic planning for sustainability. This approach provides theoretical and methodological support to understand how the public budget can be used not only as a financial tool, but also as a mechanism for integrating social, economic, and environmental dimensions, thereby strengthening the academic debate on sustainable urban development and results-oriented fiscal management.

From a social perspective, the work aligns with Pimentel's (2019) view of the UN 2030 Agenda and the SDGs: promoting global mobilization through integration and balance among social, economic, and environmental agendas. In this context, there is an opportunity to identify regional practices adopted for integrating the agenda, based on analyzing successful sustainable development practices through the use of budget laws, with the aim of possible adaptations to municipal realities.

In view of the above, the article is organized into five sections: this introduction, a literature review, methodology, analysis and discussion of the results, and final considerations.

## 2 Literature review

### 2.1 Dimensions of Sustainable Development

Sustainable development is a concept that aims to link economic development and environmental conservation, based on the economic assumption that needs are unlimited and resources are finite (Réus & Andion, 2018).

Aiming to promote these concepts worldwide, the UN 2030 Agenda is a global action plan for implementing sustainable development by 2030 (Nascimento, Oliveira & Rodrigues, 2022). It contains 17 goals and more than 160 targets, aiming to eradicate poverty, disseminate the dignity of human existence globally, and emphasize social and individual rights (Fabris et al., 2020).

Following this movement, other globally significant events are equally memorable. Ferreira (2019) cites, for example, the Rio-92 conference, which promoted sustainability and was considered by him a mobilizer of leaders and non-governmental organizations from 193 countries. He also mentions the Millennium Conference, which resulted in the Millennium Development Goals (MDGs) in 2000. This effort is regarded as the foundation of the

Sustainable Development Goals (SDGs) as they are known today, although initial discussions began in 1983 (Menêzes & Martins, 2021).

According to Ferreira (2021), sustainable development can be broadly summarized as the connection between growth and social equity, including participation from various sectors of society, reduction of income inequalities, and consideration of local particularities. Zanchin, Carneiro, and Piacentini (2023) described sustainability based on social, environmental, and economic pillars, which are part of the *Triple Bottom Line* model developed in the 1990s to measure the sustainable performance of organizations.

From the perspective of the social responsibility of organizations in the promotion of the SDGs, Silva, Vaz and Alves (2021) highlighted that companies aim to provide benefits to society, in their social, political and economic dimensions. Brito and Dias (2021) highlighted the growing social interest in the permanent environmental agenda, such as ISO 26000, with a guideline approach on social responsibility. Marques, Santos, and Aragão (2020) go further, and defend the interrelation of economic, political, ecological, sociological, spatial, and cultural aspects. Perhaps this is why Menezes and Minillo (2017) defend the idea that for there to be success in the adoption of the SDGs, there needs to be an alignment between the local reality and the active participation of the population.

Regarding the environmental agenda, Peixe et al. (2019) highlight the importance of the Environmental Management System (EMS) in Brazilian industrial companies, linking it to requirements and aspects of corporate sustainability. Implementing the EMS may involve applying the requirements of ISO 14001, which is intended to certify and regulate environmental policies, plans, and actions.

Considering the environmental, economic, and social aspects together, Marques, Santos, and Aragão (2020) note the complexity and intangibility of the topic. The authors argue that intervention is necessary to adapt all dimensions of sustainability so it can truly achieve its intended goals.

Another aspect of measuring sustainability involves using indicators based on achieved results, as highlighted by Andrade (2020), such as GDP and HDI, although their limitations are well known. Nevertheless, Boggian (2023) states that, despite being aware of possible deficiencies – such as GDP masking inequalities among various groups – he continues to support the use of such indicators, including the IDSC-BR. According to the author, by enabling a more comprehensive assessment, the indicator allows specific scores to be obtained for each SDG, facilitating the evaluation of progress and challenges faced by Brazilian municipalities in meeting the 2030 Agenda and paving the way for new metrics (Boggian, 2023).

Finally, the progress of studies involving the SDGs in the international arena is highlighted. Although many studies address the implementation of the objectives, some already evaluate their determinants (Elder, M.; Newman, E., 2023; Guillamón, Ríos & Benito, 2025; Grochová & Ltzman, 2021). High levels of education, income, and the number of women in parliament are associated with better SDG outcomes, while higher unemployment rates and smaller deficits are considered unsatisfactory factors in SDG scores.

## 2.2 The role of the public budget in implementing the SDGs

The public budget is considered the main instrument for implementing public policies, according to Nascimento and Viotto (2022). They emphasize that government decisions reflected in the budget documents – the Multi-Year Plan (PPA), Budget Guidelines Law (LDO), and Annual Budget Law (LOA)—are based on expenditure priorities linked to the sources of funds collected by state agents in accordance with a political program. According to the authors, these choices determine the portfolio of public products and services available to society during a specific period, which, in Brazil, coincides with the calendar year.

Although Nascimento and Viotto's (2022) perspective is relevant, it must be acknowledged that public policies do not become reality solely through budget planning or political decisions aimed at implementing desired policies. If this were true, Brazil's reality would have already changed, given that the current format of budget laws has existed since the late 1980s.

Silva et al. (2024) examine the issue through the lens of adopting new structures in the public sector, emphasizing sustainability, sectoral interdependence, and inclusion. The authors argue that if governments implemented robust governance structures and flexible budget processes, along with innovation in public policies, the public budget could serve as an agent of social change, fostering greater trust in institutions and ensuring responsible resource use for sustainable development.

This gap between what is planned and what is executed was also noted by Thesari, Lizot, and Trojan (2021). In the context of sustainability and development in budget planning, the authors argue that this likely disconnect could be addressed by incorporating the preferences of decision makers and considering those aspects.

Krantz and Gustafsson (2021) state that the solution to the problems is directly linked to adopting the SDGs. According to the authors, once the objectives are incorporated, the framework offers municipalities the opportunity to understand and review their organizations from a systemic and comprehensive sustainability perspective.

Therefore, there is a tendency to consider problems and solutions holistically, moving beyond the fragmented "box" approach typical of the program-budget methodology. According to the researchers, integrated action among areas such as health, social security, and education, as well as the coordination of education with environmental and economic factors, although it presents additional challenges in aligning efforts, allocating resources, and reconciling fiscal and social objectives, can represent a significant advance in overcoming the traditional barriers of the budgetary models adopted by countries.

Because of this, it is not surprising that new budgetary methodologies (traditional, program, performance, zero-based, participatory, etc.) have been developed to improve the dialogue between government and society. The adoption of the SDGs could also make an important contribution to the implementation of public policies (Silva, 2023). In this context, Nassar's (2022) observation is timely, as he highlights Brazil's efforts to improve the quality of public spending through the advancement of public policy evaluation processes and their integration into the development of budget laws, such as Brazil's experience with participatory budgeting.

