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Social, Work and Organizations Psychology

Bridging the Gaps in Social Life Cycle Assessment: Theoretical and Practical Contributions*

Arij Mohamad Radwan Omar Chabrawi[1,**], Josemberg Moura de Andrade[1], Marzia Traverzo[2], & Cássia Maria Lie Ugaya[3]

[1]*University of Brasilia, Brasília, DF, Brasil*

[2]*RWTH Aachen University, Aachen, Alemanha*

[3]*Federal Technological University of Paraná, Curitiba, PR, Brasil*

ABSTRACT – Sustainable development is based on three pillars: environment preservation, cost-effective production and human development. Within this context, emerges Life Cycle Assessment (LCA), a solid methodology for assessing the impact of products and services. Whereas Social LCA (S-LCA) is an early-stage approach, currently under development, requiring theoretical and methodological improvements. This study aimed at mapping the main gaps in S-LCA to identify potential contributions from the Psychology field. A preliminary literature review indicated several constraints: consensus between social indicators; methods for measuring subjective data; predominance of secondary data; underutilization of the Social Sciences, etc. Therefore, this study outlines multiples intersection points where the Social Sciences, more specifically, psychology could contribute to filling some of the theoretical and methodological gaps in S-LCA.

KEYWORDS: social life cycle assessment, social impact, sustainable development, labour psychology, transdisciplinarity

Avanços à Avaliação Social do Ciclo de Vida: Contribuições Teóricas e Práticas

RESUMO – O desenvolvimento sustentável ocorre por três pilares: preservação do meio-ambiente, produção com custo econômico eficiente e desenvolvimento humano. Nesse contexto surge a Avaliação do Ciclo de Vida (ACV), que determina métodos para avaliação de impacto de produtos e serviços. A ACV Social (ACV-S) é uma abordagem em desenvolvimento, requerendo avanços à plena aplicação. Este estudo objetivou mapear as principais lacunas teórico-metodológicas da ACV-S para a identificação convergências com a psicologia. A revisão da literatura indicou diferentes lacunas: consenso entre indicadores sociais; métodos para mensuração de dados subjetivos; primazia de dados secundários; subemprego das Ciências Sociais etc. Assim, este estudo apontou pontos de interseção onde as Ciências Sociais, especificamente, a Psicologia poderá contribuir para preencher algumas das lacunas teórico-metodológicas da ACV-S.

PALAVRAS-CHAVE: avaliação social do ciclo de vida, impacto social, desenvolvimento sustentável, psicologia do trabalho, transdisciplinaridade

In contemporary society work has assumed an undeniable importance, being a source of discussion and study for its understanding. Working implies profound contrasts between opportunities for human emancipation and the ills that lead to subsequent tribulations in the occupational context. This scenario is the product of a society that bases its production and subsistence models on capitalism which, in turn, reasserts and endorses diverse contradictions in society and the world of working organization. The rationale of capitalism implies the maximization of profit and, as a result, rampant production.

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** E-mail: arij.chabrawi@gmail.com

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For this, it requires the unbridled use of natural resources, the exploitation of human labour and, consequently, prescribes a perverse, continuous dynamic of the often-needless distribution of these products (Cattani, 2004).

In the context of these contradictions, some researchers have brought forth concerns in relation to the production and life models that are sustainable, and which promote both material and non-material well-being for present and future generations. It has become necessary to rethink and reengineer the models of production, life and labour in today's society, from an integrated and holistic perspective. Thus emerges Life Cycle Assessment (LCA), a method for assessing the environmental, economic and social impacts associated with a product or service along their life cycle (Vigon & Jensen, 1995).

The merits of using LCA lie in the collection of data which generate indicators of economic, environmental and social impact. The results of a LCA study have been adopted globally as inputs for decision-making process of governments and corporations, both in terms of public procurement and restrictions to import of products that generate negative impacts on the environment, economy or individuals (Benoît & Mazjin, 2009). The seminal initiative in this area was the environmental assessment method, proceeded by the economic dimension, incorporated later. As for the social dimension, this only emerged several decades later with researchers from the exact sciences and, therefore, conforming to the same process flow framework found in the environmental and economic approaches.

In 2009, the United Nations Environment Programme (UNEP) and the Society of Environmental Toxicology and Chemistry (SETAC) developed guidelines for the design of the social assessment method. Despite this, various authors have pointed out, over the years, that there has been little progress on the development of scientific instruments capable of evaluating the subjective perceptions of individuals in the context of work (Ciroth & Franze, 2011; Molnar & Waldekker, 2014). Along the same lines, Ugaya et al. (2015) highlighted practical limitations such as the difficulty in collecting primary data and the guarantee of the reliability of information.

In 2020, an update of the guidelines was published covering numerous advances in terms of the assessment scope, methodological finetuning, and impact assessment approaches (UNEP, 2020). Tokede and Traverso (2020) indicated that, despite the efforts made to update the Guidelines for Social Life Cycle Assessment of Products and Organizations (UNEP, 2020), there are still many challenges to the full implementation of a Social LCA (S-LCA) case study based on what is recommended in the document.

