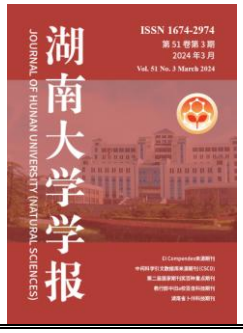

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Scope of Sustainable Development Indicators in the Post-COVID Era in México

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Abstract: This research evaluates indicators of sustainable development in Mexico, analyzing their impact on the country's economic, social, and environmental realms, and reviews the impact of the COVID-19 pandemic on the achievement of sustainable development goals. The methodology employed involves a comprehensive bibliometric analysis, comparing indicators from the United Nations (UN), the Organisation for Economic Co-operation and Development (OECD), and Mexico's National Institute of Statistics and Geography (INEGI). The results obtained in this study reveal significant challenges, including the lack of indicator homogeneity and insufficient data availability, which hinder the accurate measurement of progress and policy formulation. Furthermore, this situation is exacerbated by the consequences of the COVID-19 pandemic, which affected development and consequently the attainment of sustainable development goals in Mexico. This work highlights the urgent need for standardized indicators and better data collection systems, which are essential for effective sustainable development strategies. In addition, the importance of fostering inter-institutional cooperation and civil society participation to address these challenges is emphasized, marking a critical step toward a resilient, equitable, and sustainable future for Mexico.

Keywords: sustainable development, Sustainable Development Goals, Sustainable Development Indicators, Mexico, sustainability.

墨西哥后疫情时代可持续发展指标范围

摘要：本研究评估了墨西哥的可持续发展指标，分析了它们对该国经济、社会和环境领域的影响，并回顾了新冠肺炎大流行对实现可持续发展目标的影响。所采用的方法涉及全面的文献计量分析，比较联合国(联合国)、经济合作与发展组织(经合组织)和墨西哥国家统计与地理研究所(伊内吉)的指标。本研究获得的结果揭示了重大挑战，包括指标缺乏同质性和数据可用性不足，阻碍了进展的准确衡量和政策制定。此外，新冠肺炎大流行的后果加剧了这种情况，影响了墨西哥的发展，从而影响了可持续发展目标的实现。这项工作凸显了对标准化指标和更好的数据收集系统的迫切需要，这对于有效的可持续发展战略至关重要。此外，还强调了促进机构间合作和民间社会参与应对这些挑战的重要性，这标志着墨西哥迈向有弹性、公平和可持续的未来的关键一步。

关键词：可持续发展、可持续发展目标、可持续发展指标、墨西哥、可持续性。

1. Introduction

For several centuries now, the thought framework of humanity has been shaped by a particular stream of thinking that has influenced societies' perspectives on actions implemented in sustainable development. This thinking is related to a set of environmental, political, economic, social, and cultural elements that have set the tone in capitalism. In this context, a new model of economic organization in society has unfolded, coupled with the intervention of public policies implemented by governments, as well as the individual thinking of the autonomous individual seeking to satisfy their needs, without considering the responsibilities assigned by the new model.

In 1987, the World Commission on Environment and Development (WCED) presented a report titled "Our Common Future," also known as the Brundtland Report, named after the chairwoman of the WCED responsible for its drafting, Norwegian Prime Minister Gro Harlem Brundtland [1].

The Brundtland report introduced the concept of sustainable development, defined as the principle that seeks to meet present needs without compromising the ability of future generations to meet their own needs. The report emphasized the interdependence between economic development, social development, and environmental protection, arguing that these three pillars must be considered holistically to achieve a sustainable future [1].

Sustainable development aligns with the Sustainable Development Goals (SDGs), a set of global targets set by the United Nations (UN) to address major challenges facing the world, such as poverty, inequality, climate change, and environmental degradation [2].

It is important to focus on the SDGs because global issues cannot be addressed in isolation or fragmented. Sustainable development requires a holistic approach that considers the intricate interconnections among the social, economic, and environmental challenges we face. This approach involves a profound recognition that both individual and collective actions have a profound impact on the planet and its inhabitants [3].

The significance of these principles was reflected during the UN meeting in September 2015, where 193 member states, including Mexico, collaborated to endorse the document titled "Transforming Our World: The 2030 Agenda for Sustainable Development." This ambitious commitment aimed to address the multiple social, economic, and environmental challenges facing the planet [2, 4].

