Enhancing Social-Environmental-Economical Systemic Vision: Applying OLCA in a NGO

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Abstract Emmaüs International a non-governmental organization (NGO) in the social and environmental sector had practiced, since its foundation – now more than 60 years – the recuperation of objects that others consider as waste. This activity had allowed collecting the funds to help the needy giving them the means to find their dignity that society had taken. Nowadays, the modes had changed, and these recovery activities had made of Emmaüs movement a well-known actor against the non-controlled waste “an environmental actor” working in the reuse and recycling. Given its environmental focus, Emmaüs has interest in assessing the environmental impacts of its own activities throughout the whole value chain. Therefore, an organizational life cycle assessment (O-LCA) study had been conducted as a test in one Emmaüs community. The study was realized in the framework of the road testing of the UNEP/SETAC Guidance on Organizational Life Cycle Assessment. It is important to mention that the avoided burdens assessment is not part of the O-LCA method.

1 Introduction

The Emmaüs community Etagnières, as a non-governmental organization (NGO) in the social and environmental sector, is interested in assessing the environmental impacts of its own activities throughout the whole value chain. Therefore, an organizational life cycle assessment (O-LCA) study was conducted. The study was performed in the framework of the road testing of the UNEP/SETAC Guidance on Organizational Life Cycle Assessment [1, 2].

Emmaüs’ goals are of analytical, managerial and societal nature. The O-LCA study offer insights in internal operations as well as in other steps of the value chain, with a focus on wood board recycling. The results allow identifying environmental

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hotspots and set a reference for performance tracking over time. In a parallel study, the avoided burdens originated by the nature of the organization (recycling) will be analysed and compared with the results of the O-LCA. It is important to mention that the avoided burdens assessment is not part of O-LCA.

The study delivers the basis for environmental communications with stakeholders and reporting and allows showing environmental awareness with marketing purposes.

In general, the results of the study were analysed as an outcome of the road-testing phase of the Flagship initiative “LCA of Organizations” in the framework of the UNEP/SETAC Life Cycle Initiative and are publically available.

2 Materials and Methods

Using life cycle assessment (LCA) to quantify the environmental performance of products has become a global trend, since a comprehensive evaluation is achieved, considering all stages of the life cycle, as well as the different environmental problems, including the carbon footprint. The advantages and potential of LCA are not limited to a product application, and although the methodology was originally developed with this approach, its application at the organizational level is possible and is increasingly relevant.

The technical specification ISO/TS 14072:2014 Environmental management – Life cycle assessment – Requirements and guidelines for organizational life cycle assessment [3] describes the application of LCA with an organizational approach. In this way, it extends the application of ISO 14040 [4] and ISO 14044 [5] for all the activities of the organization, which means that the system evaluated covers the life cycle of the different products and operations within the same study.

O-LCA consists of the collection and evaluation of inputs, outputs and potential environmental impacts of the activities associated with an organization considered as a whole or portions of it, adopting a life cycle perspective.

ISO/TS 14072: 2014 provides details on:

- The application of LCA principles and methodology to organizations.
- The benefits that LCA can provide to the organization, using the methodology at the organizational level such as defining environmental aspects in the Environmental Management Systems ISO 14001: 2015, quantifying the environmental impact in an integral way and helping in strategic decision-making and prioritizing the actions that must be carried out to reduce the environmental impact of the organization.

O-LCA quantifies potential environmental impacts through a reporting flow, which is equivalent to the functional unit in a traditional LCA and is used as a reference. The system limits are defined by one of the following consolidation methodologies:

- Operational control
- Financial control
- Participation in shares (percentage of ownership)

In addition, O-LCA proposes two ways to perform data collection: the bottom-up approach and the top-down approach. In the first, the impact of the organization will be calculated with the sum of the LCA of each of the products it manufactures. This implies a collection of data broken down by product, which can be extremely complex for organizations with large portfolios. In the case of the top-down approach, the inputs and outputs of the system can be collected as a whole, by production plant (site) or even by business group. This approach eases the collection of information and allows disaggregation of the results according to the information needs of the organization.

O-LCA can be used as an input for environmental communication, especially for monitoring the environmental performance of the organization over time (performance tracking).

3 Results

3.1 *Goal and Scope*

The assessed organization was a local Emmaüs community, located in Etagnières, Switzerland, during 1 year from January 2015 to December 2015. The reporting flow was the annual sales expressed in mass (kg).

