



PROPOSAL FOR A COLLABORATIVE LCA DATA MANAGEMENT METHODOLOGICAL APPROACH FOR CREATING “NODES” IN THE BRAZILIAN NATIONAL INVENTORY DATABASE (SICV) BRASIL

Tiago Braga MSc. *, ***, Marília Folegatti Matsuura PhD **, Fernando Dias MSc. **, Carla Gama* Ms, Thiago Rodrigues PhD *, ***, Maria Cléa Figueiredo PhD

* **Institution 1**, Instituto Brasileiro de Informação em Ciência e Tecnologia.

SAUS 5, Bloco H, Brasília, DF, Brasil. +55 61 3217.6286.

E-mail: {tiagobraga, carlagama, thiagorodrigues}@ibict.br.

** **Institution 2**, Empresa Brasileira de Pesquisa Agropecuária.

Parque Estação Biológica - PqEB s/nº, Brasília, DF, Brasil.

+55 61 3448.4433.

E-mail: {marilia.folegatti, fernando.dias, clea.figueiredo}@embrapa.br.

*** **Institution 3**, Universidade de Brasília.

Campus Darcy Ribeiro, Brasília, DF, Brasil.

ABSTRACT:

Global Guidance proposes mechanisms for LCA studies and data management for improving interoperability, data exchange, accessibility and credibility of LCA databases. The PBACV (CONMETRO, 2010) has among its objectives to implement in Brazil a system capable of organizing, storing and disseminating information of LCIs. The Brazilian government responded to this demand through IBICT, which developed the SICV Brazil. For a LCI database to succeed, it is necessary to have primary data provided by the productive sector. The availability of data contributes to the growth of the country while benefiting the primary data providers, as society is increasingly attentive to the transparency and environmental awareness of companies. The management of LCA data is not a concern of national LCI databases alone. Other institutions also need to manage their LCA data independently of proprietary software, ensuring autonomy and sustainability for their operations. Keeping data on someone's own infrastructure favors autonomy, but multiplies infrastructure investment and impairs interoperability. This research proposes a procedure for shared management of LCA data through the creation “nodes”, an instance of SICV Brazil for storing LCI data from private and public institutions. This procedure for shared management promoted the Brazilian National Inventory Database (SICV Brazil) and offered advanced information resources to institutions, such as Embrapa, without additional infrastructure and facilitating interoperability with other institutions. Authors believe that the creation of other instances of the SICV could contribute to the advance of LCA in Brazil.

Keywords:

LCA Databases, data management, LCA network.

1 | INTRODUCTION

Life cycle assessment (LCA) data management is a task traditionally reserved for LCA software companies (FRISCHKNECHT; REBITZER, 2005). It was up to these software, such as SimaPro and GaBi, to manage the entire process of information flow in LCA, from its creation through analysis, distribution and storage. Such an approach was common during the gestational period of LCA, understood here to be the beginning of the discussions of ISO 14.040 (ABNT, 2014) in the early 1990s and in the first half of the 2000s.

The use of software as a tool for the management of the information cycle in LCA, although efficient in understanding the entire evaluation process, from data collection to impact analysis and information storage, also presented some difficulties. Among them, it is possible to mention the lack of tools focused on multi-user teams, technical flaws in data conversion between different software, and inefficient mechanisms to search and make available inventories (FRISCHKNECHT; REBITZER, 2005; NARITA et al., 2004; PROC SAF PR, 1999).

Such difficulties and the need to use LCA data on an integrated manner amongst distinct actors, both in national and international contexts, have led to several initiatives for the creation of networks of LCA. One of the first examples was the creation of the database ecoinvent, which aimed to integrate Swiss data production related to LCA, reflecting the situation of the year 2000 (FRISCHKNECHT; REBITZER, 2005). In 1998, Japan started its LCA network Project, with the creation of the Japanese national database (IDEA). This database was published in a first version with 100 inventories made available voluntarily. The Japanese project believed that “compatibility with reliability and openness was important in LCA's data management system” (Nakano; Sugimoto; Tahara, 2014, p. 165, authors translation). Like the Swiss and Japanese examples, other countries such as the United States, France, Italy, Australia and Brazil have also started national database projects. These initiatives aimed to allow the sharing of LCA information specific to the national context of each country, creating information networks in LCA. More recently initiatives, strived at the creation of international networks, have emerged with the European Commission (EC) through the Life Cycle Data Network (LCDN) and the United Nations Environment Program (UNEP) through the Global LCA Data Access (GLAD).

