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Environmental Product Declaration Approaches on the Brazilian Experiences: A Review

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Abstract

The Environmental Product Declaration (EPD) is a type of label that has been considered reliable and complete, and it is commonly used in purchasing decisions, product design definition, environmental communication, data sources, and other applications. This article examines the approaches for the development of EPD in the Brazilian context, taking into account the initiatives of interested parties as well as the circumstances for its adoption by national firms. This work adds value by assessing which works in Brazilian literature and experiences focus on EPD, contextualizing the issue, and offering this type of label as a strategic resource. Between 2015 and 2022, the bibliographical survey uncovered 20 works. The Prisma 2020 checklist was utilized to conduct the systematic review, and the analysis in this study was both quantitative and qualitative. Since NBR ISO 14025 (2015), the publications have been consistent. Only 35% of the review content was obtained from journals, with 6 of the 7 publications resulting from academic works from their authors'

postgraduate training processes, indicating a concentration of studies by a few scholars, all linked to universities in Brazil's south and southeast. Studies have shown that EPD is a valuable tool for environmental management due to its consistency, reliability, and completeness of data. However, due to a lack of Brazilian experience, this resource is not commonly known, disseminated, or employed. EPD has potential to be used as a strategic resource for businesses due to Brazil's normative, legal, and structural conditions for adoption.

Keywords: Environmental labelling, NBR ISO 14025, Life Cycle Assessment, Environmental policies, Environmental management

1. Introduction

In the face of constant economic competition, managers realize the need to implement strategies that strive for their best performance while also meeting demands such as, for example, expectations for environmental sustainability. Companies that prioritize environmental commitment perform better than the market in terms of operational performance (Andersen & Bams, 2022; Wen & Lee, 2020), which stimulates practices to improve production processes, such as the adoption of environmental labels.

Labeling research has expanded, as has its usage to assess product environmental performance and promote the corporate image of firms that employ sustainable business practices (Arvizu-Piña et al., 2019; Félix, 2015; Ibáñez-Forés et al., 2016). Environmental labels are important to stakeholders because they demonstrate commercial transparency and inform customers about products and their interactions with the environment (Instituto Brasileiro de Informação em Ciência e Tecnologia [IBICT], 2014). Labeling may be considered an educational tool to assist consumers in their decision-making process of purchasing products with better environmental performance throughout their life cycle, as well as a communication tool that companies must use to present environmentally friendly products in order to gain a competitive advantage (Wojnarowska et al., 2021).

Furthermore, the dynamics of businesses pursuing efficiency in processes and resource utilization have provided a guideline for developing organizational strategies that are more aligned with environmental balance (Benites & Polo, 2013; Chaudhry et al., 2021; Dornelas & Patriciane, 2005; Gunarathne & Lee, 2019). Environmental labeling can be used to affect production and consumption modes in sustainable development strategies (Miklenčičová, 2015; Moura, 2013; Song et al., 2019).

Following a global trend, organizational solutions propose improvements to cleaner production with less negative environmental impact (Roh et al., 2022; Wang et al., 2019). Labeling is used as an environmental strategy to create internal and external tactics that raise exposure for organizations, with consequences for reputation and operational performance (Andersen & Bams, 2022; Fan et al., 2019; Song et al., 2019; Yenipazarli, 2015; Wang et al., 2015; Wen & Lee, 2020).

In Brazil, three types of labeling are regulated by the Associação Brasileira de Normas Técnicas (ABNT). Type I labeling is known as environmental seals, with requirements

described in NBR ISO 14024 (2004). NBR ISO 14021 (2017) standardizes Type II labeling or environmental self-declarations. Type III labeling, often known as the Environmental Product Declaration (EPD), is described in NBR ISO 14025 (ABNT, 2015). The last one is the subject of this research.

The EPD is a label that provides quantifiable environmental information based on Life Cycle Assessment (LCA). LCA provides environmental aspects and impacts along the product's life cycle, from raw material procurement to final disposal, using NBR ISO 14040 (ABNT, 2009a) and NBR ISO 14044 (ABNT, 2009b) parameters. The development of an EPD must follow the rules, regulations, and recommendations established in the Product Category Rules (PCR) document, which has been standardized by NBR ISO 14027 (ABNT, 2019).

EPD is used in part to produce LCAs and define product designs because it is a good and full data source (Del Rosario et al., 2021; Shepherd, 2016). EPD has also been demonstrated to be a reliable, transparent, quantifiable, and verifiable resource (Fet et al., 2009; Shepherd, 2016). Label research and implementations in the Brazilian setting are in their infancy when compared to the realities of countries in Europe and North America (Dórea et al., 2018). Stronger public agency involvement in promoting and enforcing environmental sustainability practices, including the adoption of environmental declarations, is required (Arvizu-Piña & Cuch íBurgos, 2017; Young, 2015).

In relation to this low national dissemination, this article suggests that approaches that encourage the publicization of environmentally friendly behaviors be explored and addressed further. There are fewer EPD documents in Brazil than in other countries. However, there is potential for company adoption (EPD® Brasil, 2022). A research question has been established: how has the literature discussed EPD development, application, and initiatives in the Brazilian context? The purpose of this paper is to examine the approaches to EPD development in the Brazilian context, taking into account the activities of interested parties and the conditions for its acceptance by national enterprises. This article contributes by investigating the EPD in the Brazilian context and its potential as a strategic corporate resource.

2. Materials and Methods

This paper was based on a literature review that used the Prisma 2020 checklist (Prisma Group, 2020) as guidance, with this study including both quantitative and qualitative analysis. A bibliographical study was conducted in scientific sources (articles, theses, and dissertations) and sources of dissemination of ideas, such as articles from events (conferences, forums, and so on), between 2015, the year of publication of NBR ISO 14025 in Brazil, and 2022.

For paper selection, inclusion and exclusion criteria were defined. Works that may provide perspective on the factors behind the development of EPD in the Brazilian context were included. Thus, studies on the application of EPD to national products (case studies) and debates on EPD and its development in Brazil, involving the participation of interested parties and legal and regulatory measures, were considered. Works that did not have EPD and its association with Brazilian experience as their main objective were excluded.

The descriptors used were "Environmental Product Declaration", "NBR ISO 14025", "type III labeling", and "environmental declaration". They were used independently at first, then with the Boolean operator AND "Brazil" at the end. The procedure was carried out using the following languages: Portuguese, English, and Spanish. To improve the precision of the bibliographic survey, the search was adjusted with the "country" filter when applicable.

Scielo Brasil, Web of Science, Scopus, Science Direct and Springer Link were the databases investigated. The Brazilian government's journal portal, the Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), was consulted because it includes a large number of national and international datasets in Open Access format. However, just seven academic productions were obtained, which had already been pre-selected in the aforementioned databases.

Consultations were carried out in the 5th, 6th, and 7th editions of the Brazilian Congress on Life Cycle Management (BCLCM)'annals. This conference is a reference for professionals, researchers, and governmental organizations for discussing and developing LCA and related themes in Brazil, having collected eight papers. The Latin American Journal of Life Cycle Assessment (LALCA), which is a national initiative specializing in LCA and related topics, was also consulted. However, no EPD-related articles were found.

The Brazilian Digital Library of Theses and Dissertations (BDTD), which archives work from Brazilian public universities, presented six theses. Google Scholar was consulted, but it provided repetitive works, and EPD's experiences were not national, except for a course conclusion manuscript that could be used in this review.

