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Review Article

Microindicators for measuring economic circularity in clients of Venezuelan consulting firms

Microindicadores para la medición de la circularidad económica en los clientes de las empresas consultoras venezolanas

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ABSTRACT

Introduction: The transition from a linear to a circular economic paradigm has created an imperative need to develop tools for evaluating the impact of implemented transformations. In this context, the present research was undertaken with the purpose of establishing a measurement framework comprised of circularity micro-indicators for use by Venezuelan consulting firms to assess their clients' progress in adopting a circular economy.
Methodology: The methodology was based on a post-positivist and documentary approach, which involved a systematic literature review in databases such as SCOPUS, WoS, and EBSCOhost (2015-2025), following the PRISMA protocol.
Results: The results identified 24 circularity micro-indicators grouped into eight key dimensions: dismantling, resource efficiency, life extension, end-of-life management, waste management, recycling, remanufacturing, and reuse.
Discussion: The importance of these indicators as inputs for strategic diagnosis and for promoting sustainability, innovation, and informed decision-making was discussed.
Conclusions: Micro-indicators stand out as a valuable resource for consulting firms to facilitate the effective transition of their client portfolio toward a circular economy model.

Keywords: sustainable development, economy, environmental economics, green economy.

JEL Classification: M21, Q56, L84.

RESUMEN

Introducción: La transición del paradigma económico lineal hacia uno circular ha suscitado una imperativa necesidad de desarrollar herramientas para la evaluación del impacto de las transformaciones implementadas. En este contexto, se ha planteado la presente investigación, cuyo propósito radica en establecer un marco de medición constituido por microindicadores de circularidad, para que sean aprovechados por las consultoras venezolanas en pro de evaluar el nivel de avance de sus clientes en la adopción de la economía circular.
Metodología: La metodología estuvo sustentada en el enfoque postpositivista y documental, que involucró la realización de una revisión sistemática de literatura en bases de datos como SCOPUS, WoS y EBSCOhost (2015-2025), siguiendo el protocolo PRISMA.
Resultados: Los resultados permitieron identificar 24 microindicadores de circularidad agrupados en ocho dimensiones clave: desmontaje, eficiencia de recursos, extensión de vida, gestión de fin de vida, gestión de residuos, reciclaje, remanufactura y reutilización.
Discusión: Se discutió sobre la importancia de estos indicadores como insumos de diagnóstico estratégico y de promoción de la sostenibilidad, la innovación y la toma de decisiones informadas.
Conclusiones: Los microindicadores se erigen como un recurso valioso para que las consultoras propicien la transición efectiva de su cartera de clientes hacia el esquema de la circularidad.

Palabras clave: desarrollo sostenible, economía, economía medioambiental, economía verde.

Clasificación JEL: M21, Q56, L84.

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INTRODUCTION

The need to conserve resources to achieve a more sustainable planet through proper waste management is driving a

transformation in production systems toward a circular economy (CE) approach. Both businesses and governments face the significant challenge of collaborating to modify how society produces, uses, and disposes of goods. This involves reducing the use of harmful substances and waste generation, with the aim of minimizing and, ideally, reducing environmental impact (Almeida Guzmán & Díaz Guevara, 2020).

It is worth highlighting that the CE presents a fundamental challenge: optimizing the life cycle of materials (Haro Sarango et al., 2024). While waste reduction is a priority, developing infrastructure and technologies that allow for the recovery and valorization of generated waste is equally vital (Baziene et al., 2024). This is how recycling, reuse, and remanufacturing acquire strategic importance in transforming waste into resources, in order to reduce pressure on the environment and create new economic opportunities (Gómez Víquez, 2023).

In accordance with the above, the transition to a circular economy is a multidimensional and complex process that requires robust measurement tools to evaluate the impact of implemented initiatives, in order to guide strategic decision-making (Barros et al., 2024; Papageorgiou et al., 2021). Within this framework, circularity indicators have been proposed as methods to quantify progress toward a circular economy, taking into account the opinions expressed by various scholars in the field, who agree on the simplicity and practicality of these tools (Bahramimianrood et al., 2024; Carrión Grancha, 2023; Escalona Rojas, 2024). However, the research reveals an underlying complexity, since many indicators lack simplicity, and their use in a practical context is often prone to subjective data interpretation, as noted by De Oliveira et al. (2021). Furthermore, they require extensive data collection that is not always readily available.