Within the framework of the 2030 Agenda, 17 SDGs were outlined, and through the implementation of 169 specific targets, they aim to address global challenges and direct efforts toward building a more equitable, inclusive, and sustainable world. It is anticipated that by focusing on these goals, substantial progress will be made in crucial areas such as eliminating extreme poverty, promoting high-quality education, gender equality, climate action, and ecosystem preservation [2, 4].

Since then, the SDGs have not been just a set of goals; they have sought to become a compass guiding sustainable development globally. Their scope and content are aimed at being a widely adopted and used frame of reference for governments, non-governmental organizations, businesses, and civil society in general. Their impact and discussion around their goals continue to expand, driving global collaboration toward a future where sustainability and equity are unshakable pillars guiding human action toward a more promising and harmonious future.

The study on sustainable development indicators in Mexico is motivated by the commitments made by the country within the 2030 Agenda framework. These commitments serve as guiding principles for assessing and improving the country's progress toward sustainability. These indicators are vital metrics that reflect the country's performance in various aspects of sustainability, including economic, social, and environmental dimensions.

In alignment with these international agreements, this study comprehensively evaluates sustainable development indicators in Mexico. By analyzing these indicators, the goal is to obtain information on Mexico's strengths, weaknesses, and areas requiring improvement in its pursuit of sustainable development. Through this, we contribute to ongoing efforts to foster a more equitable, inclusive, and environmentally sustainable future for Mexico and its inhabitants.

1.1. Impact of the COVID-19 Pandemic on the Achievement of Sustainable Development Goals in Mexico

During the COVID-19 health crisis, Latin America was immersed in a complex situation that affected both the economic and health spheres, facing challenges of significant magnitude. The region experienced a decrease in gross domestic product (GDP) and an increase in unemployment resulting from the contraction of economic activity, leading to widespread repercussions. This situation elevated levels of informal labor, accelerated urbanization, poverty, and inequality, making a substantial part of the population particularly susceptible to the consequences of the pandemic [5].

Furthermore, disparities in access to education,

quality health services, adequate nutrition, basic infrastructure, and social protection intensified, primarily affecting vulnerable populations. The health crisis plunged the region into an unprecedented economic and social crisis, compounded by pre-existing challenges such as inequality, informal labor, and the fragility of healthcare systems. This challenging scenario impacts various population sectors, from concerning economic deceleration to environmental effects, presenting a series of opportunities and obstacles on the path to sustainable development [6].

Within this context, the COVID-19 pandemic has left a profound mark on the achievement of Sustainable Development Goals, affecting multiple social, economic, and environmental dimensions. Economically, business closures and job losses have increased poverty and inequality globally, hindering progress toward SDG 1 (end poverty) and SDG 10 (reduced inequalities) [5].

In terms of health, the burden on healthcare systems has created obstacles to adequately achieving SDG 3 (good health and well-being). The disruption of primary healthcare services and the diversion of resources to address the health crisis have weakened efforts to address other diseases and health issues [5].

In the educational sphere, the prolonged closure of schools has negatively impacted access to education (SDG 4) and intensified educational gaps, especially for those already in vulnerable situations. Environmentally, population confinement and the reduction of industrial and transportation activities have led to a notable decrease in atmospheric pollutants, showing a significant improvement in air quality. However, these advancements coexist with the need to address economic and social crises generated by the disruption of productive activities and confinement, emphasizing the importance of addressing inequalities between countries and social groups on the path to sustainable development [6].

Mexico went through an economic situation in 2019, marked by a change of government and its immediate effects. However, the situation worsened considerably in 2020 because of the COVID-19 pandemic and the short-term economic policy strategy applied. This combination of factors led to a significant economic downturn, evidenced by a marked contraction of the country's GDP, which recorded a concerning -8.7% annually. This figure reflects a considerable decrease in economic activity throughout that year, being the second economic situation determined by the pandemic and its repercussions worsening the situation previously initiated in 2019 with the change of government [7].

Additionally, during the crisis, different economic sectors were unevenly affected. The secondary sector was the most affected, showing a contraction of -25.5% in the second quarter of 2020. The impact on employment was also significant, with the economically active population (EAP) experiencing reductions in different quarters, highlighting a contraction of -8.6% in 2020, which indicates a significant decrease in employment levels in the country [7].