After evaluating the publications, a preliminary reading of the titles and abstracts of 588 papers was performed, of which 20 satisfied the required inclusion criteria. Following that, the works included in the review were thoroughly read and evaluated. The quantitative outcomes of the consultations, as well as the data sources used, are summarized in Table 1.

Table 1. Number of publications by data source

Data sources	Total quantity recovered	The quantity selected for review after a preliminary reading of the title and abstract
Scielo Brasil	2	1
Web of Science	77	2
Scopus	8	2
Science Direct	172	1
SpringerLink	60	1
Annals BCLCM (5^{th}, 6^{th} and 7^{th} edition)	8	6
BDTD	6	6
Google Scholar	255	1
Total	588	20

3. Results and Discussion

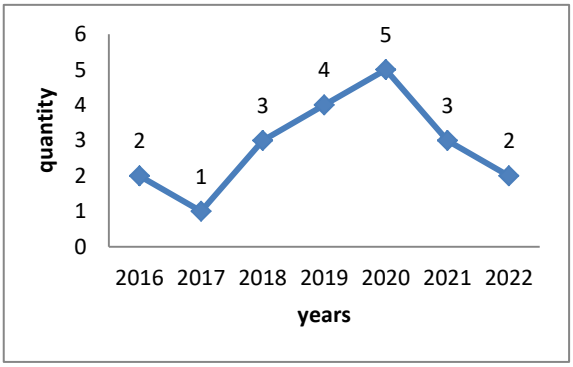
3.1 Bibliometric Analysis.

The bibliographic survey results demonstrate a modest volume of works obtained, indicating

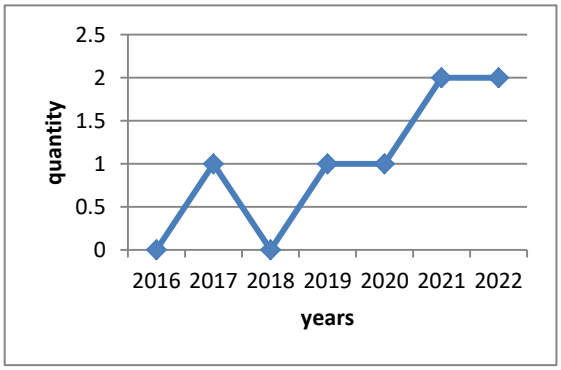
a lack of academic production and content for furthering the issue of EPD and its development in Brazil. Appendix 1 lists the academic outputs covered in this review by the most recent year of publication for the oldest.

Based on the years of publication of the articles, it is possible to see that, despite NBR ISO 14025 (2015) standardization, recent scientific productions do not show an increasing trend. However, they are consistent, with at least one EPD-related publication in each of the years studied (Graph 1). Except in 2022, when the event did not take place, the BCLCM event contribution increased the number of publications every two years (Graph 3). Journal publication has increased since 2019 (Graph 2). Academic production has decreased, as shown in Graph 4. The bibliographic study's findings show a low number of collected publications, indicating a lack of scientific production and content to further the EPD issue and its development in Brazil.

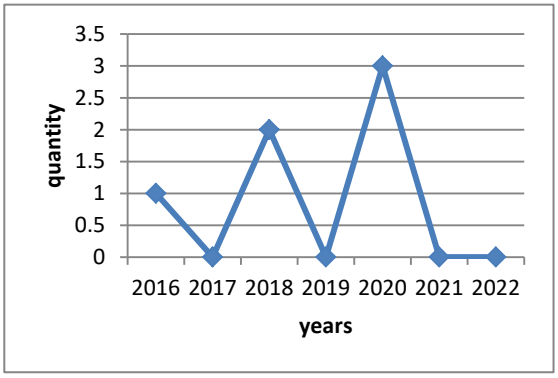
Graphic1. Number of publications per year



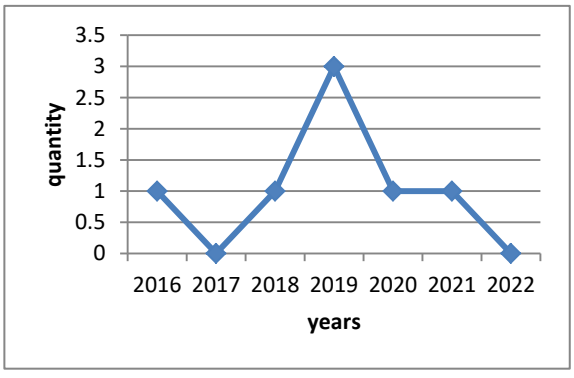
Graphic 2. Publications in periodicals



Graphic 3. Publications in Annals



Graphic 4. Publications in Academic Archives



In terms of the distribution of academic production, there was a balance among the sources of publications, being 35% of publications in journals, 35% in academic archives, and 30% in annals. However, this outcome is unfavorable to the popularity of EPD in academia. Publications in national and international journals attract a wider audience and can be found in a variety of databases. Furthermore, NBR ISO 14025 (2015) was published nine years ago, and EPD is a relatively new tool employed by Brazilian businesses. As a result, it has only been studied in a few academic case studies.

The Journal Cleaner Production published the most about EPD in the Brazilian setting, accounting for 42.8% of the journals. 50% of the content addressed EPD in the construction industry. Six of the seven journal publications were identified as academic papers from the writers' postgraduate degrees. This could indicate that a few Brazilian scholars focused on EPD, as can be seen by Hoe (2016), Rocha (2018), Crippa (2019), Timm (2019), Galindro (2019) and Moré (2021) and, respectively, the articles by Hoe and Pires (2017), Rocha and Caldeira-Pires (2019), Crippa et al. (2020), Timm and Passuello (2021), Timm et al. (2021), Galindro (2020a) and Moré et al. (2020, 2022).

By seeing the author's institutional ties, it was discovered that research initiatives on EPD are in the early stages and take place in universities in the country's south and southeast, such as the Federal University of Rio Grande do Sul, the Federal University of Rio de Janeiro, the University of Brasilia, the Federal University of Santa Catarina, the Technological Institute of Santa Catarina, the Federal University of Paraná, and the Federal Technological University of Paraná. These colleges are typically known for their high academic productivity levels, and they are located in Brazil's richest regions. Naturally, initiatives for new studies are expected to emerge from these prominent universities because they benefit from research funding resources for innovative themes, are productive, and are connected with trends in studies of international relevance.

3.2 Content Analysis of EPD Approaches and Experiences in Brazil

The investigated articles in recent years demonstrate a lack of robustness and quantity of investigations on EPD in essentially Brazilian settings or experiences. Andreazzi et al. (2016) observed a decrease in scientific production in national journals about seals, labels, and environmental certifications, but with a gradual increase over the years, evidencing environmental concerns.

Professionals and academics see EPD as a useful tool and a source of data for commercial and environmental management applications. As addressed in the studies by Timm (2019), Timm and Passuello (2021), and Timm et al. (2021), EPD data has been utilized to subsidize product comparisons during the raw material definition phase, offering a purchasing process aligned with environmental issues.

