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SUSTAINABILITY AND CIRCULAR ECONOMY: A PROPOSAL FOR INTEGRATION OF CIRCULARITY REQUIREMENTS IN A SUSTAINABILITY REPORT

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ABSTRACT

Sustainable development is an integral part of the strategy of companies seeking to maintain or conquer markets. Companies prepare sustainability reports using requirements recognized by the market. Another established trend is the concept of Circular Economy (CE). In spite of the fact that circularity and sustainability have been addressed independently as two isolated areas, recent researches pointed out an opportunity to seize synergies from their intersection. This article presents a proposal for integrating CE items into a sustainability report model. A sustainability report model was selected in the literature and the CE items not covered in this report were identified and, through a survey research, the relevance of these items was validated. The contribution of this article is in the identification of the eighteen items of CE not covered in the GRI sustainability report model, in the validation of the relevance and structuring of these items according to the GRI standards and their subsequent insertion in the model. In this way, the unprecedented nature of the research is evident, since there is no report model on the market that deals simultaneously with sustainability and the CE, generating new knowledge about the intersection of these two research areas.

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INTRODUCTION

Current consumption and growth patterns are taking society on a highly unsustainable path. It is common for a capitalist market economy to focus on financial value; however, attention should be paid to resource management, which, when incorrect, can cause serious damage to the environment (George, Lin and Chen 2015). The practice of sustainable actions has become an integral part of the strategy of any company that seeks continuity or the conquest of new markets. In its sustainable practices there must be interdependence between the environment, social responsibility and economic growth, so that, in addition to meeting what the TBL (Triple Bottom Line) proposes, it increases its competitiveness in the face of competition. However, sustainability practices in their three dimensions are insufficient to solve contemporary environmental, economic and social problems (Rogers, Jalal and Boyd 2012; Emf 2012). It is known that Sustainability is already in place and has gained evidence, both in the academic and corporate spheres, and in recent decades, it has been adopted by organizations worldwide as a strong competitive strategy, playing an important role in contemporary organization (Amui et al. 2017). Emf (2012) highlights the relevance of new discussions on the challenge of including innovative actions that lead to sustainable development, minimizing the impacts caused by the results caused by the linear economy. In this sense, the CE emerges as a model aimed at environmental protection, pollution prevention and sustainable development (Li 2012). Its importance is also due to the fact that it generates competitive advantage for organizations that adopt their practices (Lacy and Rutqvist 2016). CE concept is very extensive, abstract and little known by society (Markkanen 2016). On the other hand, CE is considered a key strategy to improve product performance (Mesa, Esparragoza and Maury 2018). Companies present their circular practices based on circularity indicators. They are important because they allow companies to evaluate the performance of a product or themselves in the context of CE, allowing them to estimate how far they have advanced in the transition from the linear to the circular model (Emf 2015). The lack of circularity indicators can hinder business development in CE practices (Easac 2017). Determining the current state of the

company's circularity is imperative in order to achieve a benchmark for monitoring.

In their study oriented to business model innovation, Pieroni, McAllone and Pigosso (2019) argues that in spite of the fact that circularity and sustainability have been addressed independently as two isolated areas, there is an opportunity to seize synergies from their intersection. A similar argument towards merging sustainability and CE is presented by Schroeder, Anggraeni and Weber (2019) that pointed out that CE practices can contribute to achieving a noteworthy number of sustain ability development goals. The CE literature at the level of organizations can be considered both from the theoretical angle and from the practice of environmental management. These authors also consider that this literature can be used to define approaches for future research in the interrelationship between the areas of CE, clean production and sustainability (Aranda-Usón et al. 2020). Many companies present their sustainable practices based on the elaboration of sustainability reports (Geerts and Dooms 2020; Yáñez et al. 2019; Lozano 2020). These reports are considered a tool to evaluate the state of an organization regarding its actions related to the economic, environmental and social dimensions, as well how to communicate their progress to stakeholders (Yáñez et al. 2019). Still, several resources and tools are available for companies to measure their level of sustainability, and in most cases it is based on indicators (Wicher, Zapletal and Lenort 2019). The sustainability reporting has been marked by an increase in importance in the last years, as it has demonstrated to be an important management instrument in the understanding of where an organization is on the path to sustainability (Geerts and Dooms 2020).

This study identified recent efforts for sustainability that also address CE: Lozano (2020) proposed the combined use of tools, initiatives and approaches including CE (called TIAs in this article as it was termed in Lozano´s study) to involve and promote sustainability; Büyüközkan and Karabulut (2018) identified conceptual structures, including Global Reporting Initiative (GRI) and CE. Other studies was dedicated to sustainability reporting: Lesic et al. (2020) propose recommendations for monitoring sustainability projects; Wicher, Zapletal and Lenort (2019) developed a methodology for assessing sustainability development; Yáñez et al. (2019) studied the application of standardized business tools for sustainability reporting; Domingues et al. (2017) studied the contribution of the sustainability report to organizations and management of organizational change to the sustainability of the public sector. GRI was selected to be complemented with the CE requirements due to its advantages, encompassing a large amount of information and quality (Siew 2015) in line with a study by Büyüközkan and Karabulut (2018) who argue that a flexible structure for reporting sustainability, since it can be adapted to specific needs (Büyüközkan and Karabulut, 2018). For all these reasons, the GRI model was selected to be complemented with the CE requirements. In turn, CE is based on closing loops through different types and levels of restoration, and usually CE activities are focused on one of three levels: micro level (aimed at improving the performance of an individual company); medium level (eco-industrial network) and macro level (regions, cities, municipalities) (Yuan and Moriguichi 2006).

Through comparative analysis of the qualitative nominal type, this study identified that the model of report GRI does not contemplate all the questions proposed by the CE. The motivation for this study is in line with two of Lozano's (2020) arguments: the need to combine tools, initiatives and approaches (TIA´s) to better meet the dimensions of business and sustainability; and, only one TIA can result in a low contribution, while many can result in waste. The objective of the study is to identify the CE requirements not yet covered in a recognized sustainability report model and integrate them into the model, in a way that presents voluntary guidelines for their elaboration. The article presents a proposal for integrating CE issues into a sustainability report model already used by companies. The topic covered in the article is relevant for professionals and academics, since the circularity report is still an open research field in the CE literature. This paper is structured in six sections. The first section deals with the brief contextualization of the theme, including the problem and research objective. Section 2 presents the literature review, containing the relevant concepts and theories. The research method is presented in section 3. Section 4 describes the results obtained by the study while Section 5 discusses the results comparing with other similar studies. This paper concludes with the final considerations, including future research proposals.

LITERATURE REVIEW

Sustainability and Global Reporting Initiative (GRI): Sustainability is currently considered one of the main strategies for increasing value for industrial companies (Wicher, Zapletal and Lenort 2019). Moreover, sustainability is a topic that has been widely discussed in recent decades and seen as an important alternative to the neoliberal economy (Schrippe and Ribeiro 2019). In the business world, the image of the organization has become a factor of interest to stakeholders. In the last two decades, there have been a growing number of companies concerned with demonstrating their efforts to consider sustainability issues in their operations. This is due to the need to comply with specific legislations, as well as to promote the dissemination of efforts towards sustainable actions. One of the most critical points in sustainability reports is the need to express social and environmental indicators that enable organizations to assess and measure the impacts of their actions on these dimensions. It is important that these indicators are also integrated with their economic results, enabling a holistic approach to sustainability issues (Lodhia and Martin 2014). GRI model was selected to be complemented with the CE requirements due to its advantages, encompassing a large amount of information and quality (Siew 2015) in line with a study by Büyüközkan and Karabulut (2018) who argue that the GRI is an example widely used in sustainability by companies in preparing their reports.