On this topic, Vinogradova's (2022) discussion of the connections between public participation in the budget process and citizen engagement is timely. The author's study showed that participatory budgeting, as an adaptive mechanism, can be integrated into national objectives for adopting the 2030 Agenda. This results from PB's small-scale nature, which allows it to serve as a mechanism for testing various innovative approaches to public service delivery. The most important contribution to the Sustainable Development Goals is the "sustainable community building" effect.

In reference to Brazilian budget laws (PPA, LDO, and LOA), and specifically regarding the PPA and its alignment with the SDGs, Ramiro (2021) presents the SDG Agendas as an alternative. These agendas focus on dialogue with public policy councils concerning social participation in the PPA, serving as a means of accountability to society by linking the budget to the implementation of the SDGs.

However, it is argued that the PPA and LOA are not the most appropriate mechanisms, given the normative configuration of the LDO contained in the Federal Constitution of 1988 (CF/88) and the Fiscal Responsibility Law (LRF). According to Nascimento and Viotto (2022), the LDO is the appropriate space where the rules for preparing the LOA are established. Thus,

the importance of the budget guidelines law in regulating the integration of the SDGs into the Brazilian budget process is emphasized, as it can determine how they will be integrated, in what proportion, which criteria to follow, execution priorities, actions to adopt in the event of anomalies, and so on. Additionally, the authors also recall the main advantage of the LDO over other instruments: this law is renewed annually, precedes the LOA, is compatible with the PPA, and serves as a prescriptive instrument in its essence (Nascimento & Viotto, 2022).

Despite the limited legal scope for the PPA to serve as a normative instrument connecting the Brazilian budget process and the SDGs, it is important to highlight the Federal Government's effort to align the goals of the PPA 2024-2027 with the 169 targets of the 17 SDGs. This concern alone can be considered a positive indicator of the country's commitment to adopting socioeconomic and environmental goals (MPO, 2023).

However, a study conducted by Godinho and Silva (2025) demonstrates the need for corrections in the process to address the previously mentioned lack of the prescribed nature of the PPA. The authors' findings regarding the comparison of the 2024-2027 PPA with the 2024 LOA revealed that the integration between planning and budgeting remains essentially normative; the associations established in the PPA are not systematically reproduced in the LOA, restricting the traceability of expenditures. This conclusion supports the understanding of Silva et al. (2024), who state that the adoption of sustainable budgets lacks continuous efforts toward robust governance structures due to the frequent challenging environments.

That said, whether it is the PPA or the LDO – considered the more appropriate means (Nascimento and Viotto, 2022)—the perception is that there must be synergy between the population's desire and the government's commitment to implementing the SDGs. A good example of this is Zaniboni et al. (2023), who advocate for participatory budgeting as an instrument for citizen inclusion and political education, as it can increase the sense of belonging among populations with fewer opportunities.

Even after the SDGs are adopted, the literature notes a lack of open, debated, and widely accepted general guidelines for linking national public spending (based on the classification of government functions) to their achievement (Cristóbal et al., 2023). However, implementing the SDGs in the public sphere does not depend solely on the political efforts of actors or dialogue with society; it also involves other institutional and socioeconomic barriers. The use of public and open indicators mentioned by Sisto et al. (2020), along with aspects such as structure, leadership and coordination, flexibility, organizational learning, time, and scheduling, were equally identified as tools that can advance the SDGs in the public budget environment (Krantz and Gustafsson, 2021; Yasir, 2025).

Another aspect to consider in implementing the SDGs is the potential for conflicting objectives, as noted by Allen et al. (2019). The authors highlighted that achieving social and environmental targets can be hindered by numerous economic concessions, although valuable opportunities exist to accelerate progress by examining the interconnections between the SDGs.

This discussion is timely to highlight policy coherence for sustainable development, which involves considering the indivisibility of the SDGs and the systemic nature of many sustainability challenges (European Parliamentary Research Service [EPRS], 2023; OECD, 2019; United Nations Environment Programme [UNEP], 2025). Effective implementation of the SDGs requires more than budgetary and institutional adjustments; it depends on governance mechanisms that can coordinate different sectors and levels of government (Silva et al., 2024), promote synergies, and prevent contradictions between the goals. Political coherence, therefore, is not just a normative principle but a practical condition for the SDGs to progress in an integrated and lasting manner.

Even if public policy providers and demanders pursue the same objectives, studies (Couto & Goularte, 2019; Elder & Newman, 2023; Guillamón, Ríos & Benito, 2025; UNEP, 2025) indicate that financing for the SDGs remains a significant bottleneck in their

implementation and can negatively affect the alignment between budgets and goals. This challenge demonstrates that merely converging objectives in budget execution does not ensure policy effectiveness, as insufficient or inadequate financial resources can compromise implementation capacity.

This finding was reported in the study by Novitasari and Sugianto (2024), who identified variations in the impact of budget allocation on achieving SDG 11, including negative effects related to the amounts allocated. The study raises an important question for public managers to consider: not only the amount of resources allocated to the SDGs, but also how resources are distributed can create distortions, limiting the transformative potential of public policies.

This concern is widespread in the country, as the Brazilian Fiscal Responsibility Law imposes several limitations on the growth of public spending, from the availability of resources to the implementation of contingencies when estimated revenues do not materialize. This concern intensified with the enactment of Constitutional Amendment No. 95 (2016) (New Fiscal Regime), which established a spending cap, limiting the growth of federal expenditures to the rate of inflation for 20 years. More recently, Complementary Law No. 200 (2023), known as the "fiscal framework," introduced a new amendment aimed at establishing a sustainable regime to balance public accounts, linking the growth of expenses to revenue increases within a range of 0.6% to 2.5% above inflation. In other words, considering Novitasari's (2024) warning about the influence of resource allocation on the SDGs, the Brazilian scenario – at least at the federal level – is concerning.

Rocha Neto (2021) identified another barrier to implementing the SDGs: the technical complexity involved in the implementation of public policies in the country. He notes that the cross-cutting nature and the need for timely cooperation arrangements to achieve the objectives require training, which he believes is not consistently available in the country, making this a concerning issue.

In turn, Nardone (2023) examined the discrepancies among various Brazilian realities, which are considered decisive in adopting the goals. These differences may create additional complexities in aligning the goals within a context marked by structural inequalities. This warning is particularly relevant and warrants further reflection.

Brazilian realities are highly heterogeneous, largely due to the country's continental size and its colonization process. It is unrealistic to expect these realities to change simply by adopting the SDGs. This presents a major challenge for implementing this new system: the country's consistent differences must be addressed while advancing the reduction of inequalities, combating poverty, and protecting the environment. To assume that implementing the SDGs would solve all global problems outlined in their objectives is to imply that the various public budgeting methodologies used worldwide over the years were futile efforts, which is not true.

What needs to be emphasized, however, is that integrating the SDGs into public policies represents a new strategy aimed at guiding countries toward more appropriate approaches to eliminating extreme poverty and hunger, providing quality education, and protecting the planet. However, this does not mean that efforts to improve budgetary techniques used by countries are replaced or eliminated.