EPD data can also be employed to incorporate technologies that address the product's life cycle, generating useful information for project design decision-making. Crippa (2019) and Crippa et al. (2020) present a method for automating the insertion of data from EPDs into a BIM (Building Information Modeling), allowing for an automated and quick building LCA procedure. Kiss et al. (2018) examined the national market for sustainability labels that can use LCA and EPD data. According to the authors, there is a prospective trend for EPD to join national certifications. Galindro et al. (2020a) and Galindro (2019) propose a framework based on efficiency assessment that compares and develops a product rating system based on EPD data.

According to another focus in the analyzed articles, EPD has national promotion potential from the viewpoint of stakeholders because it presents the prerequisites for labeling Brazilian

products. The feasibility of EPD in Brazil is dependent on variables such as PCR harmonization, increased interest from the business public, who are unfamiliar with the label, consolidation of some resources such as a national database, and the need for qualified LCA and EPD professionals (Hoe, 2016; Hoe & Pires, 2017). According to Rocha (2018) and Rocha and Caldeira-Pires (2019), one must overcome several challenges and threats. Some of them are related to a restricted national database, qualified specialists, high EPD elaboration costs, and inaccessibility to small and medium-sized businesses.

In the Brazilian scenario, there is a policy incentive for EPD, the Voluntary Program for Environmental Labeling Type III - Environmental Product Declaration of the National Institute of Metrology, Quality, and Technology, but it still requires advances in program operator structuring, the EPD registration system, and PCR preparation by productive sectors (Hoe, 2016; Hoe & Pires, 2017). Regardless of this, other program operators in Brazil collect an increasing volume of EPDs from national products, suggesting that enterprises strive to adhere to labeling in order to comply with the requirements of the international market (Moré et al., 2020).

The use of EPD as an environmental communication resource is another notable method among the works examined. Because EPD is available for reading by a wide range of interested parties, it must provide consistent data that assures its reliability in practical implementation. Three of the studies looked into this issue. Galindro et al. (2018) investigated the possibility of simplifying EPD communication by minimizing the environmental factors reported. Thus, the application and dissemination of LCA and EPD can benefit by providing accessible reading for non-specialized audiences, such as customers. Moré (2021) and Moré et al. (2022) evaluated the degree of comparability between EPDs, criticizing the label's creation for a lack or inconsistency of data.

Scachetti et al. (2020), Kremer (2020), and Barros et al. (2022) provided practical examples based on their experiences developing and evaluating EPDs. Scachetti et al. (2020) reported on the developing EPDs of the steel and mining industries. Kremer (2020) compared the PCRs and EPDs of dairy products made in Brazil. Barros et al. (2022) created an LCA for raw cow's milk produced in the Brazilian states of Paraná and Minas Gerais, as well as a study of the environmental performance of milk produced in Brazil using EPDs from other parts of the world.

The more practical research examined the structure of EPDs, compared EPDs, and verified additional evaluations of environmental performance based on EPD data. Although small in quantity, the experiences offered in this study highlighted the EPD’s qualities, notably its use as a parameter from which subsequent studies can be reviewed and validated. Table 2 summarizes the approaches observed in the bibliographic survey.

Table 2. Approaches from reviewed articles

The studies focused on...	Authors
... using EPD as a data source or resource for the implementation or improvement of other management systems	Timm and Passuello (2021), Timm et al. (2021), Galindro (2019), Galindro et al. (2020a) , Crippa et al. (2020), Crippa (2019), Timm (2019), Kiss et al. (2018)
... an examination of the promotion of EPD in Brazil, as well as its support and incentive programs	Rocha (2018), Rocha and Caldeira-Pires (2019), Hoe (2016), Hoe and Pires (2017), Andreazzi et al. (2016), Mor é et al. (2020)
... the examination and enhancement of EPD as a communication tool	Galindro et al. (2018), Mor é(2021), Mor é et al. (2022)
... real applications of EPD development and data use for assessing environmental performance in national products (case studies).	Scachetti et al. (2020), Kremer (2020), Barros et al. (2022)

EPD studies are categorized into themes that deal with its practical use, such as data utilization in various applications, as demonstrated by purchasing and project activities, and integration with other tools. In this case, the methods of applying EPD exceed the fundamental goal of an environmental statement, which is to present product environmental performance (ABNT, 2015). It evaluates the label's importance and functionality, particularly as a resource for promoting less polluting manufacturing processes. Thus, the studies demonstrate business initiatives in the use of EPD as a strategic instrument and its utility in the creation of knowledge.

Another point of contention was the EPD as a resource that could be improved and promoted in Brazil. Universities, as well as institutional and governmental bodies, are participating in global discussions about environmentally friendly practices and policies oriented toward long-term development.

3.3 Contributions to the development of EPD in Brazil

The studies revealed that EPD is a useful resource with a wide range of applications (Timm & Passuello, 2021; Timm et al., 2021; Crippa, 2019; Crippa et al., 2020; Timm, 2019; Kiss et al., 2018). Aside from unfettered and free access by program operators, the label and its environmental performance data are certified by experts with no conflicting interests (ABNT, 2015), adding to the premise that EPD is a reliable source of information.

Authors that rely on the EPD reliability assumption should exercise caution. Discrepancies, errors, and omissions in EPD data, according to research, can compromise their quality and coherence (Anderson & Moncaster, 2020; Gelowitz & McArthur, 2017, 2018). In contrast to arguments that attribute EPD as a reliable data source. These issues apply to PCRs, which, according to regulations, must be established publicly and with open consultation (ABNT, 2015, 2019). Simultaneously, more specific and harmonic rules are required (Gelowitz & McArthur, 2017, 2018). Despite critics, this type of label has a favorable impact on its use.

EPD has appropriate data for designing new product initiatives from their early phase with

production chain participation (Crippa, 2019; Crippa et al., 2020). The role of supply chains has been addressed in studies as a requirement for enterprises to adopt mitigating measures at all stages of the product life-cycle (Acquaye et al., 2015; Fan et al., 2019; Wojnarowska et al., 2021). The articulation among manufacturing partners creates an atmosphere favorable to identifying priorities for general environmental impact reduction (Acquaye et al., 2015).

As a communication tool, EPD can serve as a reference source, increasing consumers' ability to analyze the environmental impact of products (Dihr et al., 2021). Labeling helps consumers see the quality of products and their environmental impact, which influences purchase behavior (Miklenčičová, 2015). As a result, it helps to increase competitiveness and allows national products to enter more competitive markets with environmental concerns (Juliani & Rodrigues, 2018).

According to Timm and Passuello (2021) and Hoe and Pires (2017), the promotion of EPD in Brazil is an important tool for implementing environmental regulations. Even if the move is in response to global economic demands, public agents are dedicated to promoting EPD in the country (Moré et al., 2020). Priorities for implementing sustainability strategies differ across developed and emerging economies, and the conditions for them to occur are based on adaptation to the country's structural and political constraints (Arvizu-Piña & Cuch ŕ-Burgos, 2017).

Internal incentives, such as cost reduction, chances for innovation, and effective resource utilization, were similar when discussing eco-efficiency in rich and underdeveloped countries, according to Fernández-Viéet al. (2013). What differs is the importance each country places on each of them. Practical initiatives with an agenda in the product life cycle are in their early phases in Brazil. There is policymaker involvement and expansion of EPD use, mostly for providing product environmental information to consumers that takes into account the life cycle (Kiss et al., 2018).