Generally speaking, an indicator is represented by a quantitative or qualitative variable that allows for the verification and measurement of the performance, progress, or current state of a specific phenomenon, making it an essential resource in evaluation and analysis, as it provides data that facilitates decision-making, planning, and the effective formulation of policies (Beltrán Jaramillo, 2000; Campos García, 2024). Thus, circularity indicators aim to evaluate different dimensions inherent in productive activities, while also ensuring regulatory compliance, identifying temporal patterns, assisting high-level decision-making processes, and informing the public about progress toward a circular economy (Martínez González, 2024). Therefore, it is imperative that these indicators be easily applicable in the organizational field, which highlights the importance of offering guidelines and accessible information to companies that require an agile assessment of their level of circularity (Castillo Díaz, 2024).

However, this measurement initiative faces a significant limitation, as highlighted in the consulted literature, namely the lack of metrics that measure circularity at the micro level (specific products and services, which is fundamental for companies, regardless of their nature, to have the necessary inputs to evaluate developers and consumers) (Gómez Velasco et al., 2020). It is worth noting that since 2016 there has been a marked increase in scientific publications exploring circularity indicators at the micro level, such as those formulated by De Pascale et al. (2021) and Kristensen and Mosgaard (2020). This reflects a much greater awareness of the need to evaluate and document progress toward a more circular economy, viewed in terms of organizations and their products.

Consequently, when addressing the implementation process of circularity micro-indicators, consulting firms play a leading role, thanks to their holistic view of organizations and their deep knowledge of management tools. This positions them as key players in supporting other organizations in their transition to the circular economy (Piña Zambrano & Campos García, 2024). Their role is linked to designing specific strategies, identifying opportunities for improvement, and facilitating the implementation of circular practices at all levels of the companies and institutions they advise. This, of course, also includes implementing indicators to measure the level of circularity present in their clients (Gómez Víquez, 2023).

When studying the adoption of the circular economy in Venezuela in depth, it can be said that, generally speaking, it has been a multifaceted process due to the country's socioeconomic, legal, and political environment. Although consulting firms have proven potential to lead and support this process, current realities reveal significant obstacles ranging from resource scarcity to a lack of appropriate infrastructure for recycling and waste management. At the same time, the national context, characterized by a legal vacuum that would support the implementation of circularity, represents another important factor that has limited the widespread reach of this objective (Peña Farías, 2024).

According to the Cámara Venezolana de Empresas Consultoras, for a large part of its clientele, issues related to circularity and sustainability remain disconnected from their mission and are reduced to very few objectives, "*these being fundamentally those linked to the environment, waste management, and volunteering*" (CAVECON, 2022, p. 28). This situation certainly reveals a widespread lack of knowledge regarding the circular economy in the

Venezuelan business sector, a fact that contributes to generating a fragmented perception of it, causing, at the same time, the complete underutilization of the benefits associated with this economic scheme (Osto, 2023).

It is worth noting that statistics are a key resource for accurately understanding the degree of applicability of circular practices in the country, and specifically among consulting sector clients. However, to date, these figures are not available to verify this progress, hindering the development of objective diagnoses and strategies grounded in the realities of the organizations involved.

This evident lack of information has led to numerous sectors of the economy, even the most prosperous, exhibiting a low level of commitment to long-term sustainability and circularity (Opferkuch et al., 2023). This situation has resulted in a fragmented and limited view of the circular economy, focused primarily on environmental issues related to waste management, which undermines other important aspects of this paradigm (Sánchez Ramírez & Franco Romero, 2024; Stucki et al., 2022). At the same time, organizations face limitations in accessing appropriate technology that also facilitates the incorporation of circular economy practices, a situation that further exacerbates the possibility of beginning the gradual adoption of these types of initiatives. In addition to all of the above, there is a lack of tax incentives and regulations regarding circularity, which diminishes the possibilities for consulting firms, as well as their clients, to have the necessary foundation to transition towards incorporating a circular economic model that not only contributes to achieving the goal of promoting sustainability, but also allows for obtaining additional advantages in terms of efficiency and profitability (Henzen & Weenk, 2022).