Many authors have asserted that the S-LCA framework is still not yet being fully implemented (Ciroth & Franze, 2011; Dreyer et al., 2006; Moltesen et al., 2018; Tokede & Traverso, 2020). Moreover, these authors also speak of the subsequent difficulty in using the results of S-LCA studies as the criterion for the preference of goods and services with less prejudicial and more beneficial, social impacts (Moltesen et al., 2018; Tokede & Traverso, 2020).

The initial guidelines, published in 2009, had already foreseen the need to involve other areas from the social sciences in the development of the methodology and the bridging of the theoretical gaps in the area. However, since then, few social scientists have become involved in S-LCA case studies. The bridge for the exchange of knowledge is still under construction, and S-LCA is still being developed and promoted by researchers from the natural and exact sciences (Moltesen et al., 2018). Lastly, the authors indicate that acknowledging its "social" standing may be a viable path to the S-LCA completeness, and that the transfer of knowledge from these sciences may be the way to potentialize the advancement of the S-LCA by means of a review of concepts, the use of consolidated research methodology, the collection of data and an integrated redefinition of the various social impact categories (Moltesen et al., 2018).

Considering the gaps that still abound in the area, the fundamental contribution that social scientists can bring to this field, both theoretically and methodologically, can be envisioned, that have been evolving throughout the centuries of history these areas possess. As far as the field of psychology is concerned, the enormous potential that this area can and must transfer to S-LCA should be highlighted as essential inputs to the catalyst of its development. Currently, it is not uncommon to observe a bare minimum of intersection between the above mentioned areas. In a study conducted in February 2022 on the Thesis and Dissertation Database maintained by the Coordination for the Improvement of Higher Education Personnel (CAPES), no studies were found that referenced the use of psychology's theoretical or methodological framework to the area of Social LCA in Brazil.

Also in February 2022, a search was conducted of Google Scholar, which indexes a variety of databases of international repute and, principally, the journals most germane to LCA. The inquiry associated the descriptor "*social life cycle assessment"* paired with: "*social psychology"*, "*labour psychology"*, "*labor/labour psychology"*, "*work psychology"*, "*organizational psychology"* and, lastly, "*psychology"*, resulting in just five studies. The paired searches of the descriptors "*psychometrics*", "*labor/labour"* and "*work psychology"* associated with "*social life cycle assessment"* yielded no articles at all. A search in association with "*social psychology"* returned 12 articles, however, on analyzing the titles, abstracts and introduction, it was found that none of them employed psychology-related theories and methods in the area of the S-LCA.

In this regard, the aim of the present study was to map the main theoretical and methodological gaps of the S-LCA as a means to identify areas of convergence and potential contributions that the field of psychology might bring to the development and applicability of the S-LCA. The

following specific objectives were outlined: contextualization about work in present-day Brazil and its idiosyncrasies; contextualization of sustainability and LCA; introduction of the promising proposition of S-LCA as a method for evaluating social impact; presentation of the main theoretical and methodological gaps in the S-LCA and, lastly, the identification of areas of convergence between the S-LCA and psychology, proposing concrete orientation about where transdisciplinarity may serve as a catalyst for the development and advancement of S-LCA. As a contribution, we expect to elucidate the importance of bringing S-LCA closer to Social Sciences, more specifically psychology, to encourage the exchange of theoretical and practical knowledge between the two areas.

WORK IN CONTEMPORARY SOCIETY

Work is hereby understood to embody the definition proposed by Marx – a category intrinsically linked to human beings, an activity conducted with the aim of creating use-value and appropriating elements natural to man's needs. Moreover, work is understood to beprerequisite for the material exchange between man and nature, as well as an eternal, natural condition for human life through which man evolves into a social being (Marx, 1983/2008).

Numerous forms of work have been adopted by humanity since the age of pre civilization: hunting and foraging, working to pay off debts, punishment, captives of war, feudal work, (pre) industrial, and ultimately arriving at work as we know it today. Starting with the maxim that work is the transformation and accommodation of nature for our own benefit, it may be said that it has always been a part of human life to maintain and produce the means of material life, regardless of the models of production (Marx & Engels, 1974/2001).

However, far more than producing mere material things, work is a means of psychosocial experience that invades and dominates the space and time in which man does not just subsist, by satisfying his basic needs, but also provides support for identity development, inclusion and social emancipation. Thus, work emerges as a source of identity, self-esteem, a feeling of social participation and belonging, as well as a source of development of human potential (Chabrawi, 2015).

The undeniable centrality of work to man is highlighted as a link that transforms his reality, producing identity, well-being and social cohesion (Cattani, 1996). Nonetheless, it is known that this is not the only side that work reveals. Based on the early production models of the industrial revolution, and traversing manufacturing models such as Taylorism and Fordism, dictated by the current capitalist model of production, work has unveiled an infinity of obscure forms of exploitation, humiliation, degradation and annihilation, in other words: uncountable forms of suffering for the worker.