The integration between the budget and SDGs goes beyond using the latter solely as a vector for directing state action. Hege, Brimont, and Pagnon (2019) argue that these objectives can enhance the budget performance evaluation system and serve as a management tool for resource allocation.

This perspective addresses the initial concern about budget allocation, broadening it to a more strategic and sustainable approach (Mulholland and Berger, 2019). This observation is relevant, as the SDGs can be included in the discussion as tools for guiding new possibilities

for allocating expenditures beyond traditional program-based methSDG. In other words, one system does not exclude the other, as previously mentioned.

Furthermore, the effort to adopt the SDGs should not be seen as limited to either the public or private sectors, as there is significant interconnection between them. Research by Owusu (2021) highlighted the need to include the private sector's contribution, since monitoring and mapping do not fully capture its participation, including the challenge of adapting public-private partnerships to the SDGs globally (Hancock, Ralph, and Ali, 2018; Haque et al., 2020; Palmer, 2021).

In addition, complementary actions such as laws and public policies are essential to support implementation, since not all objectives are strictly financial in nature. Specifically regarding this aspect, studies on the disclosure of sustainability information compared to the implementation of the SDGs are progressing, especially in the business sector (Arena et al., 2023; Borges et al., 2022; Calabrese et al., 2021).

Unlike the traditional programmatic format, which tends to prioritize short- and medium-term needs, the systemic perspective of the SDGs requires a more far-reaching vision, enabling public policies to be developed in an integrated and sustainable manner. Yasir (2025) presented evidence that integrating performance metrics – similar to program and performance budgets – with SDG indicators led to statistically significant improvements in budget efficiency. This perspective aligns with the understanding that the implementation of the objectives does not occur uniformly and that discrepancies exist between them (Bose & Kha, 2022; Erin & Bamigboye, 2021).

### 2.3 Previous studies

The country has distinguished itself in studies on the implementation of the SDGs, highlighting the increasing importance of the topic in the national context. Generally, the research focuses on adapting the goals of the 2030 Agenda to the Brazilian reality, considering various aspects such as financial allocation, human capacity, and the use of alternative methSDG beyond budget laws. The aim is to align the current budget model, structured around the program budget, with the SDGs. Several authors have been prominent in this area, among whom the following were selected.

Regarding adherence to the SDGs in Brazil, Moura et al. (2020) examined how the planning of Brazilian states and capitals aligns with the 2030 Agenda. Using an empirical survey of data, several findings emerged: i) implementation of the SDGs in the PPAs, but with low adherence among the capitals; ii) inability to comprehensively assess the contribution of actions and resources used in implementing the SDGs; iii) successful experiences in the states of Maranhão and Paraná and in the municipalities of Belo Horizonte and Vitória; and iv) creation of websites for the UN 2030 Agenda and communication portals for SDG actions.

Mascarenhas (2020) conducted research on environmental protection through the public budget. The study analyzed the state's financial activities during the budget cycle using theoretical research and documentary analysis. It found that understanding the financial phenomenon at all stages of the budget cycle influenced the performance of the Public Administration in preserving the environment.

A study by Rocha Neto (2021) addressed the challenge of implementing the 2030 Agenda in Brazilian municipalities due to a lack of knowledge capacities for adopting the agenda. The study identified challenges such as financial limitations and qualified human resources, considering the goals and the fiscal framework.

Nardone's (2023) research aimed to discuss the content of the 2030 Agenda and the characteristics of the Brazilian public planning process, as well as to indicate difficulties in its adoption by municipalities. The method involved consulting texts and research related to the

theme, highlighting the adaptation of global goals and indicators to the Brazilian reality as a major challenge to adopting the agenda.

Romero Júnior (2023) examined the use of the SDGs in municipal public management, based on master plans, government plans, and the PPA. This analysis used qualitative and quantitative methSDG to assess municipal public management and collect data from the application of UN indicators. The findings were: i) the need to balance the triad of man, nature, and human development, and ii) the adoption of the SDGs to support the integration of public policies.

### 3 Method

The research is classified as descriptive, qualitative-quantitative, and was conducted through a survey and analysis of primary data collected via questionnaire, as well as secondary data.

The study has both associative and perceptual characteristics. It aims to identify relationships between variables and understand how certain phenomena are perceived by the participants. The associative approach explores relevant links and correlations, while the perceptual dimension analyzes the interpretations, understandings, and meanings attributed by the subjects.

The questionnaire considered the following premises: a) municipal experiences in implementing the SDGs based on budget laws; b) incorporation of the SDGs into municipal budget laws; and c) contributions from the municipal public budget to the implementation of the SDGs, distributed across 10 questions. The research instrument was structured based on a review of national and international literature and a preliminary interview with the municipality of São Caetano-SP, which ranked first in the sustainable development index of Brazilian municipalities, with a score of 63.42 points.

A total of 5,019 Brazilian municipalities were identified, and 81 municipalities participated in the IDSC BR. The questionnaire was administered using an electronic form via Google Forms, with questions directed to professionals (secretaries, unit directors, and technicians) involved in budget management in the participating municipalities.

Secondary data were obtained from specialized websites, such as IDSC-BR, Atlas Brasil, and IBGE, as well as municipal and transparency portals. These sources were used to survey the results of Brazilian municipalities that reported considering budget laws in the implementation of the SDGs, specifically Jundiaí-SP, Maringá-PR, Sobral-CE, and Palmas-TO. The municipal indices collected were analyzed using descriptive statistics, considering quartiles defined by the IDSC-BR index.

Documentary analysis was also included in the evaluation of the first specific objective by defining criteria for two categories of public budget: i) budget performance (fiscal targets, budget limits, transparency, and budget quotas), as indicated by Nascimento and Viotto (2022); and ii) budget compliance (measurement of results, adopted practices, and evaluation mechanisms), according to Nassar (2022).

In addition to the approaches mentioned in the previous paragraphs, specific objectives 2 and 3 also involved the chi-square test and Correspondence Analysis (ANACOR). These two techniques contributed to analyzing the questionnaire responses about actions, criteria, and contributions related to implementing the SDGs based on the budget laws.

Finally, the reliability of the questionnaire was verified using the coefficient, with an acceptability interval of  $0.60 \leq \alpha \leq 0.90$ , as presented in the study by Ribeiro et al. (2021) and shown in Table 1.

**Table 1***Classifications for Cronbach's alpha coefficient*

Range	Classification
$0,75 \leq \alpha < 0,90$	High
$0,60 \leq \alpha < 0,75$	Moderate

Source: Adapted from Ribeiro et al. (2021).

## 4 Analysis and Discussion of Results

### 4.1 Analysis

To confirm the reliability of the questionnaire, Cronbach's alpha coefficient was calculated and yielded a result of 0.89, indicating high reliability for the responses obtained. The descriptive statistics are presented in Table 2.

**Table 2***Summary of municipal indices*

Table of Contents	Mean	Maximum	Minimum	Standard Deviation	Coef. Variation
IDSC-BR	48,93	62,14	32,93	6,90	0,144
HDI M	0,70	0,82	0,51	0,08	0,120
GDP M*	R\$ 17,234,408.95	R\$ 359,634,752.59	R\$ 17,234,408.95	R\$ 55,140,800.32	3,233

Source: survey data (2024) \* GDP in thousand reais.