The GRI was created with the mission of "making sustainability reporting as common as financial reporting" (...). Its framework "was created to provide a common language that could be applied by all types of organizations and was prepared by reference to many international agreements and standards" (GRI 2015, 17). In addition, the GRI is able to add greater value not only to the company, but also to its stakeholders, allowing comparability and increased consistency of information provided (Woods 2003). In addition, the GRI establishes sustainability reporting guidelines, principles and indicators that companies can use to measure and communicate their economic, environmental and social performance. Its mission is to make the practice of sustainability reporting standard, while providing guidance and support to organizations (Oliveira et al. 2014). The GRI model guidelines have a specific life cycle that is renewed based on the purposes and interests that form around the participants (Brown, Jong and Levy 2009). Since its inception, GRI has developed four versions of guidelines to contribute to sustainability reporting: G1 (2000), G2 (2002), G3 (2006) and G4 (2013). In 2016, GRI launched the first global standards for sustainability reporting, called the GRI Standard, which are in transition (GRI 2018).

Circular Economy: Since its conception in the 1930s, by Leontief (1928), CE has been used being based on closing loops through different types and levels of restoration, and CE activities are usually focused on one of the three levels: micro level (aimed at improving the performance of an individual company); medium level (eco-industrial network) and macro level (regions, cities, municipalities) (Yuan and Moriguichi 2006). The CE, in its concept, has origins that cannot be traced to a single date or author (Emf 2013). Its roots can be found in the areas of General Systems Theory and Industrial Ecology (Ghisellini, Cialani and Ulgiati 2016). CE emerged as a response to serious environmental problems (Su, Heshmati and Geng 2013). With the development of the economy, man began to face many problems such as resource reduction, energy shortages, ecological destruction, environmental pollution, global warming and the extinction of many species. With this, the linear development system began to be rethought, seeking to establish a new economic development system that preserves, among others, nature (Shen and

Qi 2012). Results such as desert expansion, population increase, and depletion of biodiversity also contributed to the rethinking of the current economic system (Korhonen et al. 2018). The CE has recently emerged, proposing viable innovations linked to sustainability issues for companies (Michelini et al. 2017). In the literature, several definitions for CE are found (Leipold and Petit 2018). A classic definition for the term is: to be a restorative and regenerative industrial system by nature (Emf 2015). This economy model has often been portrayed as a combination of reducing, reusing and recycling, often failing to emphasize the need for systemic change throughout the linear process (Kirchherr, Reike and Hekkert 2017). In search of new alternatives that promote the preservation of the planet, Ellen Patricia MacArthur created in 2010, in England, the Ellen MacArthur Foundation, which studies and encourages the effective implementation of the CE (Emf 2015).

Several works have been published on CE. While McDowall et al. explored differences in the focus of CE policy in China and Europe (McDowall et al. 2017), Dodick and Kauffman (2020) compared CE focus regarding American and European CE policies. CE emerges as a new paradigm, which has been gaining momentum and promising to overcome the existing contradiction between economy and environment. It also reinforces the idea that resources should never be turned into waste but kept in the process for as long as possible and with minimal loss of quality (Pomponi and Moncaster 2017). It also reinforces the idea that resources should never be turned into waste, but kept in the process for as long as possible and with minimal loss of quality. CE is gaining great popularity in the world increasingly, with the promise of creating more sustainable projects (Petit-Boix and Leipold 2018). Elia, Gnomi and Tornese (2017) presented a systematic approach to guide the choice of a possible methodology for CE assessment (Elia, Gnomi and Tornese 2017).Petit-Boix and Leipold (2018) mentioned that CE is becoming increasingly popular in the world with the promise of creating more sustainable projects. Heyes et al. (2018) studied the development and implementation of CE business models in service-oriented technology companies. Pieroni, McAllone and Pigosso (2019) reviewed business model innovation approaches for CE and/or sustainability. Sassanelli et al. (2019) developed a framework for measuring and assessing the circularity degree of a company. Schroeder, Anggraeni and Weber (2019) identified the extent to which CE practices are relevant for the Sustainable Development Goals implementation.

A wide range of circularity indicators has been developed in recent years and, for this variety, it is important to know or represent a use that meets the needs of the company (Saidani et al. 2017). They identified 55 indicators of circularity in the market, and draws attention to the inconsistency of some in relation to its scope, purpose and possible application. The development of the CE generates competitive advantage for organizations that adopt its principles, being a central element of their growth strategies (Lacy and Rutqvist 2016). However, most companies do not have an adequate structure to receive the opportunities that the CE offers. Its operations strategies are rooted in a linear approach, which makes it difficult to implement a new model. The principles of circular economics were designed to assist in understanding the concept (Ripanti, Tjahjono and Fan 2016) and their implementation is recommended as a convenient solution to meeting sustainable development goals (Saidani et al. 2017). CE emerges from three main actions, the so-called 3R principles: reduction, reuse and recycling. The principle of reduction seeks to minimize the input of energy, raw materials and waste by improving production efficiency and consumption processes. Reuse refers to the reuse of non-waste products or components, making it very attractive (especially for environmental benefits) where it requires less energy and less labour when compared to manufacturing new products. The principle of recycling refers to the reprocessing of waste products, materials or substances for the same source product or for other purposes. One of the striking features of recycling is the reduction of waste (Ghisellini, Cialani and Ulgiati 2016; Huamao and Fengqi, 2007; Yuan and Moriguichi 2006). According to Emf (2015), the CE is based on three natural principles:

- Preserve and enhance human capital by controlling finite inventories and balancing renewable resource flows. This process begins with the so-called dematerialization of products and services, seeking, whenever possible, virtual delivery. If resources are required, selection will be made by the circular system, always involving technologies and processes that use renewable resources or provide better performance. In this principle, it is considered that a CE also enhances natural capital, seeking to stimulate nutrient flows within the system, as a way to create conditions for the regeneration of various natural resources, such as soil;
- Optimize resource performance by constantly circulating products, components and materials at the highest level of utility, both in the technical and biological cycle. In view of the proposal, product design should be prioritized for remanufacturing, refurbishment and recycling, so that the technical materials used circulate as much as possible to contribute to the development of the economy. Circular circuits are considered to use the smallest internal circuits, avoiding energy consumption and preserving other types of values instilled in components and materials in order to extend the life of products and intensify their reuse. Thus, as in the linear system, there is a constant search for the circular system that offers productivity gains in all processes, but its effectiveness requires continuous improvement, because, in a circular system, there is no compromise of effectiveness as occurs in the linear system;
- Stimulate system effectiveness by revealing and excluding negative externalities from the beginning of the production process. Effective use of resources tends to reduce damage by misuse, preventing poor management of the process from interfering with the development of the CE. Circular economics can be a driving force for sustainability by promoting and supporting the creation of new and innovative business models that incorporate such principles of economics into their practices (Manninen et al. 2018).
- Besides the principles, according to Emf (2013), the CE has the following objectives: to stimulate smart, sustainable and integrative economic growth; eliminate the use of chemicals; restore the richness of nature by reusing and recycling resources, avoiding the extraction of virgin materials; improve product quality; reduce raw material costs to exploit resources at their maximum capacity; and maintain products, components and materials at the highest level of utility and value at all times, distinguishing between technical and biological cycles.