Capitalism, during the contemporary, neoliberal model of production, generates numerous contradictions. On the one hand, in the situation of work, it enables humanization, emancipation and sociability to coexist, while on the other, it reveals its more sordid side by imposing the dictates of the capitalist doctrine of profit maximization, worker exploitation and denial of human rights. If that were not enough, neoliberalism sustains the creation of a staggering number of unemployed, job insecurity and the erosion of the longstanding symbiotic relationship between man and nature (Antunes, 2006).

Antunes (2001) lists the diverse ills that the contemporary world of work has engendered in the logic of present-day society: (i) enormous increase in the manufacturing and services subproletariat that has become referred to globally as precarious labour; (ii) significant increase in female workers, corresponding to over 40% of the workforce in developed countries, but which has been incorporated into the universe of precarious and deregulated labour; (iii) exclusion of youngsters and older people from the labour market in the core countries; and lastly, (iv) premature and illicit inclusion of children in the labour market, mainly in Asian and Latin American countries. Without exception, the list of impacts set out by Antunes (2001) is corroborated by the socioeconomic data of the contemporary world of work in Brazil.

Broadly speaking, in today's Brazil, an alarming socioeconomic situation is evident. Data from the National Household Sample Survey for the fourth quarter of 2021 (IBGE, 2022) indicate a rate of unemployment of 11.1% among people aged 14 or over. This rate represents those that belong to the country's workforce, but who are unemployed, amounting to a rate of worker underutilization of 18%, the worst indices being among women and blacks.

According to the Brazilian Institute of Geography and Statistics (IBGE, 2022), in terms of employers, the private sector accounts for 34.4 million people enrolled on the national employment register and 12.4 million unregistered, while the public sector employs 11.3 million people. As for those who, in 2020, contributed to the National Social Security scheme (INSS, 2021), they correspond to 52.36 million people, equating to just 54.6% of the total of those in work. Bearing in mind that in the 1940s, the decade in which the Consolidated Labour Laws (CLT) were established, 10% of workers were covered by the CLT (Pochmann, 2019). More than 75 years later, the percentage of those in work and duly registered is still tellingly small.

Informal workers, on the other hand, represent 43.2% and include unregistered workers (12.4 million), unregistered domestic workers (4.3 million), employers not enrolled in the National Registry of Legal Entities (750,000), unregistered family businesses (19.5 million) and auxiliary family

workers (1.9 million) (IBGE, 2022). These data reflect the huge contingent of Brazilians potentially deprived of a guaranteed wage, welfare, social security and other rights and guarantees, even though they are in work. As regards the average working wage, the disproportionate gap between men and women persists, the latter earning 22.5% less than men (IBGE, 2020).

The Historical Database of Occupational Accidents from the Ministry of the Economy (ME, 2022) maintained by the Special Department of Social Security and Labour indicates that, between 2014 and 2021, there were 4,618,616 cases of work-related accidents in Brazil, occupying fourth place in the global ranking, 16,932 of which were fatal. The three most common causes, in descending order, are: individuals being struck by objects, self-inflicted accidents, and falls due to differences in levels, which denotes a failure to adopt the appropriate occupational health and safety measures.

The data concerning child labour are no more reassuring. Of the 38.3 million children and adolescents aged between 5 and 17, two million undertake economic or self-consumption activities, of whom 1.78 million are involved in child labour. Of these, nearly 40% are classified as being in the "worst forms of child labour", engaged in activities such as drug trafficking and prostitution. There are 377,000 children aged between 5 and 13, 442,000 between 14 and 15 and 950,000 teenagers, aged between 16 and 17. Of this total, 66.4% are male, 66.1% are black or brown, and 86.1% are in school.

However, among the total population of children and adolescents aged between 13 and 17, school attendance was 96.6%. This disparity is indicative of the negative impact of child labour on school attendance. Moreover, in terms of working hours, 42% of children and adolescents aged between 5 and 17 worked up to 14 hours a week, 26.6% between 15 and 24 hours, 15.3% from 25 to 39 hours and, lastly, 16% worked 40 hours or more (IBGE, 2019).

Since 1995, work analogous to slavery has been monitored via an initiative between the Ministry of Labour and Employment (MTE), Public Ministry of Labour (MPT), Federal Police (PF) and the Federal Highway Police (PRF). In total, 22,020 operations have been carried out, inspecting 5,379 establishments across Brazil. The results culminated in 55,004 people in situations of work analogous to slavery being set free, with a decreasing curve of cases over the years, represented by the 30% of individuals set free in 2019 versus 2009. As for people trafficking for work analogous to slavery, 1,223 cases were recorded between 2017 and 2020 (ME, 2021).

Analyzing the waves of job flexibilization and insecurity in Brazil, Pochmann (2019) addresses the so-called third wave that unfolded in the 1990s in governments with neoliberal leanings. Within them, measures giving freedom to hire workers via arrangements that fell short of the requirements established by the Consolidated Labour Laws (CLT) became more widespread. As a result, infinite precedents were established for the outsourcing of contracts during burgeoning unemployment, and for labour relations in general.

The analysis of Pochmann (2019) continues with a fourth wave in which an intensification of the flexibilization of social and employment laws took place – a fact which culminated in a worsening of the abandonment and vulnerability of workers. One tangible fact that bears witness to this scenario is the global generalization, now, in the 21st century, of the so-called uberization (Pochmann, 2019) and *pejotization***1** of work. Such phenomena are known for their irregular payments to the workforce, free from labour-related commitments, welfare and social security.