The examination identified a trend where the highest municipal IDSC-BR and HDI scores were concentrated in populations between 100,001 and 500,000 inhabitants, while the highest GDPs were associated with municipalities with the largest populations, regardless of the other indexes analyzed. In general, all indices showed a coefficient of variation greater than 10%, confirming the heterogeneous nature of the sample analyzed.

Municipal performance was evaluated using IDSC-BR intervals divided into quartiles, with the results presented in Table 3.

**Table 3***IDSC-BR Quartiles*

Quartile	IDSC-BR	IDSC-BR Range
1	29,79	Up to 29.79
2	42,65	Between 29.80 and 42.65
3	46,56	Between 42.66 and 46.56
4	50,73	Between 46.57 and 50.73

Source: Adapted from IDSC BR (2024).

The results show that the IDSC-BR for most of the analyzed municipalities is higher than 50.73, corresponding to a population range between 100,001 and 500,000 inhabitants. The four best municipalities in each Brazilian region are listed in Table 4.

**Table 4***Municipalities with the best IDSC-BR (population range 100,001 to 500,000 inhabitants)*

Region	City	IDSC-BR	HDI M	GDP M (Thousand reais)
Southeast	Jundiaí (SP)	62,14	0,822	R\$ 57,670,892.71
South	Maringá (PR)	58,76	0,808	R\$ 22,656,732.55
Northeast	Sobral (CE)	53,53	0,714	R\$ 5,395,130.17

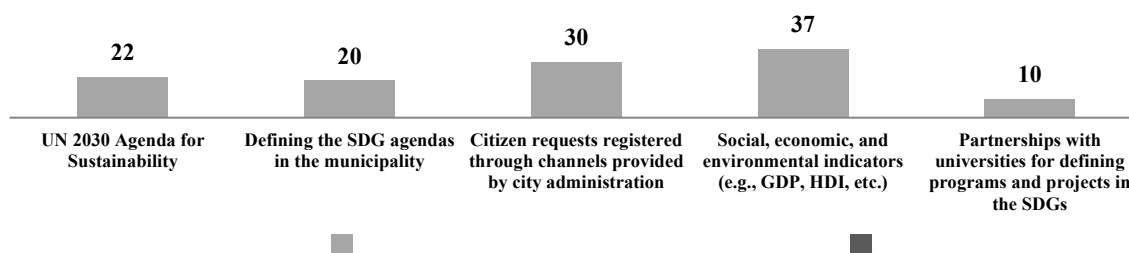
North	Palmas (TO)	52,36	0,788	R\$ 10,333,418.52
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Source: Adapted from IDSC BR (2024).

Although these municipalities had a higher SCDI-BR compared to the national average, there was a trend toward greater dispersion in the results, which can be attributed to the influence of the GDP variable on the collected data.

To support the implementation of the SDGs in municipalities, the use of the three budget laws as instruments, based on the strategies employed, was studied.

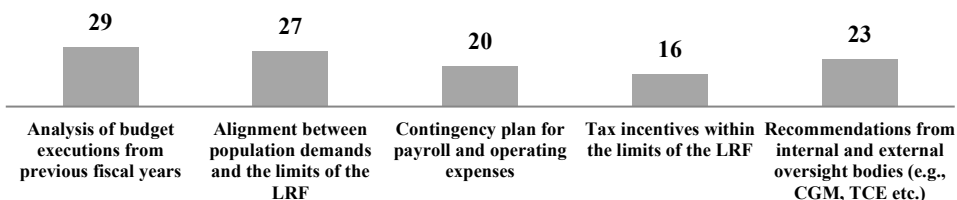
Regarding the PPA, the following aspects are listed in Figure 1.



**Figure 1** Criteria contemplated in the PPA

Source: Survey data.

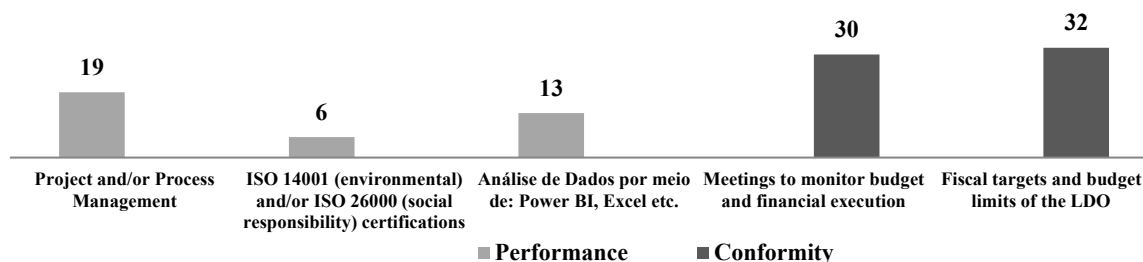
In reference to the LDO, the aspects exposed in Figure 2 were identified.



**Figure 2** Criteria contemplated in the LDO

Source: Survey data.

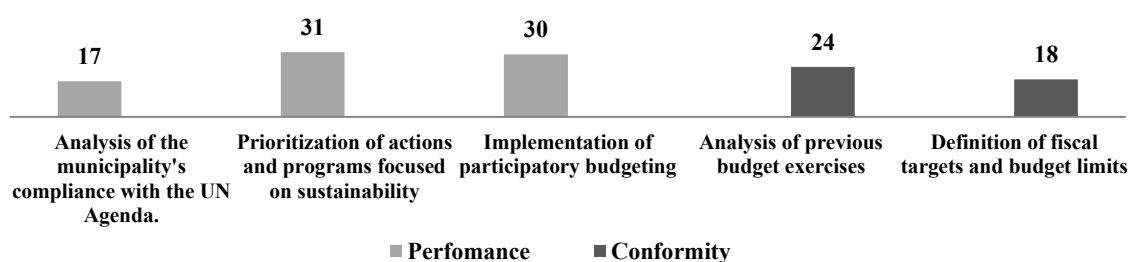
Regarding the LOA, the answers pointed to the attributes presented in Figure 3.



**Figure 3** Criteria contemplated in the LOA

Source: Survey data

In specific terms, the concentration of municipalities choosing performance aspects over budgetary aspects was observed (Figure 4), with the main criteria summarized in Table 5.



**Figure 4** Actions taken to implement the SDGs

Source: Survey data.

**Table 5**

Criteria used in municipal budget laws for implementing the SDGs

	Predominant Criteria	%
PPA	Citizens' demands registered through channels provided by the city hall	71,74
	Social, economic, and environmental indicators (e.g., GDP, HDI, etc.)	80,43
LDO	Analysis of budget executions in previous years	63,04
	Compatibility between the demands of the population and the limits of the LRF	58,70
LOA	Meetings to monitor budgetary/financial execution	65,22
	Fiscal targets and budget limits of the LDO	69,57

Source: Survey data.