Linked to circular objectives, CE also develops its practices based on its own characteristics Emf (2015), combining different action strategies:

- Losses are excluded from the outset: no waste in the circular system as a result of non-toxic biological materials being returned to the ground and technical materials being recovered, renewed and updated, always seeking to maximize retention of their economic value and resources;
- Diversity is strength: Strengthening the circular system comes from valuing diversity. The same is true of the various types of business that, in the face of different situations, seek alternative models for survival;
- Renewable energy sources drive the economy: Considering circular principles, it is necessary that the CE be driven by constantly renewing energies, reducing resource dependency and increasing system's resilience;
- Systemic thinking: This feature is fundamental to the development of the CE. Given the different scenarios, people, companies or plants make up complex systems that interrelate, and such relationship is strongly taken into account in the circularity of processes;
- Prices or other feedback mechanisms must reflect actual costs: To be effective, prices must reflect all costs in the CE. The total costs arising from negative externalities must be revealed and

the factors considered perverse subsidies removed. If there is no transparency of externalities, this could act as a barrier in the transition to the CE.

In addition to these characteristics, Emf (2012, 2013, 2015, 2017) mentions others that appear along the CE practices: the power of cascading, aiming at diversifying the reuse of products throughout the value chain; waste-free design to create products that are designed for remanufacturing, refurbishing and recycling; generation of competitive advantage for organizations, providing new business possibilities; generation of new jobs as a result of increased consumption caused by lower prices; constant concern with environmental and social problems in order to guarantee a better quality of life for society; practices involving, simultaneously, the three dimensions of sustainability; and substitution of the concept of consumer to user, in order to rethink the form of ownership of goods.
The results of this literature review reinforce the arguments of Pieroni, McAllone and Pigosso (2019) and Schroeder, Anggraeni and Weber (2019), according to which there is an opportunity to take advantage of synergies at the intersection between circularity and sustainability. Geissdoerfer et al. (2017) studied the main similarities and conceptual differences between Sustainability and CE, in this study the CE literature was reviewed with the purpose of exploring its intersection with sustainability, especially in relation to the process of issuing sustainability reports as presented in the Table 1.

METHODS

To conduct this research, a review of the literature on sustainability, GRI and CE was carried out, including the identification of CE issues. The questions were broken down according to the dimensions of sustainability. A questionnaire to collect data on the relevance of inserting each item of CE in the report model was previously improved through small group discussion and survey. After improvement, the questionnaires were sent to 60 companies and, based on the result; the selected sustainability report model was complemented with CE requirements. Finally, a pilot test was carried out in order to obtain contributions. Figure 1 presents the methodological approach of this study divided into 5 phases. Phase 1 of the research dealt with the literature review on sustainability, GRI and CE. To this end, a search was made by keywords, involving the terms “circular economy”, “sustainability” and “circular economy” along with the terms “sustainability”, “sustainable development”, “sustainability report”, “sustainability indicators”, “circular economy indicators”, “circularity indicators” and “GRI”. The research bases consulted were Scopus and ISI Web of Science. To answer the research problem, the objective of this paper was to identify CE not yet included in a recognized sustainability report model and integrate them into the model, so that it presents voluntary guidelines for its elaboration. The objective of the study is to identify the CE requirements not yet covered in a recognized sustainability report model and integrate them into the model, in a way that presents voluntary guidelines for their elaboration. In addition, the intersection of CE with sustainability is explored, focusing on the process of issuing sustainability reports (Table 1).

Phase 2 dealt with the selection of a sustainability report template recognized and used by companies that can be complemented with CE requirements. The sustainability report model chosen for complementation was the GRI, as it is, according to Siew (2015), a model superior to the others due to the large amount of information concentrated in a single model and for providing companies that use it with a higher score due to the quality of your reports. In phase 3, three principles, six objectives and nineteen characteristics of CE were identified (Emf 2015), to talling twenty-eight items. To identify the CE requirements not covered by the GRI sustainability report model, a comparative analysis of the nominal qualitative type was performed. This type of analysis was chosen because it does not consider an ordering between categories and because it considers data distributed in a number of mutually exclusive categories (Mann 2015).

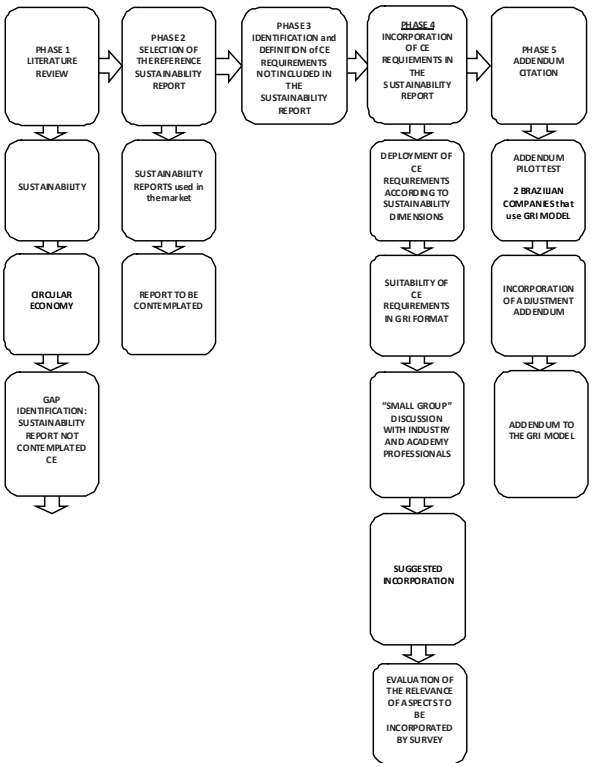

Figure 1. Methodological approach

With the twenty-eight items defined, they were compared with the items presented by the GRI model, in order to analyse / interpret which principles, objectives and characteristics of the CE were contemplated by the model. Even at this stage, these principles, objectives and characteristics of the CE were transformed into requirements. The transformation into CE items was carried out by identifying similarities followed by grouping those items that were similar, which resulted in thirteen items. With the CE requirements defined, phase 4 consisted of unfolding them in the three dimensions of sustainability (economic, environmental and social), following the structure of the GRI model. For this, each item was analysed with the purpose of identifying which dimension could be classified. Such analysis was made with the interpretation of its characteristics and, based on this classification; each item was allocated to the specific dimension. Thus, the thirteen items went to eighteen to be included in the GRI sustainability report model. For data collection, a questionnaire was prepared based on the principles, objectives and characteristics of the CE to be integrated into the GRI sustainability report model. The group was composed of ten professionals, three from the industrial sustainability area; five academics; the official GRI representative in Brazil; and the precursor to a Brazilian foundation responsible for the proliferation of CE in Brazil, all of which have been active in the area of sustainability for over ten years. On the academy side, a doctor of environmental sciences participated; a doctor in electrical engineering with expertise in the environmental and logistics areas and three more doctors in production engineering; from the industry, two sustainability managers from two different companies and a regional manager from a company that works in strategic sustainability planning and provides sustainability reporting services.

This group did not report any significant difficulties in answering the questionnaire and considered the questionnaire adequate in terms of validity and content. Few sentences were adjusted from the original questionnaire, with changes made in order to improve the clarity of the content. A survey was applied using non-probabilistic sampling by judgment, which allows choosing the participants who best represent the population (Barbetta 2008). Thus, the relevance of the insertion of each CE requirement in the GRI report model was measured using a five-point Likert scale: 1 - Not important; 2 - Low importance; 3 - Indifferent; 4 - important; 5 very important. After

obtaining the contact details, the questionnaires were sent to 60 industrial companies that published sustainability reports based on the GRI model in the last three years. These companies were selected based on the suggestions of the Director of GRI Brazil, who, according to him, were the ones that were most open to participating in the research. 32 responses were received with completed questionnaires. There was no need to eliminate any responses. Therefore, a total final sample of 32 questionnaires was obtained. Phase 5 dealt with the structuring of an addendum as a proposal to be incorporated into the sustainability report model, as well as the pilot test to verify its applicability and the incorporation of the adjustments resulting from this test. The pilot test was applied to two companies that prepare sustainability reports using the GRI model, chosen by sampling for convenience, based on the criteria of accessibility and availability of the participants (Hair et al. 2009). The contact with these companies for the application of the pre-test was made by email and / or telephone, in order to schedule a visit when possible and thus be able to send the proposal along with the search tool. In both companies, the service was provided with the unit's Sustainability Manager. With the incorporation of the adjustments proposed by the participants, the next step was to finalize the form that will guide companies in reporting their actions with a focus on CE.