Despite the supple nature of uberization, this flexibility only appears to be reflected in the rights of workers. Regarding labour-related rules and the organization of work, the daily struggle for income and meeting of targets – covert or imposed – culminates in gruelling working hours that very often do not include lunch breaks, daily or weekly rest periods or nightwork bonuses. Of course, the strain and attrition on the worker come at the price of his/her health and well-being, not only for the individual but also his/her family (Uchôa-de-Oliveira, 2020). This scenario endorses informality in the labour market, undermines the socioeconomic conditions of the workforce who survive on monthly wages and is even more aggravated by the exclusion of trade unions in the negotiation of labour relations, as the lack of an employment relationship between owner and employee precludes any discussion.

Therefore, this context contributes even more to the stripping away of the level of organization and protection of workers within their own social articulation basis. The direct dependence on income, combined with the non-payment of social benefits, the absence of paid rest, among other breaches of human rights in the area of labour, result in a situation of socioeconomic vulnerability. Public funds designed to finance social security are weakened (Pochmann, 2019), and labour finds itself in a situation of atrophy and precariousness. This scenario affects head-on the worker's human condition and impacts the social machinery that seeks to promote a fairer and egalitarian socioeconomic development for all.

1 Pejotization is an unofficial anglicization of the Brazilian Portuguese word *pejotização*. It refers to the contracting of services performed by individuals, in a subordinate, repetitive and costly manner, carried out by means of a legal entity, in an attempt to circumvent any employment relationships, in contravention of article 9 of the Consolidated Labour Laws (CLT), for violating constitutionally guaranteed rights as well as the principles of human dignity and the social appreciation of work (see https://unindustria.ind.br/en/blog/18-ebook-outsourcing-vs-pejotization).

SUSTAINABILITY AND LIFE CYCLE ASSESSMENT

Capitalism is not just a model of production but also of existence itself where the stimulus to consumerism is one of the driving forces that promotes and permits the distribution of production. Harvey (2006) highlights that we live in a world in which the logic of production and distribution of goods is underpinned by an emphasis on instantaneity and disposability. Natural and human resources are being exhausted to maintain the perverse dynamics of profit and accumulation of wealth. In this scenario, movements emerge comprised of scientists concerned with the sustainability of consumption and production.

The concept of sustainability was originally defined by forestry science, determining that one should never take more out of nature than its natural replacement rate (Wierson, 1995). Analyzing sustainability, Kuhlman and Farrington (2010) recall that, since the time of our ancestors in the Palaeolithic era, there has been a concern with extinction of prey, an apprehension about the depletion of natural resources, subsequently passed down to other generations, merely with shifts in its focus.

In their analyses, researchers advanced and repeated the question that has spanned many eras: "How can the patterns of production, consumption and the global economy be reconciled with the scarcity of natural resources?" (Kuhlmann & Farrington, 2010, p. 3438). The answer lies in the need to create a form of development that includes sustainability on its principal axis, meeting the demands of the current generation, without compromising the ability of future generations to meet their own needs, as portrayed before in the Brutland report, when defining sustainable development (Brutland, 1987).

In this regard, the notion of sustainability extends beyond environmental aspects, the argument being that the focus should be on human well-being and transgenerational equality. The concept of sustainability cases to have a single focus and becomes multifocal, viewing human well-being from an environmental, economic and social perspective (Kuhlman & Farrington, 2010). In the same direction, Benoît and Mazjin (2009) stated that the primary objective of sustainable development is human well-being, contributing to supplying the necessities of present and future generations.

In the wake of discussions about sustainability and sustainable development in the middle of the 1970s, a movement of environmentalists, apprehensive about the depletion of natural resources, created industrial ecology and LCA as a technique for measuring the environmental impact of products (Benoît & Mazjin, 2009). LCA is a tool for assessing the environmental consequences associated with a product, service, process or material along their life cycles – ranging from the extraction and processing of raw materials to final disposal, in order to assess the associated environmental impact (Vigon & Jensen, 1995).

LCA technique was consolidated and standardized by the International Organization for Standardization (ISO), through the norms 14040-44. At the present time, there are various working groups of scientists and researchers, on all the continents, dedicated to developing and enhancing the method for application to all types of products and services.

LCA is a technique designed to produce indicators for the assessment of impact, comprising all manufacturing stages of a given product – ranging from the extraction of the basic raw materials of nature, which enter the production system (cradle), to the transportation of all the materials through the supply chain, until the final product offer and use (ISO 14044). Similarly, LCA also considers disposal, maintenance, reuse and recycling of the product, verifying and measuring all inputs and outputs in nature.

It is an iterative method consisting of four essential phases: 1) definition of goal and scope: delineation of objectives, scope, study boundaries and the definition of the functional unit; 2) inventory analysis: collection of data on the product system so as on the inputs and outputs considered relevant in this phase 1; 3) impact assessment: using data collected in phase 2 to specifically evaluate potential impacts; 4) interpretation: the results of each of the previous phases are combined for an interpretative analysis of the convergent findings from the study, considering the goal and scope outlined in the initial phase (ISO 14044).