When analyzing the pandemic management, criticisms arise toward the Mexican government, arguing that the strategy and handling of the situation were deficient, with many infections and deaths. Management failures, along with structural limitations, contributed to precarious conditions in the population. This situation, along with the lack of homogeneity in the indicators used by different institutions to measure progress toward the SDGs, hinders the proper assessment of the magnitude of the impact and the implementation of effective policies [7].

In this sense, it is necessary to implement specific actions to mitigate economic and social impacts, recognizing the importance of addressing inequalities between different regions and social groups, promoting a more equitable development post-pandemic.

In the fiscal policy realm, the implementation of fiscal stimuli is highlighted as a fundamental measure and an increase in public spending. These actions stimulate aggregate demand and reactivate economic activity, generating a positive impact on economic growth. Infrastructure investment is presented as another relevant strategy in the fiscal domain. Fostering infrastructure projects not only seeks to improve the economy's competitiveness but also aims to generate employment and stimulate private investment, contributing to economic recovery [7].

Regarding monetary policy, reduction in interest rates is proposed as a key measure. By decreasing interest rates, the goal is to encourage credit and stimulate investment and consumption, creating a conducive environment for economic dynamism. In addition, credit regulation is presented as a comprehensive measure to ensure access to credit by businesses and families. These measures facilitate financing and promote investment, thus contributing to restoring economic activity during recession and economic depression [7].

Likewise, Mexico must propose the implementation of a comprehensive approach to mitigate the effects of the COVID-19 pandemic, promoting international cooperation, strengthening responses to situations like those presented during this pandemic, and adopting economic policies that provide flexibility at the national level.

2. Methodology

The methodology adopted in this study is based on bibliometric analysis with the aim of comparing sustainable development indicators in Mexico, using as reference those presented by the UN, the OECD, and those measured by the National Institute of Statistics

and Geography (INEGI). The methodological approach has been designed to ensure coherence and rigor in exploring the relationship between sustainable development indicators, addressing the differences and similarities between the measurements of these three entities.

To conduct this research, several essential stages were followed. First, an exhaustive literature review was conducted to gather secondary data from reliable sources, such as official reports from the UN, OECD, and INEGI. Given the comparative nature of the study, particular emphasis was placed on the meticulous selection of data that would allow for accurate comparison between the different metrics of sustainable development.

The next phase involved a detailed analysis of the obtained data. Review and synthesis of the collected information were carried out, identifying patterns and trends in the measurements of the UN, OECD, and INEGI. This interpretative approach allowed for a deeper understanding of the differences and similarities in how each entity measures and presents sustainable development indicators in the Mexican context.

Based on the results of the analysis, the identified divergences were contextualized, which allowed exploring possible underlying reasons behind the discrepancies in sustainable development measurements. This approach provided a more comprehensive perspective on how the UN, OECD, and INEGI address this issue in Mexico, focusing on a qualitative interpretation of the collected data.

It is relevant to emphasize that this study has exclusively focused on the evaluation and comparison of sustainable development indicators, avoiding the inclusion of tangential topics to maintain coherence and relevance in the research. The rigorous analysis focuses on a detailed exploration of the relationship between the indicators presented by the UN, OECD, and INEGI, thus providing a comprehensive and comparative view of the sustainable development landscape in Mexico.

The applied methodology is presented in Fig. 1.

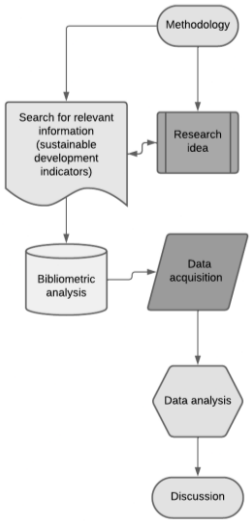

Fig. 1 Flowchart of the methodology used (The authors)

Fig. 1 shows a flowchart representing the research process. The diagram begins with the identification of the research idea, in this case, the review of sustainable development indicators in Mexico. Next, a search for relevant information regarding these indicators was conducted.

The subsequent step was data acquisition, which was performed through bibliometric analysis. Once the data were obtained, they were analyzed; finally, the research results are discussed, and conclusions are drawn.