As a result of this complex circumstance, a significant number of clients in the consulting segment have not perceived the incorporation of the circular model as an interesting strategy to respond to the scarcity of resources and materials that has been observed in Venezuela in recent years, in order to turn this into an opportunity to boost economic reactivation in strategic productive sectors (Laverde Rodríguez et al., 2022).

In this sense, the development of specific micro-indicators to measure circularity among clients of Venezuelan consulting firms is presented as an innovative solution. This would not only facilitate the evaluation of companies' performance in terms of sustainability, but would also contribute to the creation of a benchmark that allows for comparing the progress of different organizations within the same sector, thus establishing a standard of circular practices in the Venezuelan context. In this way, consulting firms are called upon to redefine their actions and advisory models, aiming to guide each client's mission toward the full adoption of circular practices. Therefore, it is necessary to have measurement frameworks that facilitate the diagnosis of their clients' current situation and thus articulate strategies that guarantee an effective transformation from a linear to a circular model (Valbuena Otalvaro & Viña Uribe, 2024).

Based on the above, the fundamental purpose of this research emerges: to propose a measurement framework that allows Venezuelan consulting firms to accurately evaluate the circular performance of their clients, with the aim of adapting and applying it in other countries with emerging economies and similar socioeconomic contexts. This, in turn, will contribute to a transition towards more environmentally friendly production and consumption models. Therefore, the research question is: what set of micro-indicators should Venezuelan consulting firms consider when measuring the level of circularity among their clients?

To answer this question, this article uses a literature review as a way to examine, in broad terms, the meaning of micro-indicators as a resource that helps consulting firms based in Venezuela identify opportunities for improvement in their clients' production, service, and consumption processes; and to communicate their sustainability progress more effectively to their stakeholders. To contribute to the achievement of internationally established sustainable development goals; and to foster innovation through the development of new products and services that align with sustainability (Sánchez Rodríguez, 2022). All of the above aims to provide a more detailed view of circular performance at the product level, so the micro-indicators should enable Venezuelan consulting firms to suggest more informed and strategic decisions, helping their clients move towards adopting circular practices.

METHODOLOGY

This article is based on the post-positivist paradigm, while also employing a qualitative approach and documentary typology. Regarding the methodological design, it was based on a systematic literature review structured according to the principles outlined in the PRISMA statement, taking into account various information sources indexed in databases. The aim was to consolidate a body of knowledge that would elucidate the essential foundations of the circular economy, with particular emphasis on circularity micro-indicators, conceived as strategic tools to consider for integration into the operational practices of Venezuelan consulting firms.

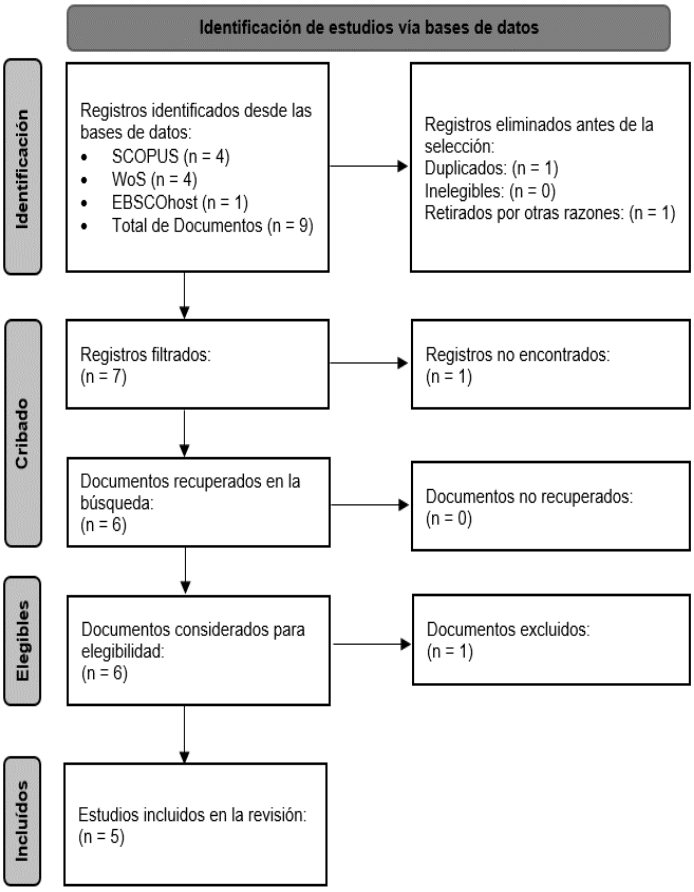
This review focused on identifying studies with empirical, conceptual, or methodological evidence that addressed the application of micro-indicators in business contexts, giving greater priority to those that developed models that could be replicated within the context of Venezuelan consulting firms for their respective adaptation to their clientele. To achieve the research objectives, the guidelines proposed by the PRISMA statement, referenced above, were followed, involving a total of four (4) stages: identification, screening, eligibility, and inclusion (Espinoza-Freire, 2025).