The environmental approach (LCA) has generally been used to measure the effects of a product or process on the environment. It enables companies to understand which of the links in their production chain are efficient and where they can be improved to diminish the negative impacts on the environment (Benoît & Mazjin, 2009).

Accordingly, LCA is one of the tools used to produce and issue environmental labelling of products and services, certifying those that are environmentally efficient. It can: (i) provide guidance on consumption and the making of decisions by ordinary citizens on the supermarket shelves around the world, (ii) help companies promote the association of their brand with "green" materials and products and, lastly, (iii) instruct governments by means of public procurement and the regulation of imports. By virtue of its holistic, systemic and rigorous perspective, LCA is the preferred technique for gathering information about the potential and actual impacts of products and services along their life cycles, measuring material flows, energy and the economic aspects (Benoît & Mazjin, 2009).

SOCIAL LIFE CYCLE ASSESSMENT: PURPOSE AND APPLICATION

LCA has expanded over the years and its holistic perspective has comprehended the understanding of the impact caused by products to society, encompassing other dimensions: the economic (Life Cycle Cost – LCC), and the social approaches. Likewise, they also entail sustainable development, human well-being, sustainable consumption and production as well as the social responsibility of organizations, driven by the social, economic and environmental techniques for assessing their respective impacts.

Relating to impact assessment, LCA focuses on the impact on the environment regarding economic activities and natural resources and, to a lesser extent, the impact on human health. LCC is a tool developed around two decades ago and focuses on direct costs and the benefits of economic activities. Last but not least, S-LCA is the earlier approach, created to complement the tripartite and holistic perspective of sustainable development. For this reason, S-LCA has only attracted scientific interest in recent decades (Dreyer et al., 2006). In the same way, it is noteworthy the interchangeable relation between the tripartite approach for sustainability assessment and the triple bottom line construct that expanded the environmental agenda of sustainability, comprising also the economic and social lines (Elkington, 1997).

In order to attempt to parametrize the method for measuring the social impacts related to a product or service, a group of researchers experts in LCA was formed in 2009 and created a document consisting of guidelines for designing and applying the S-LCA method, entitled Guidelines for Social Life Cycle Assessment of Products. These initial guidelines considered five stakeholder groups as the scope of analysis, namely: Workers, Local Communities, Society, Consumers and Value Chain Actors. In addition, six impact categories were established: Human Rights, Cultural Heritage, Governance, Socioeconomic Repercussions, and Health and Safety (Benoît et al., 2009).

The S-LCA method has an intrinsic relationship with those developed for the E-LCA and LCC, underpinned by ISO standards 14040 and 14044, as well as the principles defined in ISO 26000 relating to Corporate Social Responsibility (Kühnen & Hahn, 2017). However, while the E-LCA and LCC work with the quantitative flows of inputs and outputs in production processes, S-LCA maintains an organizational approach to the collection of quantitative and qualitative data of interest.

Additionally, S-LCA outlines two types of impact: Reference Scale Approach and Impact Pathway Approach. The new Guidelines (UNEP, 2020) presents six stakeholder groups established as the scope of analysis and the respective subcategories that guide the topics for data collection. For the sake of presentation and regarding the update of the scope of the S-LCA, the stakeholder groups and their respective subcategories have been amended, as described below.

In the Workers subcategory, the last three topic subcategories below have been added: 1) freedom of association and collective bargaining; 2) child labour; 3) forced labour; 4) fair salary; 5) working hours; 6) equal opportunities and discrimination; 7) health and safety; 8) social benefits and social security; 9) sexual harassment; 10) employment relationship; and 11) smallholders, including farmers. As far as the Consumers category is concerned, no changes were made to the five original subcategories: 1) health and safety; 2) feedback mechanism; 3) consumer privacy; 4) transparency; and 5) end-of-life responsibility.

Similarly, the Local Community stakeholder group did not undergo any alteration, possessing nine subcategories as follows: 1) access to material resources; 2) access to immaterial resources; 3) cultural heritage; 4) safe and healthy living conditions; 5) respect of indigenous rights; 6) community engagement; 7) local employment; 8) secure living conditions; and 9) delocalization and migration. Society included two new subcategories (6 and 7 below), making a total of seven: 1) public commitments to sustainability issues; 2) contribution to economic development; 3) prevention and mitigation of armed conflict; 4) technology development; 5) corruption; 6) poverty alleviation; and lastly, 7) ethical treatment of animals.

The scope of Value Chain Actors stakeholder group was expanded from four to five subcategories: 1) fair competition; 2) promoting social responsibility; 3) supplier relationships; 4) respect of intellectual property rights, and 5) wealth distribution. Finally, a new stakeholder group was created, namely "Children", which comprises three subcategories: 1) education provided in the local community; 2) health issues for children as consumers; and 3) children concerns regarding marketing practices.