3. Results

Assessment and monitoring of progress toward achieving sustainable development are fundamental processes in the implementation of the 2030 Agenda. In this context, the importance of Sustainable Development Indicators (SDIs) is highlighted as an essential tool for measuring, evaluating, and monitoring progress in each of the SDGs established in this agenda. The relevance of SDIs lies in their ability to provide both quantitative and qualitative data, allowing for a more complete and detailed understanding of the reality of countries in their pursuit of sustainable development [8].

The SDGs cover many crucial topics that are fundamental to building a sustainable future. These objectives collectively represent a necessary holistic approach to addressing the most pressing global challenges and are designed to be interdependent, recognizing the complexity of the issues faced by modern society. From eradicating poverty to promoting gender equality, climate action, and peace, each SDG encapsulates specific aspirations and goals aimed at driving economic, social, and environmental development [9].

The interconnection between these goals reflects the need for integrated approaches that transcend sectoral boundaries and foster collaborative solutions. For example, SDG 2, related to zero hunger, is intrinsically linked to SDG 13 on climate action, as sustainable food systems play a crucial role in mitigating the impacts of climate change. Understanding these interconnections is essential for effectively addressing multifaceted challenges and achieving sustainable progress in all areas.

Within the framework of the 2030 Agenda, the assessment of progress toward sustainable development is supported by the effective use of SDIs. Indicator-based measurement represents a fundamental tool for evaluating progress toward sustainable development. This approach, supported by statistical data, measurements, and evaluations from reliable sources, primarily promotes transparency, accountability, and facilitates informed decision-making. As Hak et al. [10] pointed out, the implementation and analysis of indicators contribute to creating a clear and objective

picture of progress and challenges in the field of sustainable development, allowing more effective guidance of necessary actions.

A highlighted aspect of Sustainable Development Indicators (SDIs) is their capacity not only to measure progress within the Sustainable Development Goals (SDGs) but also to identify inequalities and priority areas. Alaimo and Maggino [2] emphasize this point, highlighting how indicators not only serve the function of measurement tools but also act as catalysts for taking concrete actions that drive sustainable development. In this sense, SDIs become strategic allies by offering a comprehensive and detailed view of the situation, enabling more effective and context-specific approaches [2].

The significance of SDIs extends beyond national borders, covering regional and global levels. This applicability to various scales not only allows for the comparison of progress between countries and regions but also encourages collaboration and the exchange of best practices. Thus, SDIs become essential tools not only for assessing the performance of each entity but also for guiding policies, programs, and projects toward more effective and sustainable outcomes [10].

Within this context, the sustainable development strategy has driven the creation of specific environmental indicators. These indicators, according to Kates et al. [11], are designed to monitor human impact on the environment and assess the effects of policies aimed at achieving the SDGs. The connection between sustainable development and environmental management becomes a crucial aspect, where indicators play an essential role in providing valuable data for informed decision-making and effective policy design.

The measurement of environmental indicators has been implemented in various sectors, including tourism, education, agriculture, and business, with the aim of not only implementing improvements in sustainable development but also conducting periodic measurements to assess the impact of such improvements [12]. This comprehensive approach is fundamental to ensuring that the actions taken truly contribute to the achievement of long-term sustainable goals.

However, despite these efforts, contradictions persist between the paradigm of economic growth and sustainable development. The instruments used to promote increased production of goods and services do not always integrate transversally with the environmental indicators that are part of the goals of sustainable development [13].

This paradox poses a significant challenge because the pursuit of sustainable economic growth is affected by the lack of alignment between economic and environmental indicators.

The contradiction between economic growth and sustainable development takes on special importance in the context of sustainable development in Mexico. By comparing the GDP with the net ecological product (NEP) of the country, as shown in Fig. 2, the existing discrepancy between these two indicators is evident. Therefore, it is crucial to carefully examine these disparities to design more effective strategies that harmonize economic and environmental objectives, thus seeking authentic and balanced sustainable development.