To verify the association of the factors included in each budget law, chi-square tests were used to evaluate possible associations (see Table 6).

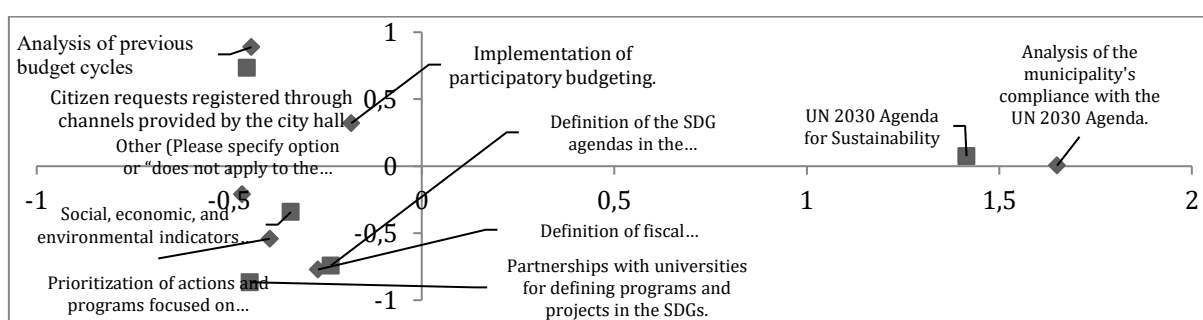
**Table 6**

*Municipalities participating in the survey, with the best IDSC BR, by region*

Factors evaluated	Chi-square
Question 3 – SDG actions; Question 5 – PPA criteria	0,000000008
Question 3 – SDG actions; Question 6 – LDO criteria	0,000000326
Question 3 – SDG actions; question 7 – LOA criteria	0.000022388

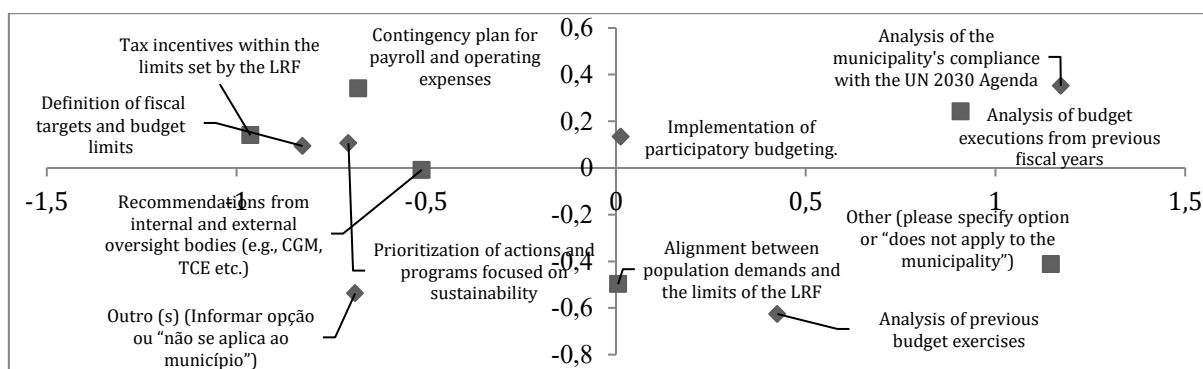
Source: Survey data.

Based on the results in Table 6, the values were found to be less than 0.05 and lower than the degree of freedom of 37.652, confirming that the actions taken to meet the SDGs are associated with the criteria in the three budget laws. This enabled the creation of percentage correspondence maps (ANACOR), as shown in Figures 5, 6, and 7.



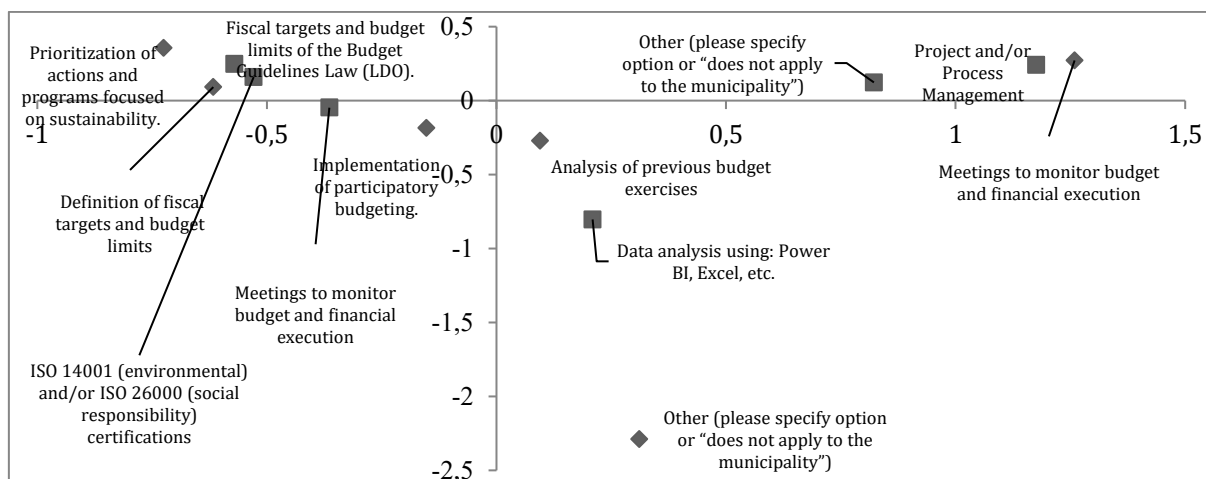
**Figure 5** ANACOR Percentage Map of the relationship between PPA and SDGs

Source: Survey data.



**Figure 6** ANACOR Percentage Map: relationship between LDO and SDGs

Source: Survey data.



**Figure 7** ANACOR Percentage Map: relationship between LOA and SDGs

Source: Survey data.

The results shown in Figures 5, 6, and 7 allowed us to identify the criteria for implementing the SDGs most closely associated with the three budget laws. For the PPA, citizen demands registered through channels provided by the city hall, along with social, economic, and environmental indicators, were emphasized.

For the LDO, the most common criteria were reviewing budget executions from previous years, ensuring compatibility between population demands and LRF limits, and considering recommendations from internal and external control bodies. For the LOA criteria, the main points were fiscal goals and LDO limits, meetings to monitor budget execution, and data analysis using Power BI, Excel, and similar tools. Among these criteria, the importance of fiscal goals and budget limits set by the LDO was also noted, as they relate to budget compliance.

Regarding the actions and criteria with the strongest associations identified by ANACOR, the following were notable: PPA – examination of compliance with the UN Agenda in the municipality (action) and analysis of the UN Agenda for Sustainability (criterion); LDO – analysis of compliance with the UN Agenda in the municipality (action) and analysis of budget execution from previous years (criterion); LOA – analysis of compliance with the UN Agenda in the municipality (action) and management of projects and/or processes, followed by fiscal goals and budget limits of the LDO (criteria).