RESULTS

Phase 1 – Literature Review

The result of the review of the CE literature carried out in order to explore its intersection with sustainability, especially in relation to the process of issuing sustainability reports, is highlighted (Table 1).

Phase 2 – Selection of the reference sustainability report.

The GRI model was chosen to be the reference sustainability report for the reasons described in sections 1 and 2 of this article.

Phase 3 – Identification and definition of CE items not covered in the Sustainability Report

Following what the comparative analysis of the nominal qualitative type proposes, the twenty-eight defined items were compared with the items presented by the GRI model, in order to analyse / interpret which principles, objectives and characteristics of CE were contemplated by the model. The results are shown in Table 2. Thus, it was found that twenty items were not covered by the GRI report model. These twenty items were transformed into CE items from the grouping of those that had similarities, resulting in thirteen items (Table 3). For the purposes of this study the set of 28 items formed by principles, objectives and characteristics is indicated as POC. The transformation into CE items was performed by identifying similarities followed by grouping those items that were similar. The name for each item was chosen, checking, among the items, which terms were presented similarly. For example: one of the strong points presented by the CE is the eradication of waste, identified within its characteristics. Because it represents the grouping of two or more characteristics, the term "waste eradication" was adopted as one of the definitions of the CE requirements. Thus, the same procedure was performed until the definition of thirteen items.

Phase 4 – Incorporation of CE requirements in the sustainability report

With the thirteen requirements defined, the next step was to unfold them into the three dimensions of sustainability. At this moment, it was identified the possibility of four requirements to be classified in more than one dimension. The breakdown of these requirements is shown below:

Waste eradication

- **Economic Dimension:** according to Emf (2015), the absence of waste and the elimination of waste generate new financial results, including non-operational ones;
- **Environmental Dimension:** eradicating waste means preserving the environment. For Ghisellini, Cialani and Ulgiati(2016) waste, besides causing financial losses, threatens the integrity of natural ecosystems. Emf (2015) also mentions that instead of eliminating a used product, its reuse and / or recycling, besides generating new results for the company, generates benefits for the environment by the simple fact that it is not dumped in nature;
- **Social Dimension:** for Emf (2017), putting waste eradication into practice tends to generate greater results for companies, including increasing their production. This will create new jobs that will benefit the local community in particular.

Substitution of consumption by use:

Economic Dimension: The fact that the manufacturer retains ownership of the product can become a source of incentives to improve its availability and performance, and may reduce, among others, operating costs (Selviaridis and Norrman, 2014). In this line of thinking, Emf (2015) cites washing machines as an example: if they were rented, the consumer would save about 30% per wash cycle and manufacturers would profit around 30% more from this operation;
Environmental Dimension: for Ghisellini, Cialani and Ulgiati(2016) and MacArthur et al. (2016), the CE proposes the rethinking of property, following a model where products will be rented to consumers who, in turn, will become users of a service. Switching from consumer to user tends to generate environmental benefits because the manufacturing companies are primarily responsible for the correct maintenance for prolongation of use and subsequent proper disposal after the end of the life cycle, avoiding, among others, the incorrect disposal of waste. Products and processes are redesigned to maximize resource value and utilization:
Economic Dimension: Michelini et al. (2017) and Emf (2015, 2017) mention that every product should be carefully thought out in the construction of the project, with skills that allow its reuse, recycling and reuse. Thus, resource saving tends to generate better and greater results for the company;
Environmental Dimension: according to Leitão (2015) sustainable design practices focus mainly on minimizing damage to the environment and human health, using resources more efficiently. Thus, products and processes must be developed in order to expand their potential, contributing to the creation of sustainable systems that preserve nature and cause no, or minimal impact on the environment.
Energy utilization from renewable sources, reducing dependence on new resources and elimination of the use of toxic chemicals
Economic Dimension: one of the ways to develop the CE is by using renewable energy sources, such as solar and wind energy, for example (MacArthur et al., 2016). According to research by Greenpeace (2016), the use of energy from renewable sources will provide huge financial savings for companies;
Environmental Dimension: for Emf (2017), the use of renewable resources tends to contribute in large scale to environmental preservation. The use of renewable sources tends to increase process resilience, helping to eliminate the use of unnecessary resources.

With the unfolding in the three dimensions, the thirteen requirements increased to eighteen to be included in the GRI sustainability report template. Table 4 shows the requirements of the CE as it unfolds into the three dimensions of sustainability. The discussion was carried out in a small group in order to critically analyse the questions to obtain contributions to increase their clarity. Then, a survey was conducted with companies opting for the GRI model to assess the relevance of the eighteen CE requirements for inclusion in the GRI report model. The survey results are shown in Table 5. The numbers indicated in the 5 columns refer to the number of responses for each level of relevance for each requirement. It is observed that about 81% of the respondents considered the insertion of the CE items in the GRI

Table 1. Sustainability Reporting in CE Literature.

Year	Authors	Journal	Overview	Sustainability Reporting concept presence
2020	Chofreh et al.	J. Clean. Prod.	Development of comprehensive guidelines for the implementation of sustainable enterprise resource planning systems. The guidelines provided steps and activities for implementing the system e were developed using a conceptual research method that relies on the various concepts found in literature.	Yes
2020	Donati et al.	Resour. Conserv. Recycl.	The study shows a way to perform assessment using Environmental Extended Input-Output Analysis and it describes software for modelling CE scenarios using a multi-regional database for the year 2011.	No
2020	Geerts and Dooms	Sustainability	Sustainability Reporting case study in a port industry. This case study was based on a survey yielding 74 valid responses from different stakeholder groups (employees, customers and society). Results shown that the expected content of the sustainability report was viewed differently by different stakeholders groups.	Yes
2020	Giannakitsidou, Giannikos and Choudrou	Was. Manage. Res.	Study that measure the environmental and CE performance of 26 European Union countries by Data Envelopment Analysis implementation oriented to deal with Municipal Solid Waste per capita using two frameworks. Results shown large disparities among performance.	No
2020	Hartley, Santen and Kirchherr	Resour. Conserv. Recycl.	Study that use data from interview with CE experts from European Union in order to explore expectations related to CE policies beyond current policies. The result is presented from a life-cycle perspective.	No
2020	Jabbour et al.	J. Env. Ma. Res.	Testing of a research framework capable of capturing relations among stakeholder pressure, circular business models, barriers to and motivators of the CE and firms´ sustainable performance. A survey was gathered from Brazilian industrial companies.	No
2020	Jansen et al.	Resour. Conserv. Recycl.	Proposition of a CE Life Cycle Costing Model for building components based on existing Life Cycle Cost techniques and adapted to meet the requirements of CE products. The model was applied to the case of the CE kitchen.	No
2020	Lesic et. al.	Sustainability	The study proposes six key recommendations for monitoring projects in sustainability when identifying metrics and designing a sustainability impact report. Those recommendations were obtained from a series of interviews with research project coordinators in the process industries.	Yes
2020	Lozano	Corp. Soc. Rsp. Env. Ma.	Analyse the using of tools, initiatives, and approaches to promote sustainability in corporations. Using the Argument of that relying only on one tool, initiative and approach (TIA´s) results in a limited contribution to sustainability, the study proposed a combination the TIAs.	Yes
2020	Rosa et al.	Int. J. Prod. Res.	Development of innovative framework highlighting the links between Industry 4.0 and CE. A set of different relations was found. A prevalence of some Industry 4.0 technology was observed as well as the influence of Industry 4.0 technologies on CE.	No
2020	Aranda-Usón et al.	J. Clean. Prod.	Adoption of a CE by businesses for cleaner production: an approach from a regional study in Spain. The study classified into four levels the main CE-related activities implemented by a sample of 52 businesses.	Yes
2019	Bai et al.	Int. J. Prod. Res.	The research explore of relationships between sustainable supply chain flexibility efforts and CE targeted performance. A DEMATEL method is used to evaluate these relationships. The study help to identify important sustainable supply chain flexibility efforts.	No
2019	Pieroni, McAllone and Pigosso	J. Clean. Prod.	This article presents a review of approaches (including conceptual models, methods and tools) for business model innovation for CE and/or sustainability, using a systematic review of practitioner-based methodologies and academic literature. The approaches were categorized and compared in order to achieve a better understanding of how to use them.	No
2019	Sassanelli et al.	J. Clean. Prod.	Literature review of CE performance assessment methods. This study was done with the aim to understand how they have been used in practice by researches. Using the findings it was developed of a framework for measuring and assessing the circular degree of a company.	No