In terms of organizational initiatives, Brazilian corporations are committed to promoting and disseminating LCA-based studies and documents. Furthermore, the Brazilian Life Cycle Association and the Brazilian Business Network for Life Cycle Assessment (Rede ACV, in Portuguese) are working to consolidate the tool and environmental labeling of products through articulations of sectoral, academic, and governmental representations (Kiss et al., 2017; Rede ACV, 2022). The National Institute of Metrology, Quality, and Technology (NIMQT) and the Brazilian Institute of Information in Science and Technology (BIIST) support the development of LCA in the country by creating a national inventory database and providing incentives for product environmental labeling. Brazil offers the normative, political, and institutional conditions required for firms to develop and use EPD as a strategic resource.

Activities that promote Life Cycle Thinking and LCA in Brazil set the framework for interest in the label to become a trend. The LCA provides a view of the systemic functioning of productive activity and its link with the environment, which subsidizes the organization's strategic planning (Luz et al., 2018). LCA assists producers in creating product value with minimal impacts, costs, and risks, giving them a competitive advantage (Manda et al., 2015). Considering the benefits, LCA acceptance in Brazilian enterprises must overcome various

challenges, such as difficulty in execution, a lack of external demand and historical data, and inexperience in applying the results to product improvement (Almeida et al., 2019).

Brazil has policies that can influence LCA use and EPD dissemination, with higher incentives for business enterprises. The National Environmental Policy (NEP) served as the primary impetus for public and private efforts aimed at preserving, improving, and restoring environmental quality (Brasil, 1981). The NEP promotes methods based on the product life cycle.

Government and industry must work together to promote EPD (Arvizu-Pin ã& Cuch ŕBurgos, 2017; Betiol et al., 2016; Scachetti et al., 2020), and the government must strike a balance between sustainability and profit (Cai & Choi, 2020). According to Pereira (2014), when the primary stakeholders, such as the productive sector and society, are involved, government actions become more legitimate. Furthermore, public or private labeling and certification provide more than just information on sustainable processes and products; they also promote transparency in value chains (Mol, 2015).

Concerning sustainable public procurement, it is stated that the duty of the government is not limited to encouraging an innovative and more sustainable market but also to promote societal education, mobilization, and awareness. Public procurement is a tool for advancing the development of a more sustainable and inclusive economy (Betiol et al., 2012). According to Timm and Passuello (2021), green public procurement is ineffective in Brazil. They investigate how, despite the availability of information, international incentives, and national norms and laws, the procurement structure does not consider how to address the environmental implications of purchased products. Adoption of EPD can serve political and economic goals with a focus on environmental sustainability by providing data on product environmental performance using public institutions that are already structured and active in EPD in the Brazilian scenario.

According to Paes et al. (2020), the most commonly used sustainable practices in public procurement are the use of environmental performance criteria in product evaluation, a requirement for the use of certificates and ecolabels, and compliance with specific legislation for bidding normalization. As a result, the environmental, social, and economic elements may benefit as the State's initiative encourages organizations to engage in sustainable production. Young (2015) proposes that enterprises with certification be given preference in public sector procurement bidding. This scenario facilitates the development of a culture based on the ideals of conservation and preservation, reaching society, the state, and the market, hence facilitating the growth of EPD in Brazil.

Policymakers' adaptation of laws displays not only a response to requests from the major global forums but also promotes the use of effective tools, particularly those that modify the forms of production and consumption. Governments may actively contribute to the effectiveness of sustainable consumption by setting the discourse, norms, incentives, and infrastructure. It can also reformulate public policies by introducing newer and more effective policy instruments (Wolff & Sch önherr, 2011).

The LCA leads to the development of sustainability criteria and requirements, which, once defined, can influence public policy, leaving the State to foster debate on the stages of the product's life cycle as well as the scope and dimensions of analysis in each (Coelho et al., 2016). According to Silva et al. (2017), Brazil is in the early stages of incorporating the LCA approach into public policy due to its low utilization in determining the suitability of standards and regulations.

Nonetheless, public policies support more sustainable environmental practices by corporations through suitable economic and voluntary tools (Pereira, 2014). Government intervention must be continuous and structured to ensure that the social, environmental, and economic tripods are maintained and that successful reforms in society and the market are promoted (Oliveira et al., 2021). According to Rocha and Caldeira-Pires (2019), there is a lack of stronger engagement by government agencies and better knowledge of EPD by public institutions. The creation of the EPD must unite governmental, intellectual, and business representations to create environmental plans, allowing advancement in discussions and methods of controlling polluting resources.

Concerning PCRs, it is crucial to determine whether global PCRs are appropriate for EPD development in the Brazilian setting (Kiss et al., 2018; Rocha & Caldeira-Pires, 2019; Hoe & Pires, 2017). The lack of PCR standardization can affect data reliability and transparency when comparing EPDs (Galindro et al., 2020b; Subramanian et al., 2012; Watson & Wiedemann, 2019).

In the Brazilian scenario, the national life cycle inventory database must be expanded and made accessible in order to prepare the EPD. For some sectors, an international database continues to be needed to prepare the LCA (Caldas et al., 2020; Nóbrega et al., 2019). In Brazil, the BIIST maintains the National Bank of Life Cycle Inventories (SICV Brasil), which is compliant with the International Reference Life Cycle Data System (ILCD), demonstrating compatibility with international standards (Rodrigues et al., 2016).

The use of worldwide databases without adaptation to the Brazilian scenario can result in unsatisfactory LCA studies (Silva et al., 2015). If the environmental circumstances of Brazil and other countries are compared, they claim that there are substantial variances in the results of processes. SICV Brasil might assist in eliminating or mitigatig the problem of a shortage of datasets appropriate to the Brazilian context (Silva et al., 2017). However, the challenge of acquiring aggregated national data remains, and this is dependent on sectorial commercial endeavors (Becker et al., 2017).

According to Moura (2013), it can be challenging to determine and quantify the benefits of labels, although their impact can be measured indirectly by modifying purchasing behavior. Furthermore, EPDs can boost company competitiveness by monitoring and improving process performance, declaring the environmental sustainability of products and processes, and promoting better commercial interaction among organizations (business-to-business) and companies and consumers (business-to-consumer), with transparency and responsibility, as well as raising consumer awareness (Barros et al., 2022; Félix, 2015).

4. Conclusion

This study explored approaches for EPD development in the Brazilian context, focusing on stakeholder initiatives and the conditions for national enterprises to adopt this type of label. The literature review discovered 20 works on EPD with just Brazilian experiences, indicating that the topic is still fairly new in academia. Despite the low output, there has been consistency in publication over the previous eight years, since the publication of NBR ISO 14025 (2015). Six of the seven journal publications are from the authors' postgraduate work, indicating a concentration of studies by a few Brazilian experts; all of them are affiliated with universities in the country's south and southeast. Another finding was that half of the studies utilized construction-related products. This result confirmed that EPD approaches in the Brazilian context are still limited and insufficient to measure the effectiveness of corporations employing this label as a strategic resource. However, the authors demonstrated the advantages of EPD applications, showing that EPD is versatile and can be helpful for businesses looking for efficient and cost-effective ways to manage their environmental impact.