The understanding that this worldwide movement to standardize LCA data management needed uniform guidelines has led UNEP to take action in order to unify efforts. One of these actions was the workshop promoted in Shonan, Japan, which resulted in the publication of the Global Guidance Principles for Life Cycle Assessment Databases (UNEP, 2011). In the same vein, the Brazilian government officialized its efforts to promote LCA in 2010, with the creation of the Brazilian LCA Program (CONMETRO, 2010), which, among other objectives, aims to “implement a recognized international system capable of organize, store and disseminate standardized information on the

life cycle inventories of Brazilian industrial production "(CONMETRO, 2010, p.3). This initiative of the Brazilian government has been promoting the LCA in the country. Although the actions of the Brazilian government make official the effort to create the National Life Cycle Inventory (SICV Brasil), there are numerous reports of companies that still find it difficult to carry out LCA studies. These difficulties are due to technical reasons, such as those mentioned above, such as difficulties in maintaining LCA software or hiring professionals, or because there is no Brazilian data to serve as a basis for deriving new studies. Thus, the question that moves this research is: how to create a network of LCA databases that allows to increase the number of datasets in the SICV Brasil and at the same time allow institutions to have autonomy to manage their inventory data? In order to answer it, the Brazilian Institute of Science, Technology and Information (IBICT) and the Brazilian Agricultural Research Corporation (Embrapa), two Brazilian institutions that participate in the subject of LCA and which respectively coordinate the technical commissions of Database and Of PBACV inventories, act together in carrying out this research. The objective is to establish procedures for the creation of "nodes" in SICV Brasil, being the first "node" of Embrapa, while defining strategies to increase the number of life cycle inventories made available by the Brazilian database.

2| METHODOLOGY

The methodology for node creation in SICV Brasil and implementation of the first Embrapa "node" is based on the analysis of PBACV documents and scientific articles related to the management of LCA databases, data collection with representatives of PBACV technical committees associated with the thematic and situation analysis from discussions between researchers from the field of LCA and Information Science.

As a consequence, the procedures and strategies that resulted in the three phases described during the presentation of results were defined.

3| RESULTS AND DISCUSSION

In order to achieve the proposed objectives for this research, IBICT and Embrapa jointly made efforts to establish the "Embrapa Node" of SICV Brasil, covering three phases:

I. Definition of structure of software of LCA that supports the creation of LCA data network;

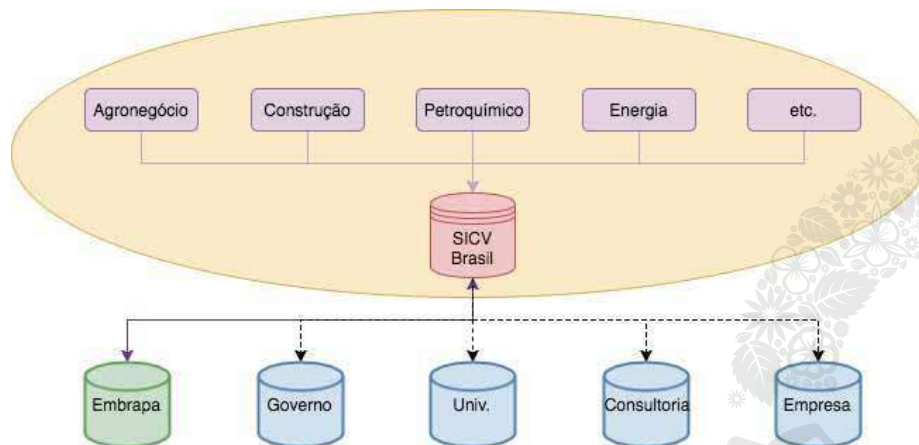
II. Establishment of technological and organizational models in the creation of "nodes" of the network; and

III. Definition of criteria for selection of "nodes".

Regarding to phase I (definition of the LCA software), we chose soda4LCA, a system designed to support the creation of LCA database networks (KUSCHE et al., 2012). Among soda4LCA's features, it is worth mentioning the management of public and open LCA databases, so that a single system installation can logically separate data. This resource allows, for example, the creation of specific bases by sector, such as agribusiness and fuels, within the SICV Brasil itself. In addition, the system has a network interface that allows communication between different instances for data exchange. In order to meet Brazilian specificities, some resources have been developed for soda4LCA, such as user management, process of revising datasets and remodeling of the messaging service. These resources are in the process of being sent to the soda4LCA repository, which is expected to be incorporated into the system root in 2017.