The system boundary considered a cradle-to-gate approach for the inputs and outputs necessary for each of the activities included, extended by considering the transport of sold goods by the costumers. The production and first use of products are not considered, as well as the use and end of life of the sold recycled materials. The activities considered are categorized into indirect upstream activities and direct activities. Supporting activities like the organization's buildings and employee commuting were considered. System boundary is depicted in Fig. 1.

3.2 *Inventory Analysis*

A top-down screening approach was used as first approximation to obtain a basis for future studies. Transport data is collected with higher granularity and disaggregated into trucks transport, direct donor transport and customer transport.

Energy data was disaggregated in energy production on site and electrical – solar.

Both generic and specific data were used. The source is on-site, from literature, statistics and databases. A data quality scheme was used with the following criteria:

Fig. 1 Emmaüs community system boundary

Table 1 Impact assessment results

Damage (Pt)	Direct activities	Indirect activities	Total
Climate change, human health	2294	11,594	13,888
Ozone depletion	0,000	0,004	0,004
Human toxicity	0,073	1513	1586
Photochemical oxidant formation	0,000	0,000	0,000
Particulate matter formation	0,543	1704	2247
Ionizing radiation	0,000	0,145	0,145
Climate change, ecosystems	1451	7336	8788
Terrestrial acidification	0,004	0,009	0,014
Freshwater eutrophication	0,000	0,008	0,008
Terrestrial ecotoxicity	0,003	0,021	0,025
Freshwater ecotoxicity	0,000	0,042	0,042
Marine ecotoxicity	0,000	0,008	0,008
Agricultural land occupation	0,000	0,493	0,494
Urban land occupation	0,000	0,095	0,095
Natural land transformation	0,000	0,409	0,409
Metal depletion	0,003	0,950	0,953
Fossil depletion	0,003	11,615	11,618
Total	4378	35,953	40,331

reliability, completeness, temporal correlations, geographical correlation and further technological correlation.

3.3 Impact Assessment

The impact assessment method ReCiPe Endpoint (H) [6] was applied. The main impacts have been detected in the categories climate change, human health and ecosystem followed by fossil depletion and particle matter formation. The impacts related to the transportation of sold materials represent an overall contribution of 41%. Impact assessment results are depicted in Table 1.

4 Discussion

The assessment with the ReCiPe Endpoint method allowed identifying environmental hotspots in the impact categories climate change, human health and ecosystem, followed by fossil depletion and particle matter formation. Electricity production, organization's buildings and transport of purchased goods are found being relevant activities. Actions to reduce transport-related impacts, such as selling points next to potential customers and online sales, are recommended.

The main limitations of the study consist in the exclusion of certain capital goods such as trucks and the boiler. The same applies for cleaning products, medicines, gardening products and personal care products that could be analysed in the future because of the potential effects of micropollutants. Facilities as kitchen, green and gardening areas were not included since they were already targeted in the framework of our food recuperation programme. Moreover, the use and end-of-life phase of the sold recycled products are not considered in this study.

Through O-LCA study, the hotspots could be detected. This could help improving the image of the community as a main actor regarding environmental activities. Emmaüs' study was a pilot and serves as example for other Emmaüs communities around the world. As first application in an NGO, Emmaüs' O-LCA experience has the great potential of being a landmark for environmental assessment activities among charitable organization.

5 Conclusions

O-LCA is useful in detection of the main environmental impact categories and their contribution concerning indirect and direct activities. A performance tracking of the mentioned activities could be established from this study on.

The study delivers the basis for the communication of "Sustainable Development Issues" with stakeholders (customer, services providers and partners) and reporting.

A basic model to apply the O-LCA methodology had been established in an Emmaüs recycling community that could be applied in other Emmaüs communities in the future.

The tools developed to apply this methodology were designed with the aim of supporting recycling communities around the world and the whole Emmaüs organization to evaluate and to reduce their environmental impacts in their own communities but also in the regions where they operate, thus positively affecting local development.

Further applications of the study are being considered. First, the data collected could be used in the future as environmental data basis for a formal Environmental Management System (EMS). Second, the Emmaüs community could serve as a pilot project as O-LCA is concerned. In fact, further recycling communities

worldwide could apply the methodology in the future, thus enabling an assessment of the whole organization or a broader part of it.

From this perspective, Emmaüs is a first mover in the NGO sector.

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