As for content analysis, the articles examined the use of EPD as a data source, as a resource to implement or improve other management systems, and as an instrument of environmental communication; explored the potential possibility of promoting EPD in Brazil; and presented case studies of EPD application for national products. Overall, the reviewed studies demonstrate that EPD is a valuable tool for environmental management due to its consistency, reliability, and completeness of data. This finding indicates EPD offers a lot of potential for usage as a strategic resource for businesses, such as for environmental performance communication, product design processes, and production systems. However, due to a lack of Brazilian experience, this resource is not commonly known, disseminated, or employed.

According to the articles studied, Brazil displays the normative, legal, and structural conditions for EPD adoption by Brazilian businesses. Life Cycle Thinking and LCA have recently been addressed and are widely regarded by practitioners as having a significant impact on the appreciation of EPD. This article emphasizes the importance of expanding incentive policies for EPD adoption by organizations with measures that can collaborate to promote the dissemination of its benefits. It is probable that the voluntary profile makes this type of label a less desirable resource for businesses. However, some initiatives might be pursued, such as the mobilization of the productive sectors and their associated supply chains, as well as the upgrading of the national inventory databases with data corresponding to Brazil's environmental features.

References

ABNT – Associação Brasileira de Normas Técnicas. (2015). *NBR ISO 14025: Rótulos e declarações ambientais: declarações ambientais de Tipo III: princípios e procedimentos*. Rio de Janeiro.

ABNT – Associação Brasileira de Normas Técnicas.. (2019). *NBR ISO 14027: Rótulos e declarações ambientais: Desenvolvimento de regras de categorias de produtos*. Rio de

Janeiro.

ABNT – Associação Brasileira de Normas Técnicas. (2009a). *NBR ISO 14040: Gestão ambiental - Avaliação do ciclo de vida - Princípios e estrutura*. Rio de Janeiro.

ABNT – Associação Brasileira de Normas Técnicas. (2009b). *NBR ISO 14044*: *Gestão ambiental - Avaliação do ciclo de vida - Requisitos e orientações*. Rio de Janeiro.

Acquaye, A. A., Yamoah, F. A., & Feng, K. (2015). An integrated environmental and fairtrade labelling scheme for product supply chains. *International Journal of Production Economics, 164*, 472-483. https://doi.org/10.1016/j.ijpe.2014.12.014

Almeida, A. R., Alvarenga, R. A. F., Sartor, L. B., & Simioni, F. J. (2019). Mitigating environmental impacts using Life Cycle Assessment in Brazilian companies: a stakeholders' perspective. *Journal of Environmental Management, 236*, 291-300. https://doi.org/10.1016/j.jenvman.2019.01.094

Andersen, I., & Bams, D. (2022). Environmental management: an industry classification. *J Cleaner Prod., 344*, 130853. https://doi.org/10.1016/j.jclepro.2022.130853

Anderson, J., & Moncaster, A. (2020). Embodied carbon of concrete in buildings, part 1: analysis of published EPD. *Build Cities., 1*, 198-217. https://doi.org/10.5334/bc.59

Andreazzi, M. A., Lizama, M. A. P., Cavalieri, F. L. B., Mendes, A. R., Dias, V. H. C., & Oliveira, K.V. de. (2016). *Análise do ciclo de vida e rotulagem ambiental: um estudo qualitativo e quantitativo das publicações nacionais*. Congresso Brasileiro em Gestão do Ciclo De Vida 5. [Online] Available: https://www.embrapa.br/vcbgcv

Aragón-Correa, J. A., Hurtado-Torres, N., Sharma, S., & García-Morales, V. J. (2008). Environmental strategy and performance in small firms: a resource-based perspective. *Journal of Environmental Management, 86*, 88-103. https://doi.org/10.1016/j.jenvman.2006.11.022

Arvizu-Piña, V. A., & Cuchí-Burgos, A. (2017). Promoting sustainability in Mexico's building sector via environmental product declarations. *The International Journal of Life Cycle Assessment, 22*, 1744-1759. https://doi.org/10.1007/s11367-017-1269-z

Arvizu-Piña, V. A., Cuchí-Burgos, A., & Chargoy Amador, J. P. (2019). A bottom-up approach for implementation of Environmental Product Declarations in Mexico's housing sector. *The International Journal of Life Cycle Assessment, 24*, 1553-1572. https://doi.org/10.1007/s11367-019-01587-w

Barros, M. V., Salvador, R., Maciel A. M., Ferreira, M. B., de Paula, V. R., Francisco, A. C. de, Rocha, C. H. B., & Piekarski, C. M. (2022). An analysis of Brazilian raw cow milk production systems and environmental product declarations of whole milk. *Journal of Cleaner Production, 367*(133067). https://doi.org/10.1016/j.jclepro.2022.133067

Becker, A. M. Jr., Dias, R. O., Chiumento, G., Motta, F. L. U. L., Almeida, L. G. O. de, Kabe, Y. H. O., & Rocha, T. B. (2017). Desenvolvimento de base de dados ambiental para a cadeia

de transformação de plástico no Brasil: primeiros avanços. *LALCA: Revista Latino-Americana em Avaliação do Ciclo de Vida, 1*, 48-62. https://doi.org/10.18225/lalca.v1iEspecial.3072

Benites, L. L. L., & Polo, E. F. (2013). A sustentabilidade como ferramenta estratégica empresarial: governança corporativa e aplicação do Triple Bottom Line na Masisa. *Revista de Administração da UFSM, 6*, 195-210. https://doi.org/10.5902/198346598879

Betiol, L. S., Ramos, L., & Cavalcanti, D. (2016). *Avaliação do ciclo de vida como ferramenta de apoio às ações de compras públicas sustentáveis: o caso do Estado de São Paulo*. Congresso Brasileiro em Gestão do Ciclo de Vida 5. https://www.embrapa.br/vcbgcv

Betiol, L. S., Uehara, T. H. K., Laloë, F. K. Appugliese, G. A., Adeodato & S., Ramos, L. (2012). *Compra sustentável: a força do consumo público e empresarial para uma economia verde e inclusiva.* São Paulo. [Online] Available: https://bibliotecadigital.fgv.br/dspace/handle/10438/15358

Brasil. (1981). *Lei nº6.938, de 31 de agosto de 1981*. Brasília - DF. [Online] Available: http://www.planalto.gov.br/ccivil_03/leis/l6938.htm

Cai, Y. J., & Choi, T. M. (2020). A United Nations' Sustainable Development Goals perspective for sustainable textile and apparel supply chain management. *Transport Research Part E: Logistics and Transport Review, 141*(102010). https://doi.org/10.1016/j.tre.2020.102010

Caldas, L. R., Carvalho, M. T. M., & Toledo, R. D. F. (2020). Avaliação de estratégias para a mitigação dos impactos ambientais de revestimentos argamassados no Brasil. *Ambiente Construído, 20* (3), 343-362. https://doi.org/10.1590/s1678-86212020000300433

Chaudhry, S. M., Saeed, A., & Ahmed. R. (2021). Carbon neutrality: the role of banks in optimal environmental management strategies. *Journal of Environmental Management, 299*(113545). https://doi.org/10.1016/j.jenvman.2021.113545

Coelho, O. F., Saccaro, N. L. Jr., & Luedemann, G. (2016). *Texto para discussão 2205: a avaliação do ciclo de vida como ferramenta para a formulação de políticas públicas no Brasil*. IPEA, Brasília - DF. [Online] Available: https://repositorio.ipea.gov.br/bitstream/11058/6685/1/td_2205.pdf