The development of these criteria was noted as a contribution of the budget laws to the implementation of the SDGs, with the most frequent responses shown in Table 7.

**Table 7**

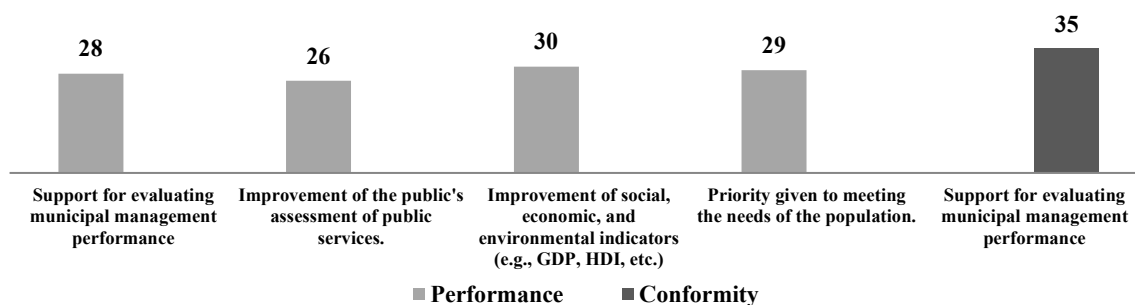
*General contributions identified in a questionnaire conducted for the adoption of the SDGs*

	Predominant contributions	%
PPA	Improvement of social, economic, and environmental indicators (e.g., GDP, HDI, etc.)	65,22
	Transparency in allocating public resources	76,09
LDO	Prioritization for LOA	67,39
	Balance between revenue and expenses	67,39
LOA	Improvement of the PPA in the preparation of the LOA	69,57
	Definition of annual public products for the population	60,87

Source: Survey data.

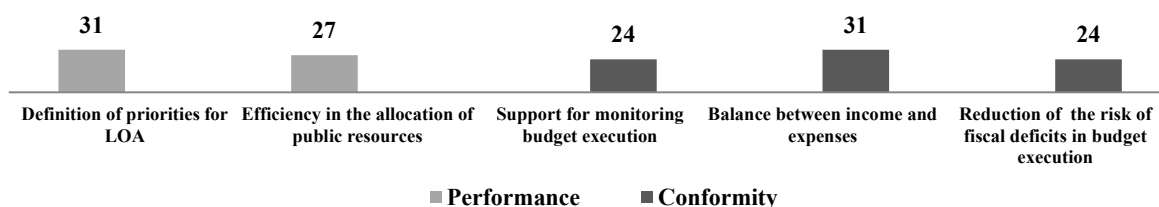
Regarding the questions about the contributions of the PPA, LDO, and LOA, a preliminary trend was observed toward using regional criteria for implementing the SDGs.

Figures 8, 9, and 10 show the contributions of the PPA, LDO, and LOA to the implementation of the SDGs, respectively.



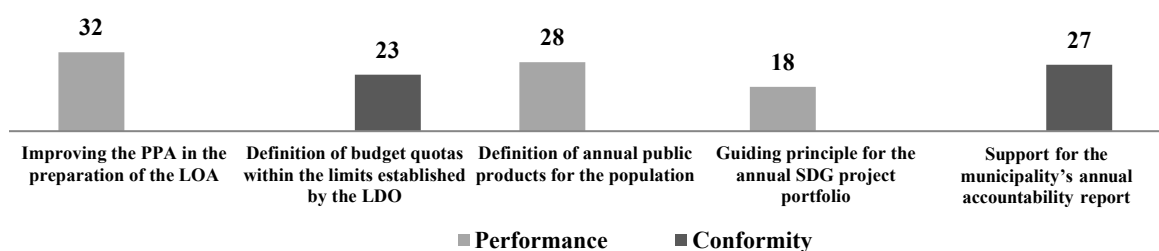
**Figure 8** Contributions of the PPA to the implementation of the SDGs

Source: Survey data.



**Figure 9** LDO's contributions to implementing the SDGs

Source: Survey data.



**Figure 10** Contributions of the LOA to implementing the SDGs

Source: Survey data.

To verify the association of the factors evaluated in the implementation of the SDGs based on the budget laws, chi-square tests were conducted to determine whether there is an association between the actions and the criteria used. The results are shown in Table 8.

**Table 8**

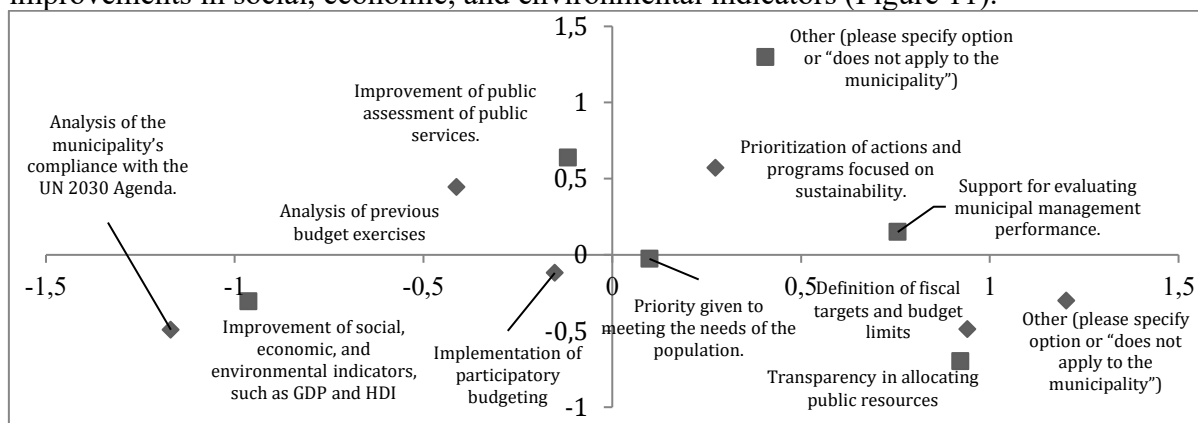
*Municipalities participating in the survey with the highest IDSC BR, by region*

Factors evaluated	Chi-square
Question 3 – SDG actions; Question 8 – PPA contributions	0,00000000742
Question 3 – SDG actions; Question 9 – LDO contributions	0,00020416100
Question 3 – SDG actions; Question 10 – LOA contributions	0,00004604721

Source: Survey data.

Considering the chi-square column of Table 9, the actions taken to meet the SDGs in the municipalities are associated with the contributions of the PPA, LDO, and LOA. This conclusion is based on all values being less than 0.05 and less than the degree of freedom, which is 37.652.

The PPA's notable contributions were transparency in allocating public resources and improvements in social, economic, and environmental indicators (Figure 11).