To ensure that the selected studies were relevant and applicable to the research context, the following inclusion criteria were established: scientific articles, books, and research on circular economy (CE) in the business sector in Latin America, published in Spanish and English between 2015 and 2025 in journals indexed in the WoS, Scopus, or EBSCOhost databases, and whose themes included micro-indicators and micro-level indicators on the applications of circularity in products and services. It is worth noting that the three databases chosen were associated with their broad multidisciplinary coverage, their well-known rigor in indexing scientific publications, and the access they provide to specialized academic literature in the social and business sciences.

The following exclusion criteria were used: publications that did not present practical and applied approaches to the circular economy, articles that did not focus on the business sector, articles that were not relevant to the consultancy context, articles that did not clearly specify the type of indicator used, and duplicate documents or those with incomplete content.

For the collection and location of articles, the following terms were defined as descriptors: “economía circular”, “circular economy”, “microindicadores”, “micro level indicators”, “indicadores” or “indicators,” specifying their location in the title, abstract, or keywords. The searches involved the combined use of Boolean operators (AND, OR) to obtain greater coverage and refine the results, ensuring that the sources obtained were related to the object of study.

Figure 1.
PRISMA protocol used for the applied systematic review process



Source: own elaboration.
Note: the figure appears in its original language.

Subsequently, a preliminary list of nine (9) references was obtained, which was later refined using the previously defined inclusion and exclusion criteria, in order to obtain those documents where micro metrics on economic circularity were proposed and that could be extrapolated for use by consulting firms, specifically in the Venezuelan context, which allowed the process to be closed with a total of (5) studies, as can be seen in Figure 1, which summarizes, in a schematic way, the systematic review process framed according to the PRISMA protocol guidelines.

The refinement of the compiled material was carried out through a critical reading of the texts in their entirety, applying an evaluation matrix that integrated various aspects of interest, such as thematic relevance, practical applicability, methodological quality, and clarity in the definition of the micro-indicators.

The synthesis technique employed consisted of thematic coding of the most relevant content, leading to a comparative analysis of the positions developed by the different authors to identify common patterns and significant differences regarding the conception and applicability of the indicators. For the analysis, categories were established to facilitate the grouping of the micro-indicators according to their operational purpose, thus facilitating their interpretation and subsequent implementation in the business environment.

RESULTS

Micro-indicators of circularity: their incorporation into the practice of Venezuelan consulting firms

As repeatedly mentioned throughout this article, the transition to a CE has become the fundamental framework for achieving sustainable development (Shaharudin et al., 2024), becoming, in turn, a priority objective for various organizations. This has increased the need to measure and evaluate the impact of sustainable practices implemented or yet to be implemented. It is here that consulting firms, in their role as strategic advisors, become key players in this process, assuming not only the task of identifying and proposing sustainable practices for their clients to implement, as Piña Zambrano and Campos García (2024) point out, but also defining metrics and evaluation tools aimed at measuring the environmental and social impact of these practices.

The literature reviewed shows the existence of various methodologies that include diverse indicators for measuring progress toward a CE (Pennella, 2021). In particular, the proposal formulated by Ghisellini et al. (2016) is quite interesting, as it establishes three (3) levels of measurement: macro (associated with states or cities), meso (linked to industrial parks or economic sectors), and micro (applicable to products and services). It is precisely at this last level that Venezuelan consulting firms should concentrate to accurately evaluate their clients' performance in terms of applying the principles of economic circularity.