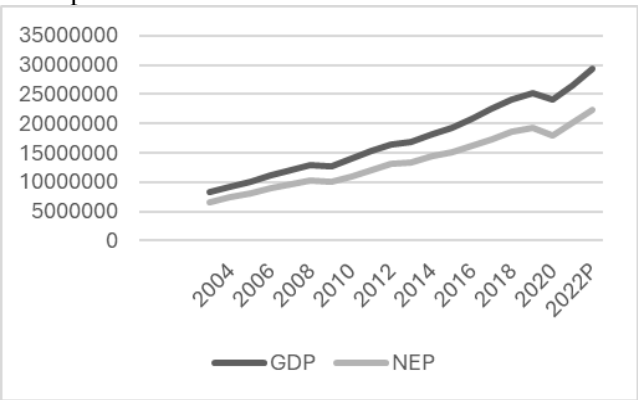

Fig. 2 GDP vs. environmentally-adjusted net domestic product (NEP) based on data from Instituto Nacional de Estadística y Geografía (INEGI) [14]

The detailed analysis of the results presented in Fig. 2 reveals a concerning dichotomy between economic growth and environmental sustainability in Mexico. Although the GDP has experienced consistent growth over the years, suggesting robust economic activity, the environmentally-adjusted net domestic product (NEP) presents a less encouraging reality. This index, which measures the net environmental impact of production, reveals that economic development is not supported by sustainable practices.

More specifically, the NEP, calculated by subtracting from the GDP the costs related to fixed capital consumption and expenses linked to the depletion of natural resources and environmental degradation, highlights a significant disconnect between economic growth and environmental care. This discrepancy raises crucial questions about the long-term viability of the current economic model and its environmental consequences.

One of the main concerns arising from these data is the substantial dependence on non-renewable resources, such as fossil fuels and mining extraction, to drive the country's economic growth. Although these resources have been key drivers of development, their constant exploitation has serious consequences for the natural environment. Mining extraction, for example, not only depletes mineral resources but also contributes to soil degradation and water pollution, directly impacting biodiversity and the quality of life of local communities [3].

Furthermore, the lack of consideration of environmental costs in traditional GDP accounting signals a deficiency in the comprehensive assessment of economic development. Ignoring these costs can

lead to economic decisions that maximize short-term growth but sacrifice long-term sustainability. This approach, therefore, poses significant challenges to achieving sustainable development that not only promotes economic prosperity but also protects and preserves natural resources for future generations.

In this context, it is essential to rethink economic policies and strategies to effectively incorporate environmental sustainability as an integral component of development. Transitioning to renewable energy sources, implementing sustainable agricultural practices, and adopting clean technologies are some possible solutions. Additionally, promoting a circular economy and reducing dependence on non-renewable resources should be prioritized goals to ensure that future economic growth aligns with environmental preservation [3, 15].

Given the dichotomy between economic growth and environmental sustainability in Mexico, it is imperative to address this disparity through a significant transformation in economic policies and strategies.

Within this framework, the transition to a green economy emerges as a vital solution. It is essential to rethink economic policies to effectively incorporate environmental sustainability as an integral component of development. The green economy, which focuses on energy efficiency, carbon emissions reduction, and proper management of natural resources, serves as a path to reconcile economic growth with environmental preservation. Cooperation between the public and private sectors and active participation of civil society are crucial in this process [13].

The green economy plays a crucial role in environmental protection and mitigation of climate change primarily caused by human activity. In addition to its environmental benefits, the green economy can drive employment and economic growth. The transition to a green economy can open new markets and business opportunities. Moreover, improvement in the quality of life for people is a prominent aspect of the green economy. Pollution of resources such as air and water and the loss of biodiversity directly affect the health and well-being of individuals. Therefore, promoting practices that protect the environment will raise the quality of life in society [16].

However, the effective assessment of progress toward comprehensive sustainability demands that attention be prioritized to existing gaps in indicator measurement. The diversity of approaches and sets of indicators proposed by global organizations such as the UN and the OECD, in contrast to those applied by INEGI in Mexico, underscores the urgency of establishing a more rigorous alignment in this area.

Fig. 3 highlights the present discrepancies, emphasizing the critical importance of developing harmonized indicators that enable a coherent and unified evaluation of progress toward the SDGs. Homogeneity in measurement emerges as an essential pillar for guiding the path toward genuinely comprehensive and equitable sustainable development.