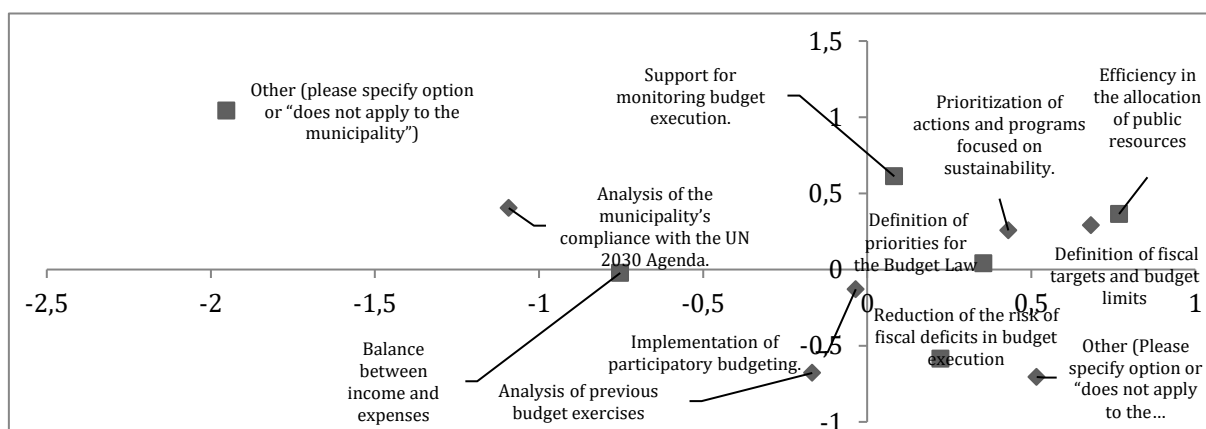


**Figure 11** ANACOR Percentage Map: Actions for the implementation of the SDGs and contributions of the PPA

Source: Survey data.

In this context, the PPA actions and contributions with the greatest association were analysis of compliance with the UN Agenda in the municipality (action) and improvement of social, economic, and environmental indicators (contribution).

Regarding the contributions of the LDO, the highlights included the balance between revenues and expenses and the definition of priorities for the LOA (Figure 12).

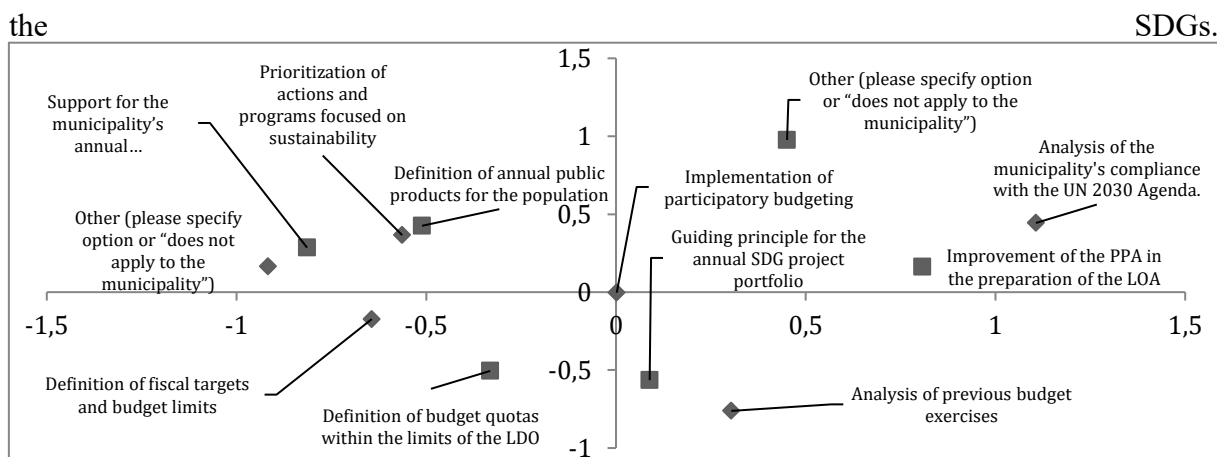


**Figure 12** ANACOR percentage map: SDG actions for the implementation of LDO contributions

Source: Survey data.

The LDO action and contribution with the greatest association were analysis of compliance with the UN 2030 Agenda in the municipality (action) and balance between revenues and expenses (contribution).

Regarding the contributions of the LOA, the most frequent were the improvement of the PPA for preparing the LOA and the definition of annual public products for the population. Figure 13 shows associations between LOA actions and contributions to the implementation of



**Figure 13** ANACOR Percentage Map: Actions for implementing the SDGs and contributions of the LOA

Source: Survey data.

The LOA action and contribution with the greatest association were analysis of compliance with the UN 2030 Agenda in the municipality (action) and improvement of the PPA in preparing the LOA (contribution).

#### 4.2 Discussion of Results

The Brazilian budget system consists of three budget laws – PPA, LDO, and LOA – each with a specific purpose defined by the Brazilian Constitution (1988). The Multi-Year Plan (PPA) refers to capital expenditures of significant importance, whose execution extends beyond one fiscal year (strategic planning). The Budget Guidelines Law (LDO) sets the priorities and actions to be carried out by the budget, serving as a bridge between the PPA and the Annual Budget Law (tactical planning). The Annual Budget Law (LOA) operationalizes the two previous laws, detailing the execution of public policies and planned programs, and constitutes the budget itself (operational planning). This study examined the adoption of these three laws in the implementation of the SDGs by Brazilian municipalities.

The results indicated the indistinct use of the three budget laws in implementing the objectives, supporting Cristóbal et al. (2023)'s concern about the lack of open general guidelines for adopting the SDGs. This fragmentation in the use of budget laws has several operational and legal implications.

The operational implication concerns the lack of consensus on which instrument is most appropriate for implementing the objectives. This issue reveals a certain lack of knowledge about the specific functions of each budget law and can compromise the effectiveness of the action. This conclusion aligns with the warning from Nascimento and Viotto (2022), who note that, among the three laws, the LDO is best suited to the prescriptive and guiding role. The authors argue that the LOA is unsuitable for purposes other than estimating revenue and setting expenditures, due to the enforceable nature of its actions and its strict adherence to the principle of exclusivity, except for constitutional exceptions.

Regarding the use of the PPA as a means to implement the SDGs, there is no explicit legal permissibility. This is because the regulation of this plan is limited to what is contained in the CF/88, in which no guiding character is observed, as mentioned in relation to the LOA. In the case of the LRF, the provision addressing the plan in this Complementary Law was vetoed. However, this does not mean that the PPA cannot be used for such a purpose, especially since, over the years, the federal government has included rules in this instrument aimed at improving the PPA, such as the PPA 2024-2027, which sought compatibility with the SDGs.

Here, it is appropriate to consider Godinho and Lima (2025) regarding the lack of a prescriptive nature in this law, which creates risks that the associations established in the PPA may not be reflected in the LOA. The survey results can serve as an important warning to entities seeking to integrate their public budget planning with the SDGs. Managing the public budget from a sustainability perspective is not limited to simply adapting or reclassifying existing policies to the sustainable development goals; rather, it requires a substantial change in behavior, mindset, and decision-making processes.