It is important to mention that defining the indicators begins with thoroughly understanding the organizations' value chain, in order to know how they perform throughout all the links in the circularity process (Van Hoof et al., 2022). Based on this, the main dimensions that will allow for measurement are established, with the understanding that these facilitate the grouping of indicators by common characteristics to be evaluated (Farfán Matiz, 2024; Valbuena, 2023).

In light of the above, a total of eight (8) dimensions of interest related to circularity have been selected, which are shown in Table 1. These are proposed by the studies of Formentini and Ramanujan (2023), Kristensen and Mosgaard (2020), Potting et al. (2017), Hirsch and Schempp (2020), as well as by the European Environment Agency (2016), which provides a clearer perspective on the distribution of the indicators that must be proposed to cover all these categories.

It is from the aforementioned dimensions that the micro-level indicators are defined to measure the circularity actions undertaken by consulting firms' clients. Thus, Table 2 presents the 24 proposed micro-indicators so that Venezuelan consulting firms can assess the current status of their clients in terms of compliance with the principles of CE.

It is worth noting that the list of indicators presented is the product of a broad review of various published studies on metrics used to quantify the transition to CE (Elia et al., 2017; Feil et al., 2015; Kristensen & Mosgaard, 2020; Saidani et al., 2019). In the author's judgment, the most relevant indicators were selected, as well as those applicable to the largest number of productive sectors covered by Venezuelan consulting firms, according to information provided by CAVECON (2023). Similarly, as an example, the business processes in which the consulting firms could suggest its applicability are presented.

Table 1.
Dimensions associated with the measurement of circularity using micro-indicators

Dimensions	Scope	References
Dismantling	Disassemble parts or materials from products at the end of their useful life to facilitate subsequent processes such as remanufacturing or recycling.	Formentini & Ramanujan (2023); Kristensen & Mosgaard (2020)
Resource Efficiency	Optimize the use of natural resources and materials.	Kristensen & Mosgaard (2020)
Life Extension	Extend the useful life of products and components.	Kristensen & Mosgaard (2020)
End-of-Life Management	Manage products responsibly at the end of their useful life.	Kristensen & Mosgaard (2020)
Waste Management	Reduce waste accumulation and minimize losses associated with the dissipation of resources that still have value.	European Environment Agency (2016)
Recycling	Recover materials from waste to reprocess them and convert them into new products, materials, or substances, either for their original purpose or for other purposes.	Potting et al. (2017); Hirsch & Schempp (2020)
Remanufacturing	Use parts of the discarded product in a new product with the same function.	Potting et al. (2017); Hirsch & Schempp (2020)
Reuse	Reuse a product that is still in good condition and fulfills the same purpose for which it was originally designed.	Potting et al. (2017); Hirsch & Schempp (2020)

Note: Adapted from: Formentini and Ramanujan (2023), Kristensen and Mosgaard (2020), Potting et al. (2017), Hirsch and Schempp (2020) and European Environment Agency (2016).

Table 2.
Proposed circularity micro-indicators

Dimensions	**Name of the micro-indicator**	**Purpose of the micro-indicator**	**Formula or Calculation Method**	**Associated business process**
Dismantling	Average disassembly time	Evaluate the ease and speed of product disassembly	Sum of disassembly time for all products / Total number of products	Maintenance and Production
	Percentage of reusable components after disassembly	Measure the number of components that can be reused	(Number of reusable components / Total number of components) x 100	Logistics and Product Engineering
	Ease of disassembly for the end user	Evaluate how easily the end user can disassemble a product	Scale from 1 to 5, where 1 is very difficult and 5 is very easy	Sales (After-Sales Service)
Resource Efficiency	Water consumption per unit of product	Measure water consumption in the production process	Liters of water / Product unit	Production and Operations
	Energy consumption per unit of product	Measure energy consumption in the production process	kWh / Product unit	Production and Operations
	Renewable energy consumption	Measure the use of renewable energy in the production process	Percentage of energy consumed from renewable sources	Operations and Environmental Management
Life Extension	Average product lifespan	Measure the lifespan of products	Sum of useful life of all products / Total number of products	Engineering and Sales
	Product repair rate	Evaluate the frequency with which products are repaired	(Number of products repaired / Total number of products) x 100	Maintenance and Sales (After-Sales Service)
	Product repairability index	Evaluate the ease of product repair	Scale from 1 to 5, where 1 is very difficult and 5 is very easy	Engineering and Sales (After-Sales Service)
End-of-Life Management	Waste recovery rate	Measure the percentage of waste that is recovered (recycled, reused, etc.)	(Amount of waste recovered / Total amount of waste) x 100	Logistics and Environmental Management
	End-of-life management cost	Evaluate the cost associated with end-of-life management of products	Total end-of-life management cost / Total number of products	Logistics and Accounting/ Finance