Thus, S-LCA is not just limited to presenting conclusions on the social performance of organizations. Based on its holistic approach, it can help businesses identify the extent and frequency of practices that either surpass or fall short of the established standards of respect for human rights, working conditions, health and safety, as well as other socioeconomic repercussions (Benoît & Mazjin, 2009). The benefits of the results of the S-LCA can be extended both to organizational practices and to the lives of all the stakeholders in the production chain, encompassing workers, consumers, suppliers, as well as the local community and society in general.

Consumers are now questioning the socioeconomic circumstances in which a product is assembled. For their part, companies do not wish to be associated with child labour or corruption, whether it occurs within their organization or in their supply chain (Benoît & Mazjin, 2009). Accordingly, S-LCA approach has become a driver for social and individual

transformation to strengthen and create solid bases for sustainable human development, in harmony with the other lives that make up its environment, in an inclusive, inspiring, egalitarian and positive way.

At the beginning of the study, the goal, scope and functional unit should be defined, detailing which stakeholder groups and subcategories will be considered and what are the limits or boundaries of the study. It should be stressed that not all S-LCA studies consider the functional unit as a parameter for the data collection and subsequent assessment of impact (Moltesen et al., 2018), since a direct relationship cannot be fully established between social impacts associated with the volume of production and/or acquisition and use of the product and/or service at stake (Hosseinijou et al., 2014).

Proceeding to the phase of the life cycle inventory, in which the data relating to the processes in the production chain will be mapped, information may be collected from primary data (specific) by obtaining data directly from the subjects or locality in question; or secondary data (generic) from the literature, aggregate or average data of a company, state, country, region or even economic sector (Macombe et al., 2013). The data relating to the type of impact to be assessed are then gathered, within the six aforementioned categories, proceeding to the selection of the method for impacts' assessment. Lastly comes the interpretation with the summary of all the results of the previous actions.

Based on the description of the phases of an S-LCA study, the second phase, involving the procedure of data collection, is incontestable and of the utmost importance, as it forms the substrate of interest which will contain the measures for assessing the impact and subsequent interpretation of the study's findings. Along the same lines, there is a predominance of primary data over secondary data as they more faithfully represent the reality of the situations evaluated, together with the actors directly involved (Tokede & Traverso, 2020).

First comes the gathering of absolute or average data representative of the production link in the chain that corresponds to a particular product or service. They may be qualitative, quantitative or semi-qualitative (Benoît et al., 2013). The next phase is the production of indicators based on the data collected, to be subsequently incorporated into one of the corresponding impact types (Benoît & Mazjin, 2009). However, it is necessary to conceptualize the terminology and procedures for impact assessment in the LCA.

For Wu et al. (2014), the indicators act as a bridge that provides a connection between the data and the impact assessment, guiding the process of data collection. Based on an extensive literary review of articles in the area of S-LCA ran by Wu et al. (2014), the authors found out that generally indicators are developed as a direct measure of particular social issues, rather than indirect indicators. This may result in mistakes and blind spots as some direct indicators are not capable of explaining the complexities associated with social issues, given their subjectivity (Wu et al., 2014).

In agreement with Wu et al. (2014), the S-LCA guidelines document published in 2009 anticipated that the researchers would have to incorporate a broad spectrum of qualitative data as they believed that, given the subjective nature of the social topics, quantitative data would be in short supply and would not address all the social problems in question. The authors follow the rationale with the example of the inadequacy of quantitative data collection in respect of people who earn the minimum wage, without inquiring into discrepancies in respect of job function, wage equality and subsistence conditions (Benoît & Mazjin, 2009).

Macombe et al. (2013), on the other hand, do not really discuss the types of data collected. Nevertheless, they explain that the real impact arising from the social and work practices of an organization is difficult to measure as it may touch on the measurement of the direct effects of situations imposed by organizational dynamics. These, for their part, should be considered as the social performance of an organization.

Therefore, Macombe et al. (2013) refer, for example, to the eleven subcategories of the "Workers" stakeholder group (freedom of association and collective bargaining, child labour, etc.) as the social performance of the organization. In the proposed flow, we initially have the data and/or indicators in respect of one or more subcategories, that create a direct effect on the workers, where the impact is just a consequence of the effect caused.

SOCIAL LIFE CYCLE ASSESSMENT: THEORETICAL AND METHODOLOGICAL LIMITATIONS AND GAPS

Following the publication of the guidelines for S-LCA of products, numerous researchers have attempted to put the guidance into practice in terms of impact assessment but have encountered a number of obstacles and methodological gaps preventing the full application of S-LCA. One of the main reasons relates to the method having been developed based on the E-LCA framework, an area intrinsically divergent from the social one, being essentially quantitative where impact may be causally and directly attributed (Lagarde & Macombe, 2012; Wu et al., 2014). Although a relatively new method, the imminent need for approaches that include the social dimension have given rise to a rapid increase in interest and the development of studies that bridge the theoretical and practical gaps in the S-LCA (Macombe et al., 2013).