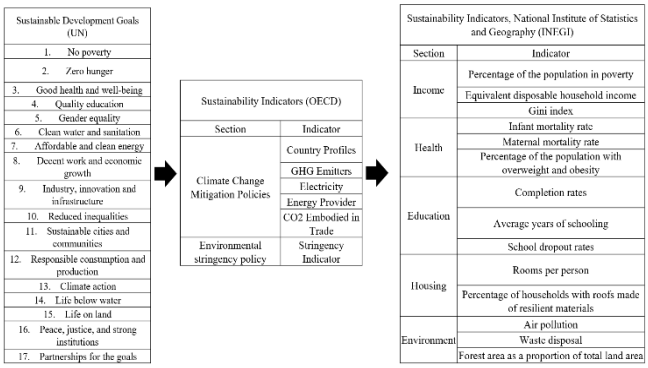

Fig. 3 Comparison of SDIs proposed by the UN, the OECD, and the INEGI based on data from the INEGI [17]

The lack of uniformity poses substantial obstacles to accurately and coherently evaluating sustainable development strategies. The absence of a common set of indicators complicates the comparison of data at the national and international levels and the aggregation of information to gain a global perspective on progress toward the SDGs [9].

Despite efforts by relevant organizations to develop indicators covering multiple dimensions of sustainable development, significant limitations have been identified in their applicability within the realm of environmental policy. This presents considerable challenges in accurately and coherently assessing sustainable development strategies [1, 2].

The lack of homogeneity and limitations in evaluating sustainable development strategies are crucial when considering the importance of the interrelation between the goals. In this context, the need to overcome these barriers becomes even more apparent to ensure a comprehensive and effective assessment of progress toward global sustainability.

In this regard, Velasco et al. [18] emphasized the importance of addressing interconnection as an integral part of the goals to contribute more significantly to sustainable development and citizen well-being. First, the fundamental connection between employment and the achievement of SDG 8, focusing on decent work and economic growth, is highlighted. Within this framework, the aim is to stimulate the economy effectively without compromising environmental balance while ensuring adequate job opportunities for the working-age population.

In addition, the intrinsic relationship with other SDGs that directly impact sustainable development is emphasized. For example, SDG 10, "reduced inequalities," becomes an essential component by promoting social, economic, and political inclusion in the workplace. This inclusion not only has a positive impact on individuals' well-being but also contributes to building a more equitable society [18].

The research also highlights SDG 12, "responsible consumption and production." In this context, the

importance of promoting efficient resource use and energy consumption is emphasized, advocating for the creation of eco-friendly jobs that are fairly paid and provide optimal working conditions. This perspective aligns not only with corporate responsibility but also with building a society that is aware of its production and consumption habits [16].

Similarly, SDG 11, "sustainable cities and communities," which advocates for urban planning that does not harm the environment, is highlighted. Here, the importance of developing environmentally friendly infrastructure and creating sustainable and efficient environments that contribute not only to economic benefit but also to the ecological balance of cities is emphasized [18].

However, some existing indicators face challenges in adequately capturing the complexity and interconnection of environmental and social challenges. Environmental problems are often interrelated with economic and social aspects, and measuring them in isolation can underestimate or completely ignore their true impact [11].

Therefore, developing more integrated and holistic indicators that reflect the complexity of sustainable development challenges is crucial.

One of the most notable limitations in analyzing and monitoring the SDGs is the lack of adequate and reliable data, a challenge intensified by the total absence of information in certain instances. This challenge manifests itself heterogeneously among countries and regions, generating significant disparities in the accuracy and reliability of indicators used to assess progress toward the SDGs and in the comparisons made between regions. The importance of having solid and up-to-date data lies in the complexity of accurately assessing progress and designing effective policies to address sustainable development challenges. The lack of this data and a reliable method to assess and compare it significantly hinders the ability to make informed and strategic decisions [9].

An illustrative case of this issue is observed in Mexico, where a lack of data updates affects crucial indicators such as the percentage of the population in poverty or the proportion of people experiencing food insecurity. Unfortunately, in some cases, these data date back almost five years. This deficiency in the availability of updated information not only hinders accurate assessment but also the formulation of relevant strategies to address the actual needs of the population [9].

The need for reliable data is emphasized when considering that, in some SDGs, the quantity of indicators is insufficient, as is the case with the "climate action" SDG in Mexico, where only one indicator is available, thus limiting its proper application and development [17].