2019	Schrippe and Ribeiro	J. Clean. Prod.	The study identifies and quantifies the main criteria that define Corporate Sustainability based on data collected from large Brazilian companies participating in the Brazilian stock exchange. Principal Component Analysis (PCA) was applied in a sample of companies. A list of eighteen preponderant criteria was created
2019	Schroeder, Anggraeni and Weber	J. Ind. Ecol.	The study identifies the extent to which CE practices are relevant for Sustainable Development Goals (SDG) implementation. Result shows that five SDG targets have strong relationships with CE practices and also that circular practices can be applied as a toolbox and specific implementation approaches for achieving SDG targets.
2019	Wicher, Zapletal and Lenort	J. Clean. Prod.	Development and verifying a methodology for aggregated sustainability performance assessment of an industrial corporation using Fuzzy Analytic Network Process approach. A logarithmic fuzzy preference programming methodology was selected. The approach used a combination of three evaluation methods (basic evaluation, trend evaluation, and categorization) and action matrix
2019	Yáñez et al.	J. Clean. Prod.	Case study based on standardized Sustainable Report business tools in a University. This research presents the case of the "Escuela Técnica Superior de Ingenieros Industriales" of "Universidad Politécnica de Madrid". The study used eight years of experience and three continuous, cyclical improvement processes.
2018	Buyuközkan and Karabulut	J. Env. Ma.	Literature review of sustainability performance evaluation. Gaps pointed out from the study stimulated establishment of practically applicable performance evaluation frameworks in order to help assess and compare the degree of sustainability. A unique definition for corporate sustainability performance evaluation is presented.
2018	Heyes et al.	J. Clean. Prod.	The study analyses the potential of service-oriented companies in the information a communication technology sector to build and implement CE principles in daily business practice by means of applying of the back casting and eco-design for the CE framework.
2018	Hu et al.	Sustainability	The study describes an estimation of Chinese CE degree and also identify the changes of key indicators before and after the adoption of the CE Promotion Law (CEPL). A material flow based methodology was designed and applied to realize this estimation.
2018	Korhonen et al.	J. Clean. Prod.	Literature review of CE concepts and proposition o a model for CE research. The study identified, discussed and developed various definitions. Results showed that the previous research is mainly done on the practical and technical levels of the actual physics flows of materials and energy in production.
2018	Leipold and Petit-Boix	J. Clean. Prod.	The study analysed the business community's view on the CE. It focused on the bio-based sector because it is one of the most resource-intensive in Europe. Methods included document analysis and participants observation data.
2018	Manninen et al.	J. Clean. Prod.	The aim of the study is to outline a framework for evaluating the environmental value propositions of CE business models. The framework consists of an environmental value proposition table and a step-by-step approach towards and evaluation process.
2018	Mesa, Esparragoza and Maury	J. Clean. Prod.	Proposition of a set of sustainability indicators for product families based on CE model. This study proposed six indicators regarding material flow, reusability, reconfiguration, and functional performance. It were focused on measuring the circularity of product families.
2018	Petit-Boix and Leipold	J. Clean. Prod.	Study of practices of CE in creation more sustainable processes in cities. It was analysed the extent to which research focuses on quantifying the environmental balance of CE initiatives promoted at the municipal level.
2017	Domingues et al.	J. Env. Ma.	Research focused on the contribution of sustainability report to Organizations and Organizational Change Management for Sustainability in Public Sector. A survey was gathered from public sector organizations that have published sustainability report based on the GRI guidelines.
2017	Elia, Gnomi and Tornese	J. Clean. Prod.	Current literature analysis on CE assessment and proposition of a reference framework for monitoring phase of a circular strategy. This study also includes an analysis of the main existing environmental assessment methodologies based on indexes.
2017	Geissdoerfer et al.	J. Clean. Prod.	The research aimed to provide conceptual clarity by distinguish the term CE and sustainability and synthesizing the different kinds of relationships between them. It includes an extensive literature review. Eight different relationship types were identified in the literature.
2017	McDowall et al.	J. Ind. Ecol.	The study explores differences in the focus of CE policy in China and Europe. Evidence on differing understandings of the CE concepts was presented. A qualitative and quantitative analysis of documents, media articles and academic publications was shown.

Report to be totally relevant and about 14% as relevant. Thus, the two levels represent 95%.

Phase 5 – Addendum Citation

At this phase, the circularity report guidelines were developed as an addendum to the GRI report model. New contributions for the presentation of the questions were obtained through a pilot test in 2 Brazilian companies in which the addendum was evaluated. After the result of the pilot test and the necessary adjustments, the eighteen questions were adjusted to the GRI report model, inserting, in each of them, guidelines for guidance at the time of use. Based on this, guidelines for the Circularity Report elaboration (Table 6) were created to support the inclusion of the CE in the GRI report. With the use of these guidelines, the company may, from the preparation of its sustainability report, also demonstrate its actions aimed at the practice of CE. With this demonstration of circularity, in addition to promoting its image to different stakeholders, it will also be able to increase its market value, extending its perpetuity and contributing to the strengthening of sustainable practices.

DISCUSSION

Some studies have been considering Sustainability and CE, including Büyüközkan and Karabulut (2018) and Lozano (2020). Other studies were dedicated to sustainability reporting, including Lesic et al. (2020), Wicher, Zapletal and Lenort (2019), Yáñez et al. (2019) and Domingues et al. (2017). Büyüközkan and Karabulut (2018) identified 36 conceptual articles on sustainability performance evaluation from 2007 to 2017 and found that about one third of the articles proposed conceptual approaches; 80% proposed a structure with its own set of sustainability performance criteria and 20% used an existing conceptual framework. This research does not fit into either of the two categories of the study by Büyüközkan and Karabulut (2018) because we use two existing conceptual structures: GRI and CE. Lozano (2020) proposed the combined use of tools, instruments and approaches (TIAs) to involve and promote sustainability. Due to his extensive discussion in the literature, Lozano (2020) selected six TIAs: CE, corporate sustainability, green marketing, integrated management systems, social / sustainable investment and sustainable supply chains.