	Extended Producer Responsibility (EPR)	Evaluate compliance with Extended Producer Responsibility (EPR) legislation	Percentage of products managed under the Extended Producer Responsibility (EPR) scheme	Legal and Environmental Management
Waste Management	Waste generation rate per unit of product	Measure the amount of waste generated in the production process	Amount of waste generated / Number of products produced	Production and Environmental Management
	Waste management cost	Evaluate the cost associated with waste management	Total waste management cost / Total amount of waste	Logistics and Accounting/ Finance
	Hazardous waste generation per unit of product	Measure the generation of hazardous waste in the production process	Amount of hazardous waste / Number of products produced	Production and Industrial Safety
Recycling	Material recycling rate	Measure the percentage of recycled materials in production	(Amount (Number of recycled materials / Total amount of materials) x 100	Production and Environmental Management
	Percentage of recycled waste used in new products	Measure the degree to which recycled materials are reintroduced into the value chain	(Number of recycled waste used in new products / Total amount of recycled waste) x 100	Engineering and Production
	Cost per ton of recycled material	Evaluate the economic efficiency of the process of recycling	Total recycling cost / Total amount of recycled material	Logistics and Accounting/ Finance
Remanufacturing	Product remanufacturing rate	Measure the percentage of remanufactured products	(Number of remanufactured products / Total number of products) x 100	Engineering and Production
	Remanufacturing cost per unit of product	Evaluate the economic efficiency of the remanufacturing process	Remanufacturing cost / Number of remanufactured products	Production and Accounting/Finance
	Number of life cycles of a remanufactured product	Measure the number of times a product can be remanufactured	Number of life cycles	Engineering
Reuse	Product reuse rate	Medir la frecuencia con la que se reutilizan los productos	(Number of reused products / Total number of products) x 100	Sales and Logistics
	Average lifespan of reused products	Medir la duración de uso de los productos reutilizados	Sum of the lifespan of all reused products / Total number of reused products	Sales and Production
	Platforms of reuse implemented	Medir el uso de plataformas digitales para facilitar la reutilización de productos	Number of platforms implemented	Information Technology and Sales

Note: Adapted from Kristensen and Mosgaard (2020); Elia et al. (2017); Saidani et al. (2019) and Feil et al. (2015).

The proposed measurement framework has been structured to be sufficiently simple and expedient for both consulting firms and their clients, with the aim of empowering these clients to implement a more effective circularity transition or assessment process.

It is also worth highlighting that this set of indicators was developed considering the qualities they should possess according to the World Business Council for Sustainable Development (WBCSD, 2023), which states that they must be: simple (for easy application in the context of the circular economy); uniform (i.e., applicable across different types of organizations); comprehensive and flexible (so that they can be used or adapted by companies according to their nature and needs); complementary (to promote the incorporation of other business metrics that help to better understand the circularity landscape internally) and neutral (which implies that no type of material or dimension is prioritized over others, as all are relevant to the context of circularity).

DISCUSSION

Upon examining the 24 proposed circularity micro-indicators, it can be said that this measurement framework should allow Venezuelan consulting firms to obtain a comprehensive overview of the level of circularity their clients have achieved. The results have highlighted that dividing the framework into eight dimensions (assembly, resource efficiency, life extension, end-of-life management, waste management, recycling, remanufacturing, and reuse) facilitates the disaggregation of various strategic elements of the circular economy for their proper application within companies dedicated to the production of goods and services. This not only simplifies the identification of opportunities for improvement but also provides greater guidance for implementing better-structured decision-making processes (Aguilera & Sapere, 2024)

The implementation of these micro-indicators takes on significant importance for evaluating circular performance (Gursel et al., 2023), as it allows for the measurement of operational aspects (such as average disassembly time or waste generation rate per unit of product), as well as more strategic elements (such as the reparability index or the average useful life of reused products). This provides an initial framework for Venezuelan consulting firms to assess their clients' level of compliance with aspects inherent to the circular model, considering that many of them have not yet integrated these practices into their daily activities (Piña Zambrano & Campos García, 2024). It is important to note that this measurement framework is not rigid; on the contrary, it is entirely adaptable or tailored to the specific needs of the companies where it will be applied.