As the evaluation of sustainable development measures deepens, the inherent complexity in the methodological structure of the SDGs becomes obvious. These are broken down into 17 overarching goals, which are further subdivided into 169 measurable targets supported by 230 verifiable indicators. This multitude of targets and indicators poses substantial challenges for accurate measurement and effective implementation. It has been noted that some of these goals are purely theoretical, and several targets lack realism or practical applicability, further complicating the viability of approved indicators [19].

Digging into the analysis of how to evaluate sustainable development in a specific context, various tools and methodologies are available. However, literary reviews, surveys, direct observation, and expert consultations, while valuable, may not always be sufficiently precise in measuring all the set objectives. To address this complexity, thematic models supported by computer tools such as Microsoft Office Excel, Microsoft Office Visio, and EndNote are employed [12].

Despite these measurement methods, there remains a need to develop more precise and comprehensive methods to thoroughly evaluate progress toward the SDGs.

Faced with limitations in data availability and reliability, it is crucial to implement comprehensive and coordinated measures. Improving data collection systems through the definition of clear standards and methodologies is a fundamental step to ensure coherent and reliable information gathering that is relevant for assessing progress toward the SDGs. In addition, strengthening institutional capacity to ensure effectiveness in data collection and analysis processes is essential [3, 8, 19].

A crucial element in overcoming these limitations lies in the active inclusion of the civilian population in decision-making processes and in the assessment and analysis of issues for indicator generation. The participation of various stakeholders in defining and monitoring indicators is fundamental to ensure that relevant problems are addressed and public policies accurately reflect the needs and aspirations of society [20]. Ignoring this perspective risks perceiving some issues or indicators as irrelevant, potentially distorting the actual evaluation of the impact of actions implemented to achieve the SDGs.

In addition to improving the quality and availability of data, it is essential to promote transparency and facilitate access to information. This will enable decision-makers and policymakers to have a robust evidence base to guide their actions. Similarly, it is necessary to foster collaboration and cooperation between various relevant actors, such as governments, international organizations, and civil society, to ensure the exchange of best practices and learning from others' experiences [3, 11].

In this regard, the growing importance of sustainability for some members of the private sector is

recognized, who have identified opportunities related to the SDGs through sustainable entrepreneurship, seeking a return on their actions. These entrepreneurs are not only the visible tip of the iceberg but also draw on information and knowledge to contribute ideas and solutions that contribute to transformation. In recent years, they have offered sustainable solutions. In this context, the importance of the business sector, entrepreneurs, sustainable entrepreneurship, and the 17 goals for academia, government, and society is highlighted. All these elements constitute a small but leading solution to address the issue and achieve the measurement and fulfillment of the SDGs [21].

To achieve a measurement of progress toward the SDGs that is consistent and comparable internationally, a joint effort is imperative. This endeavor requires the development of common and standardized indicators covering various dimensions of sustainable development. Improving the functionality of these indicators and deepening the evaluation of sustainable development strategies are essential to obtain a more complete and accurate view of the progress made in this crucial area [16].

A paradigmatic example of this approach is evident in the recognition of education as a tool in the service of the population. As education is established as a fundamental pillar, the possibility of structuring public policy focusing on the right to education opens up. This approach is not limited to mere knowledge acquisition but becomes a model for learning and citizenship training with a direct impact on achieving the goals of the 2030 Agenda, supported by the regulatory strength of substantial educational reform [22].

In this context, it is vital to provide young people with the necessary tools, appropriate guidance, and development opportunities. By ensuring these elements, it is guaranteed that upon reaching adulthood, individuals are equipped to contribute significantly to society's development. This approach translates into a long-term investment, with benefits reflected not only in accelerated economic growth but also in poverty reduction, thus generating a positive and sustainable impact on the social fabric [22].

Ultimately, these actions provide solid foundations for a more prosperous and equitable future.

4. Discussion

The review and analysis of sustainable development indicators within the Mexican context emerge as an essential exercise that calls for deep reflection on the current state of implementation and monitoring of the SDGs and their impact on the country's economic and social development. The relevance of this analysis is manifested in the urgency to recognize and address systemic deficiencies that negatively impact the country's prospects to achieve the goals set in the ambitious 2030 Agenda. These deficiencies, revealed as true systemic challenges, demand the adoption of effective corrective measures to chart a more accurate path toward a sustainable future.