Table 2. Comparison of CE principles, objectives and characteristics with the GRI report

CE Principles	Contemplated in the GRI SRT[1]
P1. Preserve and enhance natural capital by controlling finite inventories and balancing renewable resource flows, dematerializing virtual delivery products and services wherever possible. When this is not possible, resources should be selected for greater renewability.	No
P2. Optimize resource efficiency by circulating products, components and materials at the highest level of utility, both in the technical and biological cycle, to design remanufacturing, refurbishment and recycling, maximizing product circulation.	No
P3. Stimulate system effectiveness by revealing and excluding negative externalities from the outset, including reducing harm to systems and areas such as food, housing, education and health.	No
CE Objectives	
O1 Stimulate smart, sustainable and integrative economic growth.	Yes
O2. Eliminate the use of toxic chemicals.	Yes
O3. Restore the richness of nature by reusing and recycling resources to the maximum possible level, avoiding the extraction of virgin materials.	Yes
O4. Improve product quality.	No
O5. Reduce raw material costs to exploit resources at their maximum capacity.	No
O6. Maintain products, components and materials at their highest level of utility and value at all times, distinguishing between technical and biological cycles.	No
CE Characteristics	
C1. Efficient use of materials and energy, ensuring economic growth less dependent on natural resources and the reduction and / or elimination of waste generation.	No
C2. Transitioning to the use of energy from renewable sources, reducing dependence on new resources.	No
C3. The power of cascading, diversifying the reuse of a product across the value chain, so that the same product can be reused multiple times by multiple users until it exploits its maximum value. After this procedure, it is safely returned to the biosphere.	No
C4. Systemic thinking, so that different parts should be strongly linked to each other.	No
C5. Restorative economy, using renewable energy and eliminating the use of toxic chemicals.	No
C6. Elimination of waste in all production processes, so that all materials can be reused, resulting in reduced raw material costs.	No
C7. Design without waste, creating products that are designed for remanufacturing, refurbishing and recycling.	No
C8. Generation of competitive advantage for organizations through new market possibilities and new business creation.	No
C9. New jobs generated as a result of increased spending spurred by lower prices in all sectors and labour-intensive use for recycling and remanufacturing activities.	No
C10. Promising approach to reduce environmental and social problems, ensuring better quality of life for society.	Yes
C11. Development through a technical cycle, so that consumption is replaced by use and materials are recovered and restored, where what was once considered waste becomes the raw material of another process.	No
C12. Development through a biological cycle, where, after use or consumption, part of the material is brought back to nature as a source of nutrients, in order to turn them into biological nutrients.	No
C13. Regenerative and restorative system by nature, allowing industrial operations to develop according to the biological cycle of nature, considered as a cyclic flow, reducing the demand for raw materials, excessive energy consumption and, consequently, the production of non-reusable waste either technically or biologically.	No
C14. Approach the 3 dimensions: environmental, economic and social, so that all work simultaneously.	Yes
C15. It is directly influenced by changing consumption patterns.	Yes
C16. It is based on the concepts of industrial ecology, in the sense that industrial production takes place in order to preserve the environment.	Yes
C17. Integration of reduction, reuse and recycling activities during production, exchange and consumption by maximizing the potential of each product, replacing the concept of end of life.	Yes
C18. Resilience development through diversity.	No
C19. Substitution of the concept of consumer to user, in order to rethink the property, following a model where products will be rented to consumers who, in turn, will become users of a service.	No

Table 3. Construction of CE Requirements not included in the GRI report

CE Requirements to include in the GRI report template	Principles (P), Objectives (O) and/or characteristics (C) that gave rise to the CE Requirements
1. Waste eradication	C4, C6, C7, C13
2. Substitution of consumption by use	C11, C19
3. Products and processes are redesigned to maximize resource value and utilization	O4, C4, C7, C8, C18
4. Use of energy from renewable sources, reducing dependence on new resources and eliminating the use of toxic chemicals.	C2, C5, C8
5. Concern about sharing	C3
6. Concern about maintenance / prolongation of use	O5
7. Concern about material and energy efficiency	P2, P3, O6, C1, C18
8. The company uses digital technology	P1, C8
9. The company encourages the sale and delivery of virtual products and services	P1, C8
10. The company is concerned with returning adequate biological resources to the biosphere.	C12
11. The company is concerned with direct dematerialization (books, CDs, etc.).	P1, C8
12. The company develops educational actions with the local community focused on the proliferation of CE	C9
13. The company develops actions that promote the generation of new jobs.	C9, C18

Table 4. Follow-up of additional questions in the tree dimensions of sustainability

Dimensions	Requirements
Economic	1. Waste eradication
	2. Consumer to user substitution
	3. Products and processes are redesigned to maximize resource value and utilization.
	4. Energy use from renewable sources, reducing dependence on new resources and eliminating the use of toxic chemicals
Environmental	5. Waste eradication
	6. Products and processes are redesigned to maximize resource value and utilization
	7. Concern about sharing
	8. Concern with maintenance / prolongation of use
	9. Concern for material and energy efficiency
	10. Energy use from renewable sources, reducing dependence on new resources
	11. Consumer to user substitution
	12. The company uses digital technology
	13. The company encourages the sale and delivery of virtual products and services
	14. The company is concerned with returning adequate biological resources to the biosphere
	15. The company is concerned with direct dematerialization (books, CDs, etc.)
	16. Waste eradication
Social	17. The company develops educational activities with the local community and internal and external collaborators aimed at the proliferation of the CE
	18. The company develops actions that promote the creation of new jobs

Table 5. Relevance of additional CE requirements according survey

Dimensions	Requirement	Relevance Level					Total
		1	2	3	4	5	
Economic	1. Waste eradication					32	32
	2. Consumer to user substitution			3	21	8	32
	3. Products and processes are redesigned to maximize resource value and utilization.					32	32
	4. Energy use from renewable sources, reducing dependence on new resources and eliminating the use of toxic chemicals					32	32
Environmental	5. Waste eradication					32	32
	6. Products and processes are redesigned to maximize resource value and utilization				28	4	32
	7. Concern about sharing					32	32
	8. Concern with maintenance / prolongation of use					32	32
	9. Concern for material and energy efficiency					32	32
	10. Energy use from renewable sources, reducing dependence on new resources					32	32
	11. Consumer to user substitution					32	32
	12. The company uses digital technology					32	32
	13. The company encourages the sale and delivery of virtual products and services		4	19	6	3	32
	14. The company is concerned with returning adequate biological resources to the biosphere					32	32
	15. The company is concerned with direct dematerialization (books, CDs, etc.)			1	27	4	32
Social	16. Waste eradication					32	32
	17. The company develops educational activities with the local community and internal and external collaborators aimed at the proliferation of the CE					32	32
	18. The company develops actions that promote the creation of new jobs					32	32
	Total	0	4	23	82	467	576
	%	0	0,69	3,99	14,23	81,.07	100,00