Crippa, J. (2019). *Integração BIM-ACV como apoio à tomada de decisão na fase de concepção de projeto*. Dissertação, Universidade Federal do Paraná. [Online] Available: https://hdl.handle.net/1884/62546

Crippa, J., Scheer, S., & Ugaya, C. (2020). *Aplicação de Declarações Ambientais de Produto (DAP) na Modelagem da Informação da Construção (BIM)*. Congresso Brasileiro sobre Gestão do Ciclo de Vida 7. [Online] Available: https://www.ufrgs.br/gcv2020/wp-content/uploads/2021/09/ANAIS-GCV-2021_V2-vers%C3%A3o-preliminar-sem-ISBN.pdf

Del Rosario, P., Palumbo, E., & Traverso, M. (2021). Environmental Product Declarations as

data source for the environmental assessment of buildings in the context of level (s) and DGNB: how feasible is their adoption? *Sustainability, 13*(11), 6143. https://doi.org/10.3390/su13116143

Dihr, M., Berthold, A., Siegrist, M., & Sütterlin, B. (2021). Consumers' knowledge gain through a cross-category environmental label. *Journal of Cleaner Production, 319*(128688). https://doi.org/10.1016/j.jclepro.2021.128688

Dórea, R. J. S., Almeida, J. A. A. N., & Rodrigues, L. B. (2018). *Revisão sistemática da rotulagem ambiental da última década*. Congresso Brasileiro sobre Gestão do Ciclo de Vida 6. [Online] Available: https://acv.ibict.br/documentos/publicacoes/4679-gcv2018-anais-do-vi-congresso-brasileiro-sobre-gestao-do-ciclo-de-vida/

Dornelas, M., & Patriciane, N. (2005). Meio ambiente x organizações: uma discussão dos efeitos causados pela atuação das organizações diante da questão ambiental. *Revista Eletrônica de Ciência Administrativa, 4*, 1-20. [Online] Available: https://doi.org/10.5329/RECADM.20050401004

EPD® Brasil. (2022). *Brasil ganha mais espaço no cenário mundial das EPDs*. [Online] Available: https://www.epdbrasil.com.br/post/brasil-ganha-mais-espa%C3%A7o-no-cen%C3%A1rio-mundial-das-epds

Fan, T., Song, Y., Cao, H., & Xia, H. (2019). Optimal eco-labeling strategy with imperfectly informed consumers. *Industrial Management & Data Systems, 119*. https://doi.org/10.1108/IMDS-06-2018-0256

Félix, M. C. L. (2015). *A rotulagem ambiental como instrumento de efetivação do desenvolvimento sustentável*. Dissertação, Pontifícia Universidade Católica de Goiás. [Online] Available: http://tede2.pucgoias.edu.br:8080/handle/tede/2749

Fernández-Viñé, M. B., Gómez-Navarro, T., & Capuz-Rizo, S. F. (2013). Assessment of the public administration tools for the improvement of the eco-efficiency of Small and Medium Sized Enterprises. *Journal of Cleaner Production, 47*, 265-273. https://doi.org/10.1016/j.jclepro.2012.08.026

Fet, A. M., Skaar, C., & Michelsen, O. (2009). Product category rules and environmental product declarations as tools to promote sustainable products: experiences from a case study of furniture production. *Clean Technologies and Environmental Policy, 11*, 201-207. https://doi.org/10.1007/s10098-008-0163-6

Galindro, B. M., Fries, C. E., & Soares, S. R. (2018). *Simplificando a comunicação das declarações ambientais de produto*. Congresso Brasileiro sobre Gestão do Ciclo de Vida 6. [Online] Available: https://acv.ibict.br/documentos/publicacoes/4679-gcv2018-anais-do-vi-congresso-brasileiro-sobre-gestao-do-ciclo-de-vida/

Galindro B. M. (2019). *Desenvolvimento de sistema de benchmarking para a comunicação de declarações ambientais de produto (DAPs)*. Dissertação, Universidade Federal de Santa Catarina. [Online] Available: https://repositorio.ufsc.br/handle/123456789/211495

Galindro, B. M., Bey, N., Olsen, S. I., Fries, C. E., & Soares, S. R. (2020a) Use of data envelopment analysis to benchmark environmental product declarations—a suggested framework. *International Journal Life Cycle Assessement, 25*, 2417-2431. https://doi.org/10.1007/s11367-019-01639-1

Galindro, B. M., Welling, S., Bey, N., Olsen, S. I., Soares, S. R., & Ryding, S. O. (2020b). Making use of life cycle assessment and environmental product declarations: a survey with practitioners. *Journal of Industrial Ecology, 24*, 965-975. https://doi.org/10.1111/jiec.13007

Gelowitz, M. D. C., & McArthur, J. J. (2017). Comparison of type III environmental product declarations for construction products: material sourcing and harmonization evaluation. *Journal of Cleaner Production, 157*, 125-133. https://doi.org/10.1016/j.jclepro.2017.04.133

Gelowitz, M. D. C., & McArthur, J. J. (2018). Insights on environmental product declaration use from Canada's first LEED® v4 platinum commercial project. *Resources, Conservation and Recycling, 136*, 436-444. https://doi.org/10.1016/j.resconrec.2018.05.008

Gunarathne, A. D. N., & Lee, K. (2019). Environmental and managerial information for cleaner production strategies: an environmental management development perspective. *Journal of Cleaner Production, 237* (117849). https://doi.org/10.1016/j.jclepro.2019.117849

Hoe, V. M. (2016). *A construção do Sistema Brasileiro de Declaração Ambiental de Produtos*. Dissertação, Universidade de Brasília. [Online] Available: https://repositorio.unb.br/handle/10482/22523

Hoe, V. M., & Pires, A. (2017). A construção do Sistema Brasileiro de Declaração Ambiental de Produto. *Sustentabilidade em Debate, 8*(2), 44-59. https://doi.org/10.18472/SustDeb.v8n2.2017.23738

Ibáñez-Forés, V., Pacheco-Blanco, B., Capuz-Rizo, S. F., & Bovea, M. D. (2016). Environmental Product Declarations: exploring their evolution and the factors affecting their demand in Europe. *Journal of Cleaner Production, 116*, 157-169. https://doi.org/10.1016/j.jclepro.2015.12.078

IBICT - Instituto Brasileiro de Informação em Ciência e Tecnologia (2014). *Desenvolvimento sustentável e avaliação do ciclo de vida*. IBICT, Brasília - DF. [Online] Available: https://acv.ibict.br/documentos/publicacoes/283-desenvolvimento-sustentavel-e-avaliacao-do-ciclo-de-vida/

Juliani, A. J., & Rodrigues, T. O. (2018). *Uso de ferramentas da ACV no comércio internacional: estudo de caso sobre rotulagem ambiental*. Congresso Brasileiro sobre Gestão do Ciclo de Vida 6. https://doi.org/10.22533/at.ed.16319080516

Kiss, B., Dinato, R., & Fernandes, M. (2017). *Experiências e reflexões sobre a gestão do ciclo de vida de produtos nas empresas brasileiras: ciclos 2015 e 2016*. EAESP, São

Paulo-SP. [Online] Available: https://redeacv.org.br/files/b36f48eaef79f68a2da64f1f4beab4fb.pdf