With regard to Phase II of defining the technological and organizational model for creating "nodes", two business models were defined. The first, possible only for public entities such as Embrapa, allows the technological structure to be maintained in the physical structure of IBICT. Such support includes backup, software update, and network monitoring. In this model, the administrative management of the system is the responsibility of the IBICT partner institution. In order to implement this model, it

Figure 2 - Structure supported by SICV Brasil



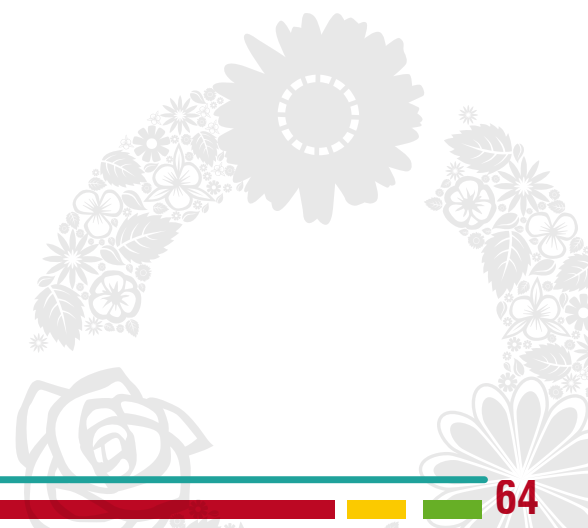
With regard to Phase III (definition of criteria for selection of "nodes"), it was established that both public and private institutions, be they small, medium or large, individual or sector representative, could become a "knot" of the SICV Brazil. However, as the resources available to support the addition of new "nodes" are limited, the implantation of new "nodes" of the SICV Brazil will begin with the institutions representing the sectors to be prioritized by the PBACV Technical Inventory Committee.

4 | CONCLUSIONS

The creation of the procedure to create "nodes" linked to the SICV Brasil will favor the availability of inventories of several Brazilian productive sectors, bringing benefits both to the institutions that provide inventories and to society in general. The "Embrapa Node" of SICV Brasil, still in the consolidation phase, can be considered a milestone, since it will enable one of the institutions that most invest in research in the area of LCA in Brazil to actively contribute to the advancement of the methodology in the country. The data that will be made available in the SICV Brasil through this "node" will allow the creation of new studies in LCA. At the same time, it is understood that Embrapa acquires a robust system of ACV data management and reduces costs with information technology infrastructure. With the established SICV Brazil "nodes" methodology, it is expected that new institutions will be able to join the Brazilian database of LCA databases, allowing the Brazilian bank to expand its activities in the promotion of LCA in the country.

References

- ABNT, Associação Brasileira de Normas Técnicas. NBR ISO 14040 (2014): Avaliação do Ciclo de Vida: Princípios e Estrutura. . [S.l.: s.n.], 2014
- CONMETRO. Resolução no 04, de 15 de dezembro de 2010. . [S.l.: s.n.]. Disponível em: <<http://www.inmetro.gov.br/legislacao/resc/pdf/RESC000236.pdf>>. Acesso em: 14 dez. 2015. , 15 dez. 2010
- FRISCHKNECHT, Roif; REBITZER, Gerald. The ecoinvent database system: a comprehensive web-based LCA database. *Journal of Cleaner Production*, v. 13, n. 13, p. 1337–1343, 2005.
- IBICT, Instituto Brasileiro de Informação em Ciência e Tecnologia. Relatório BRACV: Fórum Brasileiro de Avaliação do Ciclo de Vida. , Relatório BRACV, no 1. Brasília: IBICT, 2016. Disponível em: <http://acv.ibict.br/wp-content/uploads/2017/01/Relatorio-BRACV_Ano-2016_1.pdf>.
- INGWERSEN, Wesley W. et al. A new data architecture for advancing life cycle assessment. *The International Journal of Life Cycle Assessment*, v. 20, n. 4, p. 520–526, 2015.
- KUSCHE, Oliver et al. Creating LCA Data Exchange Networks. 2012, [S.l.: s.n.], 2012. p. 525–532.
- NARITA, Nobuhiko et al. Current LCA database development in Japan-results of the LCA project. *The International Journal of Life Cycle Assessment*, v. 9, n. 6, p. 355, 2004.
- PROC SAF PR. LCA database on US industry now available. *Process Safety Progress*, v. 18, n. 2, p. 7–7, 1999.
- UNEP, United Nations Environment Programme. Global Guidance Principles for Life Cycle Assessment Databases. Shonan, Japão: United Nations Environment Programme, 2011.
- NAKANO, Katsuyuki; SUGIMOTO, Takuma; TAHARA, Kiyotaka. Implementation of Inventory Data Management System Ensuring Compatibility with Reliability and Openness. *Journal of Life Cycle Assessment*, Japan, v. 10, n. 2, p. 165–172, 2014.





Carbon and Water Footprint

CILCA 2017

VII Conferencia Internacional de
**Análisis de Ciclo de
Vida en Latinoamérica**

12 al 15 de junio de 2017

Medellín - Colombia