With the aim of clarifying the approach and to better instruct researchers as to data collection and creation of S-LCA indicators, UNEP and SETAC published The Methodological Sheets for Sub-categories in Social Life

Cycle Assessment (Benoît et al., 2013). However, the manual was, for the most part, limited to a description of the potential sources of generic data and several (frequently qualitative or semi-qualitative) indicators containing vague suggestions of how to calculate them. Finally, the Methodological Sheets did not present any recommendations for scientific instruments or procedures for measuring subjective information using quantitative methods, in order to set an objective design of reliable indicators.

For Kühner and Hahn (2017), even though S-LCA satisfies the principles of some of the ISO standards, they merely propose generic criteria for the performance of studies assessing the social performance of organizations. As a result, several researchers have questioned the applicability of the standards and recommendations in the theoretical framework of LCA. Even so, they have not been able to reach a consensus about which indicators to apply as there is a lack of empirical experience in data collection and handling for the sustainable and social performance measurement throughout the production chain's life cycle (Kühner & Hahn, 2017).

Despite the existence of defining documents produced by UNEP and SETAC (Benoît & Mazjin, 2009; Benoît et al., 2013), and various initiatives by researchers trying to bridge the theoretical and methodological gaps in the S-LCA (Macombe et al., 2013), the area is still in development (Kühner & Hahn, 2017). There is still no consensus as to the indicators that should be employed to assess social performance (Traverso et al., 2012) and, consequently, there is a fragmented field in terms of procedures, methods assessment tools (Arcese et al., 2018).

In an extensive systematic papers review focusing on running S-LCA studies, Kühner and Hahn (2017) found that approximately 63% were composed of empirical works. Of these, 50% employed an essentially quantitative approach versus 13% qualitative. However, the authors signaled that the scope of the quantitative indicators when assessing social performance of organizations is questionable, as they address subjective themes and, potentially, qualitative indicators are being neglected due to the ease of obtaining quantitative data. Therefore, the authors recommend running interviews with those actors involved in each topic, for a proper drilling down in the areas under assessment, based on the worldly perceptions and subjective experiences of the individuals concerned (Kühner & Hahn, 2017).

As for the six stakeholder groups in S-LCA, the one that has the greatest ease of access and assessment is Workers. As a result, this is the stakeholder with the greatest coverage in S-LCA studies (Macombe et al., 2013), primarily regarding the subcategory health and safety (Kühnen & Hahn, 2017). This shows that this stakeholder may potentially be the link in the chain that suffers the greatest consequences as a result of the positive or negative policies that the working organization generates.

Nonetheless, it is possible to find myriad studies that use methods involving the collection of secondary rather than primary data (Molnar & Waldekker, 2014). This is due to several factors such as: being less expensive, ease of access to data (Benoît & Mazjin, 2009) and, mainly, the scarcity of scientific instruments for specific data collection related to S-LCA (Ciroth & Franke, 2011).

In the same line of Macombe et al. (2013), Kühner and Hahn (2017), concluded that S-LCA requires greater technical robustness regarding the understanding of social performance assessment throughout the corporate production chain and life cycle and, primarily, the expansion of the methodology and procedures in terms of strategies for collecting qualitative data. The authors also predict potentially surprising contributions from scientific fields yet barely explored by S-LCA that, quintessentially, use approaches for assessing qualitative and subjective data (Kühner & Hahn, 2017).

Moreover, since 2009, the S-LCA guidelines already predicted this need and recommended to practitioners the development of research tools and the gathering of data that would facilitate and accelerate the completion of S-LCA studies (Benoît & Mazjin, 2009). Five years later, Wu et al. (2014) endorsed the criticality methodological gaps regarding the collection and data types to be mapped for the proper application of S-LCA.

Lastly, Macombe et al. (2013), following an also extensive systematic review of studies in the area, concluded that the full completion of an S-LCA study is still not feasible, lacking theoretical, practical and methodological elements. The authors predict that there is still much work to be done before all these gaps are bridged and to become possible to rely on robust procedures for the performance assessment of products and services in the organizational context.

Despite the countless limitations that the full application which S-LCA continually faces, Hosseinijou et al. (2014) also conducted a broad review on S-LCA works published up to that point and concluded that the area has gradually developed as a theoretical and practical field over the years, since it first appeared. Hosseinijou et al. (2014) are in agreement on the gaps reported by the other authors who undertook similar reviews (Macombe et al., 2013), but they reiterate, in various excerpts, the validity of the method and the importance of the holistic perspective for the enhancement of the processes and dynamics of organizations, of labour and of social development.

After more than ten years of research, case studies and the development of the method, UNEP updated the aforementioned Guidelines for Social Life Cycle Assessment of Products and Organizations (2020), considering a wider scope of stakeholder groups, as well as the respective impact subcategories. However, authors have already pointed out the theoretical and methodological limitations in the document and signalized the inherent need for specific methods recommendations for data collection to the due viability

of case studies, as well as a better design for social impact models (Tokede & Traverso, 2020).

In short, S-LCA was developed based on the assumptions, principles and rules of their predecessors (E-LCA and LCC) aiming at reaching an indicator of sustainability that would bring the three dimensions together based on equivalent methodologies. However, as the E-LCA and the LCC consist of quantitative measurement approaches and the modeling of direct, causal impact based on long-standing and valid theoretical frameworks, the various procedures that apply to the last two types are not entirely applicable to the social perspective given the nature of its essentially subjective, dynamic, and qualitative scope, far removed from the exact social sciences.