Kiss, B., Sampaio, C., Coelho, F., Souza, L., Costa, M., Meira, M., & Rosa, M. S. (2018). *Panorama de selos de sustentabilidade que demandam rotulagem tipo III no Brasil.* Congresso Brasileiro sobre Gestão do Ciclo de Vida 6. [Online] Available: https://acv.ibict.br/documentos/publicacoes/4679-gcv2018-anais-do-vi-congresso-brasileiro-sobre-gestao-do-ciclo-de-vida/

Kremer, G. M. (2020). *Declarações ambientais de produtos lácteos: análise e recomendações para aplicação*. Monografia, Universidade Tecnológica Federal do Paraná. [Online] Available: http://repositorio.utfpr.edu.br/jspui/handle/1/24090

Luo, Y., Song, K., Ding, X., & Wu, X. (2021). Environmental sustainability of textiles and apparel: a review of evaluation methods. *Environmental Impact Assessment Review, 86*(106497). https://doi.org/10.1016/j.eiar.2020.106497

Luz, L. M., Francisco, A. C., Piekarski, C. M., & Salvador, R. (2018). Integrating life cycle assessment in the product development process: a methodological approach. *Journal of Cleaner Production, 193*, 28-42. https://doi.org/10.1016/j.jclepro.2018.05.022

Manda, B. M. K., Worrel, E., & Patel, M. K. (2015). Prospective life cycle assessment of an antibacterial T-shirt and supporting business decisions to create value. *Resources, Conservation and Recycling, 103*, 47-57. https://doi.org/10.1016/j.resconrec.2015.07.010

Miklenčičová, R. (2015). Perception of environmental product labelling by Slovak consumers. *Procedia Economics and Finance, 34*, 644-648. https://doi.org/10.1016/S2212-5671(15)01680-9

Mol, A. P. J. (2015). Transparency and value chain sustainability. *Journal of Cleaner Production, 107*, 154-161. https://doi.org/10.1016/j.jclepro.2013.11.012

Moré, F. B. (2021). *Avaliação do grau de comparabilidade entre DAPs*. Dissertação, Universidade Federal de Santa Catarina. https://repositorio.ufsc.br/handle/123456789/227013

Moré, F. B., Galindro, B. M., & Soares, S. R. (2020). *Panorama da implementação das Declarações Ambientais de Produto (DAPs) em países da América Latina*. Congresso Brasileiro sobre Gestão do Ciclo de Vida 7. [Online] Available: https://www.ufrgs.br/gcv2020/wp-content/uploads/2021/09/ANAIS-GCV-2021_V2-vers%C3%A3o-preliminar-sem-ISBN.pdf

Moré, F. B., Galindro, B. M., & Soares, S. R. (2022). Assessing the completeness and comparability of environmental product declarations. *Journal of Cleaner Production, 375*(133999). https://doi.org/10.1016/j.jclepro.2022.133999

Moura, A. (2013). O mecanismo de rotulagem ambiental: perspectivas de aplicação no Brasil. *Boletim Regional, Urbano e Ambiental, 7*. [Online] Available: http://repositorio.ipea.gov.br/bitstream/11058/5655/1/BRU_n07_mecanismo.pdf

Nóbrega, C. C., Carvalho, M., Garcia, H. R. M., Ibáñez-Fóres, V., & Bovea, M. D. (2019). Avaliação do ciclo de vida da coleta seletiva de papel e papelão no núcleo do Bessa, município de João Pessoa (PB), Brasil. *Engenharia Sanitária e Ambiental.*, *24*(5), 875-886. https://doi.org/10.1590/s1413-41522019197802

Oliveira, V. M., Gomes, A. A., Teodósio, A. S. S., Correia, S. E. N. (2021). Avanços e retrocessos nas ações governamentais de promoção do consumo sustentável. *Cadernos Gestão Pública e Cidadania, 26*, 1-23. https://doi.org/10.12660/cgpc.v26n84.81400

Paes, C. O., Zucoloto, I. E., Rosa, M., & Costa, L. (2020). Práticas, benefícios e obstáculos nas compras públicas sustentáveis: uma revisão sistemática de literatura. *RGSA - Revista de Gestão Social e Ambiental, 13*, 21-39. http://dx.doi.org/10.24857/rgsa.v13i2.1798

Pereira, G. R. (2014). *Subsídios para implantação da Produção mais Limpa no Brasil*. Tese, Universidade Federal de Santa Catarina. [Online] Available: https://repositorio.ufsc.br/xmlui/handle/123456789/130958

Prisma Group (2020). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses. University of Ottawa/Oxford University*. [Online] Available: https://www.prisma-statement.org/PRISMAStatement/Checklist

Rede ACV - Rede Empresarial Brasileira de Avaliação de Ciclo de Vida (2022). *O que é a Rede ACV*. [Online] Available: https://redeacv.org.br/pt-br/o-que-e-a-rede-acv/

Rocha, M. S. R. (2018). *Rotulagem Ambiental tipo III: oportunidades para o Brasil*. Dissertação, Universidade Federal do Rio de Janeiro. [Online] Available: http://hdl.handle.net/11422/12173

Rocha, M. S. R., & Caldeira-Pires, A. (2019). Environmental product declaration promotion in Brazil: SWOT analysis and strategies. *Journal of Cleaner Production, 235*, 1061-1072. https://doi.org/10.1016/j.jclepro.2019.06.266

Rodrigues, T. O., Sugawara, E. T., Silva, D. A. L., Matsuura, M. I. da S. F., Braga, T. E. N., & Ugaya, C. M. L. (2016). *Guia Qualidata: requisitos de qualidade de conjunto de dados para o Banco Nacional de Inventários do Ciclo de Vida*. Instituto Brasileiro de Informação em Ciência e Tecnologia, Brasília. [Online] Available: https://www.embrapa.br/busca-de-publicacoes/-/publicacao/1071958/guia-qualidata-requisitos-de-qualidade-de-dados-para-o-banco-nacional-de-inventarios-do-ciclo-de-vida

Roh, T., Noh, J., Oh, Y., & Park, K. (2022). Structural relationships of a firm's green strategies for environmental performance: the roles of green supply chain management and green marketing innovation. *Journal of Cleaner Production, 356*(131877). https://doi.org/10.1016/j.jclepro.2022.131877

Scachetti, M. T., Fernandes, M. H. N., & Ribeiro, L. G. (2020). *Experiências da rotulagem tipo III no Brasil - DAP de 3 produtos da ArcelorMittal*. Congresso Brasileiro sobre Gestão do Ciclo de Vida 7. [Online] Available: https://www.ufrgs.br/gcv2020/wp-content/uploads/2021/09/ANAIS-GCV-2021_V2-vers%C3

%A3o-preliminar-sem-ISBN.pdf

Shepherd, D. (2016). *Environmental product declarations: transparency reporting for sustainability*. IEEE-IAS/PCA Cement Industry Technical Conference. https://doi.org/10.1109/CITCON.2016.7742664