Table 6. Guidelines for Circularity Report Elaboration

1 Economic Dimension	
1.1 Aspect: Economic Performance	
EC 1.1.1. Circularity Requirement: Waste Eradication	
Waste can be understood as "any human activity that absorbs resources but creates no value (...)". The development of multiple actions can contribute to this point, such as eliminating production defects and producing only what is necessary, following what the CE proposes. Zero waste can be implanted with recycling and reuse of waste produced in another manufacturing process, by optimizing the use of tools, developing new precise manufacturing systems and sustainable manufacturing theories, among others.	Report the actions taken by the company aimed at eradicating waste in production processes, so that all materials can be reused even generating non-operating revenues and ensuring economic growth less dependent on natural resources.
ANSWER	
EC 1.1.2. Circularity Requirement: Consumer to User Substitution	
The CE should encourage and encourage rethinking of ownership of a good, in order to promote the replacement of the sale of a product with its lease, promoting its use as needed. In many situations the CE requires, in addition to technological changes, institutional changes and the creation of a network of relationships involving multiple activities, including servitisation, considered as a process in which the manufacturer retains ownership of the product and the consumer pays for its use. The fact that the manufacturer retains ownership of the product can become a source of incentives to improve availability and performance, and may even reduce operating costs.	Report the actions taken by the company that contribute / encourage the replacement of the consumption of a product by its use, keeping the good in the property of its manufacturer.
ANSWER	
EC 1.1.3. Circularity Requirement: Products and processes are redesigned to maximize resource value and utilization	
Any product must be designed for remanufacturing, refurbishing and recycling so that technical and biological components and materials continue to circulate and contribute to the economy. Products must be rethought and designed to foster system effectiveness by revealing negative externalities from the outset and deleting them early in the project. In the preparation of the project, skills should be developed to facilitate the reuse, recycling and cascade reuse of all that was used in its manufacture. In this first phase, products should be designed with the intention of remaining durable within a cycle (whether technical or biological) and designed for future disassembly and / or reframing. The longer the product is used, the more results it tends to offer to those who use it.	Report actions aimed at developing products that are designed for remanufacturing, refurbishing, and recycling so that technical components and materials continue to circulate and contribute to the economy.
ANSWER	
EC 1.1.4. Circularity Requirement: Utilization of energy from renewable sources, reducing dependence on new resources.	
The energy needed to develop the CE must be renewable, reducing resource dependency and increasing the system's resilience. In this regard, it is important for the company to adopt policies that encourage and promote the use of energy from natural resources and constantly replenished as sun, wind and rain.	Report company actions that show the use of energy from renewable sources, reducing their costs in this segment.
ANSWER	
2. Environmental Dimension	
2.1 Aspect: Materials	
EN 2.1.1. Circularity Requirement: Waste eradication	
At this point, the eradication of waste is considered a requirement that seeks environmental preservation. In addition to economic losses, waste threatens the integrity of natural ecosystems, which are considered essential for the survival of humanity. The industrial system must interact with the biosphere in order to eliminate negative factors that may harm it. Having the waste generation minimized, consequently environmental impacts will be lessened.	Report company actions that have eliminated potential waste and / or reduced consumption of available natural resources while preserving the integrity of natural ecosystems.

Continue …..

ANSWER	
EN 2.1.2. Circularity Requirement: Products and processes are redesigned to maximize resource value and utilization	
In the CE there are no residues because they are intentionally excluded from the project conception, either by the use of biological or technical materials. As proposed by the CE, products and processes must be developed to expand their potential, contributing to the creation of sustainable systems that preserve nature and cause no (or minimal) impact on the environment. For this, it is necessary to develop a regenerative approach and integrated with all activities, which may involve from the simple use of water and energy, among others.	Report company actions that contributed to maximizing the value of its resources, reducing waste generation in the environment.
ANSWER	
EN 2.1.3. Circularity Requirement: Concern about sharing	
According to its peculiarities, the company should be concerned with the sharing of its goods and materials, exploiting its maximum potential for collective use, that is, the same product may be used by various stakeholders according to the needs of each moment, avoiding idleness. In the CE, a shared economy is encouraged, one in which goods and resources must be distributed and redistributed in a way that benefits all participants. This sharing process may not only consider the company's internal customers, but may involve other companies that are interested in using the same characteristics as this one, and vice versa. As proposed by the CE, sharing expands product utilization.	Report company actions focused on material sharing, exploring the maximum capacity to use a good collectively.
ANSWER	
EN 2.1.4. Circularity Requirement: Concern about maintenance / prolongation of use	
Predictive product maintenance should be developed on an ongoing basis to avoid technical problems and to extend the product life cycle through periodic follow-up. The extension of the life of a product aims to extend its use time and, therefore, it is important to perform the correct maintenance, as well as careful use.	Report company actions focused on the ongoing maintenance of its products and services to extend the product life cycle.
ANSWER	
EN 2.1.5. Circularity Requirement: Concern about material efficiency	
Efficiency in the use of materials is one of the possibilities to improve the CE and improve industry operations, as this action tends to reduce the generation of industrial waste and the extraction and consumption of natural resources, among others. In this regard, the company is expected to exploit the usability of the technical materials used by circulating products, components and materials at their highest level of utility, managing and ensuring that they have their maximum capacity utilized.	Report company actions that show that the technical materials used circulate as much as possible, ensuring economic growth less dependent on natural resources.
ANSWER	
2.2 Aspect: Energy	
EN 2.2.1. Circularity Requirement: Use of energy from renewable sources, reducing dependence on new resources	
The energy needed to develop the CE must be renewable, reducing resource dependency and increasing system's resilience. In this regard, it is important for the company to adopt policies that encourage and promote the use of energy from natural resources and constantly replenished as sun, wind and rain. The use of solar energy should be prioritized, reducing dependence on natural resources and increasing resilience of systems.	Report company actions that encompass the use of energy from natural and constantly replenished resources, such as sun, wind, rain, etc.
ANSWER	
2.3 Aspect: General	
EN 2.3.1. Circularity Requirement: Substitution from consumer to user	
The CE proposes to rethink property, following a model where products will be rented to consumers who, in turn, will become users of a service. Switching from consumer to user is one of the strong alternatives that the CE proposes, which tends not only to generate economic benefits by reducing expenses, but also to generate environmental benefits due to the fact that the manufacturing companies are mainly responsible for the correct maintenance to prolong the use and subsequent proper disposal after the end of the life cycle, avoiding, among others, the incorrect disposal of waste.	Report company actions that already encourage or encourage rethinking ownership of a good to promote the replacement of selling a product with its lease, promoting use as needed.
ANSWER	
EN 2.3.2. Circularity Requirement: The company uses digital technology	
The use of multiple technologies is one of the aspects explored by the CE, but digital technology is part of what the literature calls circular business, which they say enables universal, low-cost access. Thus, it is expected that the company had digital technologies that enable the accomplishment of various operational activities, such as contact with suppliers and customers, among others, in addition to reducing the consumption of resources.	Report the types of digital technology used by the company that enable the performance of various operational activities, such as contact with suppliers and customers, among others, reducing the consumption of resources.

Continue….