Thus, the SDGs should guide the formulation of public policies, considering the social, environmental, and economic dimensions in an integrated manner (Ferreira, 2019; Vaz and Alves, 2021). This makes a significant difference, as it shifts the budget's focus from being merely an instrument of financial allocation for elected policies to serving a strategic role in promoting sustainable development and fostering greater coherence between planning, budget execution, and long-term results.

A possible explanation for the behavior observed among the municipalities may stem from the issues associated with the program-based budgeting model currently in use in the country. There is a perception that something is lacking and that budget planning cannot fully align with society's demands, making it an unreliable representation of reality. This is compounded by the limited ability to coordinate with other government plans, even though the Constitution (1988) requires compatibility between budget laws and other public planning instruments.

The findings also revealed municipalities' concerns about the financial impact of the SDGs on budget laws, which is one of the most recurrent themes in the literature (Couto & Goularte, 2019; Elder & Newman, 2023; Guillamón, Rios & Benito, 2025; UNEP, 2025). In Brazil, beyond the issue of financing the SDGs, it is necessary to consider the ongoing containment of public spending, especially at the federal level, as exemplified by fiscal restriction rules (EC No. 95/2016 and LC No. 200/2023).

This means that, in addition to the tension inherent in financing the SDGs, it is necessary at the federal level to reconcile this issue with fiscal restrictions. The alert is relevant because budget allocation can affect the achievement of the intended objectives not only due to the amount of resources available, but also because of how they are distributed (Novitasari and Sugianto, 2024). This dynamic directly impacts the performance of the established goals, as observed by Yasir (2025).

As the Brazilian budget environment is disparate and complex, reflecting the diversity of Brazilian realities (Nardone 2023), it requires entirely opposing solutions across different regions. In one area, water distribution is needed, while in another, efforts focus on containing excess water, demonstrating that uniform solutions are unworkable. The same situation occurs within a single municipality. This scenario highlights the need for a budget model capable of addressing multiple and conflicting demands.

At this point, sustainable budgets emerge, grounded in cross-cutting agendas, strategic governance (Silva, Silva & Pereira, 2024; Suchitwarasan et al., 2024), systemic character (Krantz & Gustafsson, 2021), and the indivisibility of the SDGs (EPRS, 2023; OECD, 2019; UNEP, 2025). While these attributes offer advantages by enabling an integrated and long-term approach, they also present challenges, as they require profound changes in behavior and mindset.

As Silva et al. (2024) point out, adopting this logic requires ongoing efforts to build new institutional and cultural structures capable of supporting the complexity inherent in implementing the SDGs in a country as heterogeneous as Brazil. This understanding largely arises from the high complexity of the problems facing modern societies. In addition, the increasing incorporation of multidimensional agendas demands not only regulatory adjustments but also changes in behavior patterns and governance practices.

In addition, it is important to recognize the logic of the SDGs as an advance in public innovation (Silva, Silva & Pereira, 2024; Suchitwarasan et al., 2024) when aiming to make the budget an instrument of strategic governance (Mohd Yusof, Zainal & Harjanto, 2026). However, linking resource allocation to interdependent and measurable objectives risks increasing administrative complexity and overloading planning and execution mechanisms. The transversality and systemic approach, which theoretically promote integration, can also create practical difficulties in coordinating different government areas, especially in federative contexts marked by regional inequalities and unequal institutional capacities, as is the case in the country.

In addition, attempting to integrate social, economic, and environmental dimensions within the same budget can create tensions between competing priorities. Allen et al. (2019) observed potential contradictions between environmental and economic goals, indicating that achieving balance is not always straightforward. In this context, the need to meet fiscal targets can conflict with long-term social investments or environmental policies that require immediate resources, creating dilemmas that are difficult for public managers to resolve.

Unlike studies that supported participatory budgeting as an important democratic tool capable of mitigating risks and preventing waste (Lucena, 2021; Nassar, 2022; Vinogradova, 2022; Zaniboni et al., 2023), this research indicated that PB was not used as a means to implement the SDGs. The results contradict the understanding of the structural connection between sustainability, inclusion (Silva et al., 2024), and budget planning, since municipal budget laws – PPA, LDO, and LOA – can be used as instruments to integrate the 2030 Agenda into local public policies.

This process enables society's demands to align with global sustainable development goals, ensuring that financial resources are allocated strategically and with a focus on results. Thus, the public budget assumes a central role as a governance mechanism that promotes balance among economic growth, social inclusion, and environmental preservation, establishing itself as an essential tool for the effective implementation of the SDGs in the municipal context.

## 5 Final Considerations

This study began with the question of which factors associated with Brazilian municipal budget laws address the implementation of the SDGs, based on the perceptions of public managers.

The empirical results obtained through the Correspondence Analysis technique (ANACOR) showed that, although the relevance of the three budget laws (PPA, LDO, and LOA) is recognized, their use is fragmented and poorly coordinated, revealing a lack of understanding of their specific functions and a tendency to rely on the LDO. Concerns were also raised about the financial impact on the implementation of the SDGs, which can strain the achievement of the goals, as well as the lack of use of participatory budgeting as a tool to facilitate the process.

Although budget laws are considered important planning instruments for budget implementation, the Brazilian experience has shown that incorporating the SDGs still lacks clear institutional mechanisms, consistent normative guidelines, and intergovernmental coordination practices. This finding reinforces the relevance of the research question by showing that the effectiveness of integrating the public budget and SDGs depends not only on the existence of legal instruments, but also on how they are understood and implemented by managers.

Compared to international experience, the practices adopted in the country remain embryonic and are largely limited to the use of budget laws, despite the existence of other mechanisms discussed in the literature (such as structure, leadership and coordination, public policies, budget flexibility, organizational learning, action plans, etc.). In this context, the

empirical findings of this study align directly with international experience: while they highlight the potential of budget laws as planning instruments, they also indicate that, without structural and cultural changes, Brazil risks confining the SDGs to a merely normative framework – incorporating the SDGs into the budget without achieving the practical effects of this process.

The comparison reinforced that Brazil's challenge lies not only in aligning legal instruments, but also in developing a governance framework capable of sustaining the transversality and indivisibility of the SDGs, transforming them into effective public policy guidelines. It also showed that adopting the 2030 Agenda requires a systemic effort, involving not only the integration of different budgetary instruments, but also coordination among levels of government, civil society, and the private sector. Countries that have advanced in implementing the SDGs demonstrate that institutional innovation, intersectoral coordination, and effective social participation are essential for turning the goals into concrete results.

Finally, the main limitation of the research is the small number of participants and the limited experiences reported in the national literature. This restriction compromises the representativeness of the results, creates dependence on specific reports and the perspectives of those involved, and makes it difficult to conduct longitudinal studies.

For future research, it is suggested to identify instruments beyond budget laws, such as the adoption of agendas, reformulation of administrative processes, and action plans. Further analysis of which instruments are being used is recommended, including evaluation of their effects, given that this modeling of existing budget laws in Brazil is rare worldwide. The study also indicated a lack of homogeneity in the mechanisms used to implement the SDGs.

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