Silva, F. B., Arduin, R. H., Oliveira, L. A. de & Becere, O. H. (2015). Análise da viabilidade técnica da adaptação de dados internacionais de inventário de ciclo de vida para o contexto brasileiro: um estudo de caso do concreto para as paredes moldadas no local. Congresso Brasileiro de Concreto 57. [Online] Available: https://www.researchgate.net/publication/302167374_Analise_da_viabilidade_tecnica_da_adaptacao_de_dados_internacionais_de_inventario_de_ciclo_de_vida_para_o_contexto_brasileiro_um_estudo_de_caso_do_concreto_para_paredes_moldadas_no_local

Silva, D. A. L., Chabrawi, A. M. R. O., & Oliveira, J. A. (2017). Perspectivas do setor empresarial brasileiro quanto ao uso da ACV e a colaboração para o fortalecimento do SICV Brasil. *LALCA: Revista Latino Americana em Avaliação do Ciclo de Vida*, *1*(1), 112-137. https://doi.org/10.18225/lalca.v1i1.3038

Song, Y., Qin, Z., & Yuan, Q. (2019). The impact of eco-label on the young Chinese generation: the mediation role of environmental awareness and product attributes in green purchase. *Sustainability, 11*(4), 1-18. https://doi.org/10.3390/su11040973

Subramanian, V., Ingwersen, W., Hensler, C., & Collie, H. (2012). Comparing product category rules from different programs: learned outcomes towards global alignment. *The International Journal of Life Cycle Assessment, 17*, 892-903. https://doi.org/10.1007/s11367-012-0419-6

Testa, F., Nucci, B., Iraldo, F., Appolloni, A., & Daddi, T. (2017). Removing obstacles to the implementation of LCA among SMEs: a collective strategy for exploiting recycled wool. *Journal Cleaner of Production*, *156*, 923-931. https://doi.org/10.1016/j.jclepro.2017.04.101

Timm, J. F. G. (2019). *Consideração de desempenho ambiental em modelo para Compras Públicas Verdes na construção civil*. Dissertação, Universidade Federal do Rio Grande do Sul. [Online] Available: http://hdl.handle.net/10183/205408

Timm, J. F. G., Maciel, V. G., & Passuello, A. (2021). Green public procurement model for environmental assessment of constructive systems. *International Journal of Construction Management*. https://doi.org/10.1080/15623599.2021.1920162

Timm, J. F. G., & Passuello, A. C. B. (2021). Potencial de uso de declaração ambiental de produto para auxiliar em compras públicas verdes na construção civil. *Ambiente Construído, 21*(2), 263-276. http://dx.doi.org/10.1590/s1678-86212021000200525

Wang, C., Ghadimi. P., Lim, M. K., & Tseng, M. (2019). A literature review of sustainable consumption and production: A comparative analysis in developed and developing economies. *Journal of Cleaner Production*, *206*, 741-754. https://doi.org/10.1016/j.jclepro.2018.09.172

Wang, L., Cui, Z., & Liang, X. (2015). Does it pay to be green? Financial benefits of

environmental labeling among Chinese firms, 2000-2005. *Management and Organization Review, 11*(3), 493-519. https://doi.org/10.1017/mor.2014.8

Watson, K. J., & Wiedemann, S. G. (2019). Review of methodological choices in LCA-based textile and apparel rating tools: key issues and recommendations relating to assessment of fabrics made from natural fibre types. *Sustainability, 11*. https://doi.org/10.3390/su11143846

Wen, H., & Lee, C. C. (2020). Impact of environmental labeling certification on firm performance: empirical evidence from China. *Journal of Cleaner Production, 255*(120201). https://doi.org/10.1016/j.jclepro.2020.120201

Wojnarowska, M., Soltysik, M., & Prusak, A. (2021). Impact of eco-labelling on the implementation of sustainable production and consumption. *Environmental Impact Assessment Review, 86*(106505). https://doi.org/10.1016/j.eiar.2020.106505

Wolff, F., & Schönherr, N. (2011). The impact evaluation of sustainable consumption policy instruments. *Journal of Consumer Policy, 34*, 43-66. https://doi.org/10.1007/s10603-010-9152-3

Yenipazarli, A. (2015). The economics of eco-labeling: standards, costs and prices, *International Journal of Production Economics, 170*(Part A), 275-286. https://doi.org/10.1016/j.ijpe.2015.09.032

Young, C. E. F. (2015). Sustentabilidade e competitividade: o papel das empresas. *Revista de Economia Mackenzie, 5*(5), 87-101. [Online] Available: https://editorarevistas.mackenzie.br/index.php/rem/article/view/797

Appendix

Appendix 1. Distribution of academic productions in chronological order from most recent to oldest

n.	Journal/ Collection	Author/Year	Title of the article	Source
1	Journal of Cleaner Production	Moré et al. (2022)	Assessing the completeness and comparability of environmental product declarations	Science Direct
2	Journal of Cleaner Production	Barros et al. (2022)	An analysis of Brazilian raw cow milk production systems and environmental product declarations of whole milk	Web of Science
3	Ambiente Construído	Timm and Passuello (2021)	Potential use of environmental product declaration to assist in green public procurement in construction	Scielo Brasil
4	International Journal of Construction Management	Timm et al. (2021)	Green public procurement model for environmental assessment of constructive systems	Scopus
5	Repositório Institucional UFSC*	Moré (2021)	Evaluation of the degree of comparability between EPDs	BDTD
6	Annals BCLCM (7th edition)	Moré et al. (2020)	Overview of the implementation of Environmental Product Declarations (EPDs) in Latin American countries	annals
7	Annals BCLCM (7th	Crippa et al.	Application of Environmental Product	annals

	edition)	(2020)	Declarations (EPD) in Building Information Modeling (BIM)	
8	Annals BCLCM (7th edition)	Scachetti et al. (2020)	Experiences of Type III Labeling in Brazil -EPD of 3 ArcelorMittal products	annals
9	Acervo Digital UFPR**	Kremer (2020)	Environmental declarations of dairy products: analysis and recommendations for application	Google Scholar
10	Journal Life Cycle Assessement	Galindro et al. (2020a)	Use of data envelopment analysis to benchmark environmental product declarations — a suggested framework. International	Springer Link
11	Repositório Digital UFRGS***	Timm (2019)	Consideration of environmental performance in model for green public procurement in construction	BDTD
12	Acervo Digital UFPR**	Crippa (2019)	BIM-LCA integration as a support for decision-making in the project design phase	BDTD
13	Repositório Institucional da UFSC*	Galindro (2019)	Development of a benchmarking system for the communication of environmental product declarations (EPDs)	BDTD
14	Journal of Cleaner Production	Rocha and Caldeira-Pires (2019)	Environmental product declaration promotion in Brazil: SWOT analysis and strategies	Web of Science
15	Repositório da UFRJ****	Rocha (2018)	Type III Environmental Labeling: opportunities for Brazil	BDTD
16	Annals BCLCM (6th edition)	Galindro et al. (2018)	Simplifying the communication of environmental product claims	annals
17	Annals BCLCM (6th edition)	Kiss et al. (2018)	Overview of sustainability labels that require type III labeling in Brazil	annals
18	Sustentabilidade em Debate	Hoe and Pires (2017)	The Construction of the Brazilian Product Environmental Declaration System	Scopus
19	Repositório Institucional da UnB	Hoe (2016)	The Construction of the Brazilian Product Environmental Declaration System	BDTD
20	Annals BCLCM (5th edition)	Andreazzi et al. (2016)	Life cycle analysis and environmental labeling: a qualitative and quantitative study of national publications	annals

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