Studies such as those by Li et al. (2025) and Mejía-Moncayo et al. Halter et al. (2025), Costa et al. (2025), and Costa et al. (2025) suggest the relevance of the proposed set of metrics, which can not only be perceived as diagnostic tools but also as inputs to drive change by revealing critical points that require strategic interventions, as well as the incorporation of best practices that enhance the transition towards circular models.

In this sense, this represents a significant contribution for consulting firms, and particularly for those based in Venezuela, given that specific publications on circularity micro-indicators focused on organizations of this nature are practically nonexistent. This situation is even more pronounced in Venezuela, where not only is there a significant lack of literature on these types of metrics, but also, in general, very limited scientific dissemination regarding circularity, highlighting local models or experiences that could promote the adoption of this economic model (Llanos Encalada et al., 2023).

However, the implementation of this model faces a series of operational limitations in the Venezuelan context, primarily due to the scarcity of concrete data available to consulting firms to understand the performance of circularity in the business sector they serve, as well as the absence of public policies that promote the adoption of these metrics. Consequently, the consulting sector is called upon to assume a decisive role in training its clients on topics related to the circular economy, in order to pave the way for the implementation of circular metrics.

Given that it has been mentioned that these indicators should and can be adapted to the context of each organization, it could be said, then, that they can be replicated or transferred to other countries that share similar structural characteristics to those of Venezuela. This opens up possibilities for conducting comparative analyses and even promoting the design of regional strategic frameworks that drive circularity on a larger scale, especially in countries with emerging economies.

CONCLUSIONS

Although the CE remains a concept under construction and definition, it is vital that organizations, especially in Venezuela, have effective measurement tools to evaluate their transition to this new economic model. In this regard, micro-indicators are presented as a key tool for measuring progress toward circularity, focusing on specific processes, products, and services within organizations. Consulting firms in Venezuela have a significant opportunity to position themselves as leaders in circularity measurement and in providing a comprehensive measurement framework to evaluate performance in relation to CE principles.

Implementing these micro-indicators in the Venezuelan context presents a clear challenge, given the diversity of productive sectors advised by consulting firms. That said, this research successfully developed a set of micro-indicators that can be generally applied to a wide range of companies and institutions, regardless of sector or size. However, it is essential that, during implementation, consulting firms actively participate in adapting these metrics to the specific characteristics of each organizational and sectoral context.

Likewise, the process of continuous measurement and monitoring of circularity becomes one of the most critical activities to ensure the model's success. Circularity is a dynamic process that requires periodic adjustments, and this is where consulting firms must establish mechanisms for ongoing evaluation that allow organizations to regularly assess their progress toward circularity, make adjustments, and optimize their strategies based on the results obtained.

It is important to note that, although the literature review facilitated the acquisition of an interesting set of micro-indicators, the research faced two (2) significant methodological limitations: first, the scarcity of scientific literature produced in Venezuela on the circular economy, especially when these references are situated within the field of consulting; and second, the lack of statistical data from consulting firms to empirically validate the results of the proposed metrics. Finally, the documentary approach prevented a direct comparison of the micro-indicators with practical field experiences, suggesting the need for complementary studies using mixed methodologies or case studies.

Finally, the issues addressed open the door to countless additional lines of analysis, especially related to the application of the circular economy in the various sectors of the Venezuelan economy. Future research could focus on identifying best practices for the implementation of micro-indicators by consulting firms, as well as on evaluating the economic, environmental, and social impact of these initiatives within organizations. This will allow for a deeper understanding not only of the effectiveness of the proposed tools but also of the real impact that circular practices can have on sustainability at both the local and global levels.

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