ANSWER	
EN 2.3.3. Circularity Requirement: The company encourages the sale and delivery of virtual products and services	
This aspect is associated with the activities developed by e-commerce and can be defined as a form of transaction in which the parties interact electronically and without physical contact. According to the scientific literature, there is a strong growth in e-commerce sales worldwide, which should be considered as a favourable business opportunity for companies to generate competitive advantage. A factor that is well pointed out by online sales operations is the generation of environmental benefits, especially the reduction of gas emissions in the atmosphere, economies of scale in product delivery and reduced inventories.	Report company actions that encourage the user to use virtual environments to purchase products and services as well as receiving them at home without having to move to the environment to remove the product.
ANSWER	
EN 2.3.4. Circularity Requirement: The company is concerned about returning biological resources properly to the biosphere	
Through the CE, by moving biological materials through anaerobic digestion or composting, there will be a large decrease in synthetic fertilizers, and by 2050 it could be reduced by 80%. With this, besides the preservation of the soil, the production of organic foods will be expanded. Thus, the company should develop and / or encourage actions that promote the intelligent use of these biological resources, providing social and environmental well-being. This will also help to avoid wasting water, land and other resources on their production.	Report company actions that encourage the safe reintegration of biological nutrients into the biosphere for decomposition.
ANSWER	
EN 2.3.5. Circularity Requirement: The company is concerned with direct dematerialization (books, CDs, etc.)	
Using virtual products and services will prevent future waste generation as the consumption of a virtual product and service may be shared by several users at the same time, causing dematerialization and, consequently, the reduction of the use of materials that may come producing technical waste. If material resources are required, the circular system will select it wisely, always prioritizing the choice of technologies and processes that use renewable resources and / or perform better, and mitigate the risks of environmental disasters because there is no materialization.	Report company actions that evidence the use of virtual products, dematerializing whenever possible.
ANSWER	
3. Social Dimension	
3.1 Aspect: Local Communities	
S 3.1.1. Circularity Requirement: Waste eradication	
Considering the practice of circular actions by companies, one of its consequences is the generation of benefits for society in general, increasing the number of jobs and family income, which may be increased by 11% until the year 2030, with opportunities in recycling, reverse logistics and technological innovation. And this is a result of the utilization of all the generated waste that, consequently, will be reverted in benefits for the community in general.	Report company actions that, through the eradication of waste, contributed to increase family income and improve their quality of life.
ANSWER	
S 3.1.2. Circularity Requirement: The company develops educational activities with the local community and internal and external collaborators aimed at the proliferation of the CE	
Consumer behaviour, in particular, should be driven by actions that encourage the practice of CE. And one of these actions is through education, that is, activities that promote the CE and stimulate its practice by society at large. In this sense, because the CE is still considered a recent business model, it is important that companies develop educational actions and works aimed at developing circular practices with the local community and its internal and external collaborators. These actions are diverse and should stimulate the development of people's environmental awareness.	Report company actions that address educational work aimed at developing circular practices for the local community and its internal and external collaborators.
ANSWER	
S 3.1.3. Circularity Requirement: The company develops actions that promote the creation of new jobs	
The adoption of CE practices by companies is important for several reasons. Among them, it highlights the opportunity to generate new jobs by expanding the fields of work resulting from new business practices. Failure to sell a product and offer it as a service, for example, will lead companies to expand their staff, as it is their responsibility, in this case, the continued maintenance of the good that will be in use by the consumer.	Report company actions that contribute to the generation of new jobs.
ANSWER	

The GRI was considered preliminarily on its initial list, but was rejected. They also point out, as new research for specific cases, countries and sectors. In this study, the GRI was selected to be complemented with the CE requirements due to its advantages, encompassing a large amount of information and quality (Siew 2015) in line with a study by Büyüközkan and Karabulut (2018) who argue that the GRI is an example widely used in sustainability by companies in preparing their reports. When comparing the twenty-eight items of CE, it was found that twenty items were not covered by the GRI reporting model, as shown in Table 2. This included all three CE principles, half of the CE objectives and also most of the CE characteristics. It is understood that this finding could justify an effort to integrate these TIAs. Joint analysis was done to transform these twenty items into thirteen items, as shown in Table 3. With the unfolding in the three dimensions of sustainability, these thirteen items increased to eighteen, as shown in Table 4. It was observed that the environmental dimension was the dimension most contemplated by the eighteen items to be adjusted to the GRI report model (11 items out of 18), followed by the economic dimension (4 items) and, finally, the social dimension (3 items). Thus, we observed that the merger of the CE items and the GRI report model can increase the perception of each of the three dimensions of sustainability, especially the environmental dimension.

Survey results showed that the insertion of the CE items in the GRI reports is relevant. In Table 5, it is possible to assess that, of the 18 items evaluated, item thirteen (the company encourages the sale and delivery of products and services in a virtual way) was considered by 59.37% of the respondent companies as indifferent in the degree of evaluation. However, even presenting this assessment, the issue was maintained due to the strong relationship with the direct dematerialization of the products, which consequently will reduce the use of waste-generating materials. In this proposal, it is understood that, for dematerialization to occur, it is important to associate sales and virtual delivery, so that one contributes to the existence of the other. In the last phase, the eighteen items were adjusted to the GRI report model, as shown in Table 6. At the end, the main result of our research is a conceptual approach that could be described as an adaptation of the GRI to the CE requirements. The motivation for this study is in line with some arguments by Lozano (2020): the need to combine TIAs to better meet the dimensions of company and sustainability, being that only one TIA can result in a low contribution, while many can result in waste. On the other hand, it is argued that GRI should be part of the conceptual framework of CE considering its wide use pointed out by Büyüközkan and Karabulut (2018) and due to the large volume of information concentrated in a single model and also to provide companies that use it, a higher score due to the quality of its reports (Siew 2015). In addition, a combination of two existing conceptual frameworks adds less complexity to the requirements. With regard to the application of the GRI-CE conceptual framework, this study is aligned with Büyüközkan and Karabulut (2018) who argue that the proposed solutions for assessing sustainability performance do not meet all needs.

In this sense, the proposed GRI-CE structure is suitable mainly for companies that already use GRI and plan to implement CE strategies.

The article proposes a qualitative study on how to integrate the current official report developed by GRI based on issues related to CE. The topic covered in the article is relevant for professionals and academics, since the circularity report is still an open research field in the CE literature.

CONCLUSION

Sustainable development has become an integral part of the strategy of any company seeking to maintain or conquer new markets. However, sustainability practices in their three dimensions are insufficient to solve contemporary environmental, economic and social problems. In order to complement and strengthen sustainability, the concept of CE is highlighted. Companies that prepare sustainability reports use questions that are already recognized by the market. However, the reports made available do not meet all the requirements proposed by the CE. The main objective of this work was to identify CE issues not yet covered in a recognized sustainability report model, in order to integrate them into the model, presenting voluntary guidelines for their elaboration. The structuring of the eighteen items with their subsequent inclusion in the GRI sustainability report model highlights the unprecedented nature of the research, since there is no report model on the market that deals with sustainability and CE, while generating new knowledge about the intersection of sustainability with CE.

The development of this research supports the integration of sustainability with CE, allowing companies to evaluate, in a single report, their sustainable and circular practices, as well as allowing a diagnosis of their situation regarding the implementation of these practices. This integration, in addition to innovating in the preparation of sustainability reports, will contribute to the proliferation of circular actions by companies, strengthening long-term sustainability and promoting a better image of these before the market. In addition, the proposal to integrate circularity issues in a sustainability report stands out for allowing companies to address these concepts together, providing an overview of the company's sustainability and its CE practices. The contribution of the work is focused: i) in the identification and selection of a Sustainability Report model recognized and used by companies that can be complemented with circularity indicators (CE indicators); ii) in the identification of these indicators and creation of CE requirements not yet contemplated in the referred model; and, iii) in the integration of these questions to the model so that it presents voluntary guidelines for its elaboration and that it is well accepted by the market. The relevance of CE requirements insertion on the GRI reporting model surveyed by the research model is a limitation of this study. In this sense, different results may arise from other samples or individual analyses. Based on this fact, generalizing the present findings from our sample to the wider population may not be possible. Although the survey brought the view of practitioners it is necessary to carry out an operational application of the new additional conceptual framework so that it is possible to deep the value added by this study and improve its efficiency. Future research should be address measurability of the proposed indicators and also is recommended a quantitative validation in order to better understanding of the real value added by this study which seems to be theoretical until a complete operational application. In addition, this research also contributes to scientific knowledge by: i) filling a research gap by integrating sustainability and CE in a sustainability report; ii) expanding the research field between concepts; iii) strengthening the existing relationship between sustainability and CE and; and iv) contribute to the proliferation of CE, as it is a concept still little known by society.

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