Bearing in mind that S-LCA was born out of the core of its predecessors and, mainly, through the hands of engineers, environmentalists and economists, it is only natural to conclude that, possibly, some of the theoretical and methodological discrepancies in the area are due to the need to construct new bridges of practical and conceptual understanding to other applied social sciences and human sciences. These fields of knowledge have, for a long time, prioritized the conceptualization and development of social theories and specific tools for the collection, processing and modeling of data. They have deployed methods for measuring phenomena, whether subjective or objective, in order to grasp social realities, develop diagnoses and/or establish impact models.

CONCLUSION

It is undeniable that the world of work and society in general suffer from a variety of socioeconomic scourges. Social inequality in terms of access to basic resources such as education and work are reflected in an alarming unemployment context, work analogous to slavery, child labour, reduction or nullification of workers' rights and fragilization of the employment relationships, as well as the other aspects that highlight the enormous precariousness in the world of work and society in general.

LCA emerged out of the global wake of unfettered production and consumption and the extreme socioeconomic vulnerability of the majority. It is a method for assessing the sustainability of products, services and organizations with a holistic perspective of natural, economic and social resources, focusing on human well-being in a fair and equitable way.

Given the above, the social importance of S-LCA is clear. It addresses themes of exceptional criticality, whether for the worker in the organizational context, whether for consumers who seek for improvements towards a more sustainable consumption, or whether a company meets children well-being, and poverty alleviation, for instance. Certainly, these topics are of paramount importance and convergence for a society that seeks human well-being and social equilibrium.

As previously mentioned throughout the present study, LCA is a structured method endorsed by various researchers across the world in the areas of environment and the economy, both because of their precedence and because they are quantitative approaches capable of better accommodating generic data. As for the S-LCA, it still faces several challenges, principally because it requires mostly qualitative, subjective and primary data.

Among the theoretical and methodological boundaries agreed upon by the majority of S-LCA researchers, there is an undisputable need to consolidate concepts and terminologies (Benoît et al, 2009). Most of the S-LCA studies are being spearheaded by the same researchers from other areas of LCA, the majority of whom are engineers and economists. Therefore, the matters addressed in S-LCA may lack of theoretical inputs from the social sciences to enhance understanding and boost advancement – both from the perspective of understanding the phenomenon assessed and also to employ methodological designs consistent with the objectives and expected results.

Hence the proposal to create bridges that span the universes of the S-LCA and the various fields of knowledge related to Social Sciences. For instance, social, labour and organizational psychology could contribute with its framework and the widely adopted and scientifically validated practices to supplant the theoretical and conceptual gaps in S-LCA.

In conceptual terms, a wide theoretical structure can be found in topics specifically concerning labour, such as: work relationships, quality of life at work, health and safety, sexual harassment, cooperation and solidarity, diversity in organizations, recognition, among others. Theoretical uncertainties with regard to the object of the study are reflected in flaws in data collection procedures which, in turn, result in misleading diagnoses or analysis, the adoption of inaccurate intervention strategies and the possible intensification of the asymmetries of the situation at stake.

As far as the gaps in procedures and methods are concerned, the use of psychometrics and various instruments available on the market may be suggested, for example, the ones that measure different phenomena regarding not only the world of work and the consumer, but also other topics related to the human ethos, such as children and human well-being. Moreover, instruments not yet available in the marketplace may equally be developed in accordance with the particular needs for measuring and assessing the S-LCA subcategories, in order to evaluate subjective and also objective phenomena in reliable terms.

In the same vein, it is noteworthy the growing importance that the psychology of the consumer might offer in terms of research findings and knowledge, both in theoretical

and methodological scopes, by using the available means or adapting the measurement and interventions methods related to consumption patterns, customer satisfaction, customer health and security, among others. In addition, regarding children as a stakeholder, child psychology and the development psychology may expand the outlook for this individual, understanding them based on their idiosyncrasies and needs, in each single development phase, permitting a suitable and proper identification of assessment indicators.

It is known that the intersections and contributions of psychology extend beyond those mentioned above: there are countless areas that study the most diverse of social aspects such as migration and coping strategies, cultural heritage, environmental impact and man's living standards, the social responsibility of organizations, among others. It was listed here some of the areas of knowledge where psychology might be able to transfer and contribute significantly to advances in the theory and methodology of S-LCA, but not limited to the above. Other fields such as sociology, anthropology, social services, etc., similarly possess great synergy with that advocated by S-LCA and, likewise, the social scientists in these areas can and should contribute to its improvements.

Due to S-LCA being a branch of sustainable development and having an enormous intersection with the aforementioned approaches, emanating from the human sciences, carries the singular potential to be the big link between sustainability and the social sciences. S-LCA is not just a method for assessing social impact, but it is also a drive and the personification of what social sciences long for and advocate: socioeconomic transformation, the possibility of an informed decision-making regarding more sustainable products, services and organizations, and moreover, creating just and fair working and existence conditions, that promote and protect human rights and human well-being in any context.

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