First, the lack of homogeneity in indicators proposed by various entities is identified as a crucial point. This considerable disparity in the definition and measurement of progress toward the SDGs within Mexico not only complicates comparisons between different regions and sectors but also hinders the identification of clear patterns that could guide strategies and policies based on precise and reliable data. This absence of robust indicator standardization presents itself as a critical obstacle that limits the effectiveness of sustainable development strategies in Mexico.

To this challenge is added the inadequacy of adequate and up-to-date data, forming a second crucial front that adversely impacts the country's ability to assess and improve its progress toward the SDGs. The lack of accurate information not only complicates a comprehensive understanding of the current situation but also complicates the identification of priority areas and the efficient allocation of resources to undertake actions toward achieving sustainable development. The pressing need to strengthen data collection and monitoring systems for relevant information becomes an unavoidable task in evaluating Mexico's performance in relation to the SDGs.

Placing these findings in a broader and enriched context, the review and comparison with previous research [3], [16], [19] highlights the existence of similar challenges in other regional and national contexts. However, the magnitude of the deficiencies observed in Mexico underscores the urgent need for specific measures tailored to the unique characteristics of the country. This comparative analysis not only emphasizes the importance of learning from the experiences of other nations but also underscores the need for contextualized solutions that address Mexico's particular circumstances.

In this sense, it is imperative to emphasize how policymakers must comprehensively consider the diversity of factors contributing to the identified deficiencies in indicator management. Thus, the focus is not only on addressing the lack of homogeneity in indicators and the inadequacy of data but also on promoting inter-institutional cooperation and the active participation of civil society in implementing corrective measures.

These findings pave the way for generating improvement plans aimed at homogenizing and optimizing the review of data within sustainable development indicators. By identifying areas of inconsistency and insufficiency in data collection and standardization, targeted strategies can be developed to ensure that these indicators align with the 2030 objectives. Implementing measures to enhance data collection methods, establishing clear standards for indicator definition and measurement, and fostering

collaboration among relevant actors are key steps in this endeavor. Through these efforts, Mexico can improve its capacity to accurately monitor progress toward sustainable development goals and effectively allocate resources to address priority areas, ultimately advancing toward a more sustainable and prosperous future.

5. Conclusion

This analysis of sustainable development indicators in Mexico reveals a pressing need for immediate action to address the systemic challenges that hinder the country's progress toward achieving the SDGs. The analysis of texts and data conducted during this research highlights important disparities in the measurement of indicators, intensified by the presence of inadequate and obsolete data, which limits the formulation of effective policies and strategies.

Within this context, Mexico finds itself at a critical juncture in which it must address the contradictions between the paradigms of economic growth and the principles of sustainable development. Furthermore, the COVID-19 pandemic has further exposed the fragility of existing systems, highlighting the imperative for Mexico to recalibrate its approach toward a more balanced and equitable sustainable future.

Given this situation, urgent measures are required on multiple fronts. First, there is a pressing need to standardize sustainable development indicators across various entities, fostering consistency and facilitating meaningful comparisons to accurately measure the progress and effectiveness of implemented actions. At the same time, efforts must be intensified to improve data collection mechanisms, ensuring the availability of up-to-date and reliable information, which is crucial for informed decision-making.

Additionally, Mexico must reaffirm its commitment to the 2030 Agenda and the SDGs through the implementation of specific policies and programs aimed at promoting social equity, environmental management, and inclusive economic growth. This requires active participation and coordination of all relevant actors, including government institutions, civil society organizations, and the private sector.

By prioritizing sustainability in the formulation and implementation of public policies, Mexico can pave the way toward a future that is more resilient and prosperous for current and future generations.

This work aims to contribute significantly to the discourse on sustainable development in the Mexican context, shedding light on overlooked challenges and thus helping lay the necessary foundations to implement plans and actions to improve sustainable development in Mexico. Given the limited literature that exists on this specific topic in the Mexican context, this analysis serves as a valuable resource for policymakers, researchers, and relevant actors seeking to advance the sustainable development agenda in the country. By paying attention to the data presented in this study, Mexico can form a more informed and effective path toward achieving its SDGs.

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